TAC ATTACK

AUGUST 1974

WAKE TURBULENCE
...Pg 16

TAC ATTACK AUGUST 74 VOLUME 14 NUMBER 8

AUG

Cover Art
TSGT John Tomkowski

FOR EFFICIENT TACTICAL AIR POWER

FEATURES

DEPARTMENTS

TACTICAL AIR COMMAND

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COMMANDER

LT GEN DALE S. SWEAT
VICE COMMANDER

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Angle of ATTACK

...FIRST IN LINE...

My time has come to PCS. As that time draws near, I can't shake one nagging, frustrating feeling. The statistic boards in my office tell me that during my 24-month tour, TAC had 49 major aircraft accidents, 48 aircraft destroyed, and 59 fatalities. The boards don't tell me why these accidents occurred, but I'm familiar enough with the causes to know that the majority of these grease-penciled numbers are due to one thing . . . human error . . . and that's the cause of my frustration.

It is difficult to know what part TAC's safety programs have played in accident prevention. It's not so difficult to realize that what we've done about the human factor in accidents is not enough – and although I've never been a pessimist, I feel our efforts may never be enough. "You can lead a horse to water . . . "

We can't afford more than one accident before we take action to prevent a similar tragedy. Our aim is to prevent all accidents, but until this lofty goal is reached, we must glean every bit of useful information from the accidents that do occur. We must learn from the other guy's mistakes so we don't repeat them. I've always believed in this approach and a good part of TAC's safety education program is devoted to the enlightenment of aircrews by telling them about the other guy's unfortunate experiences. This works only if effective two-way communications are developed between Safety types and "Blue Four," the young fighter jock, airlifter, crew chief, or gun plumber . . . the guy at the end of the line . . . "the last to know and first to go."

Our only hope of keeping Blue Four out of a smokin' hole is to keep him from getting into a situation from which recovery is doubtful. We can do this by insuring he is the first to know. Put Blue Four first in line, every time.

E. HILLDING, Colonel, USAF
Chief of Safety

JUST LUCKY

"Gear-up . . . flaps up . . . How about half a cup . . . black, please load."

Captain Sam Talbot, the IP right-seater, finished reading the after takeoff checklist as the loadmaster brought Major Nino Baldachi his coffee. The left seater engaged the autopilot, moved his seat back a couple of notches and fired up an El Ropo.

"It's gonna be great to hit the tables again . . . I figger ole 'lost wages' owes me about 400 bucks. When I heard about this Nellis trip, I used all the influence and persuasion of my high position to get on the orders. How'd you get so lucky, Sam?"

"Well, to tell the truth, I didn't even ask for it. They said they needed an IP and here I am."

Major Baldachi took a sip of his coffee, winced, and stuck the cigar back in his mouth.

by Maj Joe Tillman

"I wonder why they need an IP for this gravy run? Twelve pax and a NORS-G delivery ain't exactly mission impossible."

"Dunno, Major Baldachi, they must have their reasons."

The major took his wallet out and counted his cash.

"Yes sir, I'm gonna withdraw some of that money I deposited in the casino last time I was in 'Vegas – I can feel it in my bones."

"OK, Maj Baldachi, but there's a lot of people who go to Las Vegas in a five thousand dollar car and go home in a sixty-thousand dollar bus."

The left seater rolled forward trim on the autopilot elevator control and engaged the altitude hold while the IP called level. The navigator, Captain "Spider" Speigle, spun the wheel and gave them an indicated airspeed.

"How about you, Spider – you gonna hit the tables?"

"Well, I guess I can donate a few bucks. I'm saving up for a new boat so I'm kinda budgeting myself."

"Bad attitude, Spider, my boy. The biggest advantage the house has is that they got more money than the player. You got to play big to win big."

The big nav unstrapped and went back to get the sextant.

"That theory may be OK for you, Major Baldachi, but with my luck, I'd rather lose a little than a lot. Besides, I prefer to sit down, play a couple of Keno tickets, eyeball the cute runners and sip free drinks."

The C-130 droned on over the brown flat terrain of west Texas. By now the Major had undone his shoulder harness, reclined the seat and placed the folded flight plan between his eyes and his sunglasses. He was, for all practical purposes, toes up, and Sam winked at Spider when the nav asked for a ten-knot reduction in airspeed and got no response. The IP throttled back a bit and scanned the engine instruments.

"Got a flux on # 2, engineer."

MSgt Nelson checked it on the freqmeter.

"About one percent, sir. I can hear it now."

Major Baldachi jerked upright and thrashed around for a few minutes until he realized the reason he couldn't see was because he still had the flight plan covering his eyes. He tore the paper out from behind his glasses and grabbed the IP's arm.

"A one-percent flux? We better shut it down, Sam!"

The engineer put his hand on the left seater's shoulder.

"Just a second, Major Baldachi. Captain Talbot, try mechanical on # 2."

"Rog, engineer, # 2 to mechanical."

The prop beat subsided. Sgt Nelson rechecked the freqmeter and reported # 2 stable rpm. By now, Major

JUST LUCKY

Baldachi was wide-eyed and bushy-tailed. He asked for another cup of coffee, raised his seat back and located his position on the high-altitude chart.

"Sam, I imagine your squadron safety job and IP duties keep you hopping. And speakin' of gambling! That safety business is a real gambler's paradise. You safety guys work strictly on luck. If you're lucky you get ahead — if your unit has a few accidents, you end up trying to raise your OER average to a five-zero."

The IP took out his thermos and poured himself a cup of Funny Face (rootin' tootin' raspberry).

"There's a little truth to that, but what you have to consider is that a 'few accidents' is no small thing. I won't say that luck plays no part in the safety business, but when it does, there are ways we can increase the odds in our favor. Just as a good crap shooter stays away from poor field bets, there are things we can do to reduce our losses."

The IP rubbed the back of his neck and continued . . .

"You know, I thought about this a lot. I've heard the aircrews use the word 'lucky' so many times that I began analyzing what lucky means. I found out that there really are times when a tight-cheek situation is relieved by luck — but most of the time when the guys say they were lucky, they created their own good luck."

Major Baldachi unwrapped another cigar, perforated it with a 2B pencil and stoked it up.

"Horsefeathers, Sam! Luck is luck and when the lady deserts you, there's no skill and cunning that's gonna save you. Everyone's got a bullet with his name on it."

"I can't buy that. Let me give you an example. I just helped write up an incident report for a tail pipe fire on the ground. When I talked to the crew, the conversation went something like this: 'We were shutting down the engines when the loadmaster told us # 3 was on fire. Luckily, we had talked about this very same thing during the flight because it happened just about a week ago – a fire caused by an oil leak in the turbine section. The copilot notified ground control, we shut it down, and got out. By the time we got out, the 'chief had an extinguisher on it and we saw the fire trucks pulling up. We found out later the parking spot we were on had just been washed down because of a fuel leak. We were really lucky!' "

Major Baldachi, partially obscured by a cloud of blue cigar smoke, leaned back and stretched his legs.

"You're damn right they were lucky – the whole thing could have gone up in black smoke. I've seen JP-4 fires."

Sam propped his feet up on the foot rests and continued: "Well, I started analyzing it and I was a little surprised when I found that luck really wasn't involved here. Let's start at the beginning: I hate to stoke my own boiler but the reason that 'lucky' crew had talked about the recent tail pipe fire was that they heard about it at a recent safety briefing – and if they missed that, it was in the FCIF. Luck? I like to think it's just a matter of getting the word out. Was it just luck that the loadmaster happened to be scanning the engines during shutdown? No, after I talked to him I found out it was a habit he got into . . . He said his instructor had thought it was a good idea – and passed the habit on. Now – the crew shut the engine down according to the Dash One – and the pilot remembered not to motor the engine like you're supposed to for an engine fire during start. Luck? No way. Same with the copilot. He kept cool enough to let the Fire Department know which parking spot they were on – and things like that are hard to remember when it hits the fan. The crew ground egressed without messing up. Sure, this is no big thing, but one reason they got out without strangling themselves on an interphone cord or leaving the battery switch on was that they had just completed their egress training – and they didn't just pencil-whip it either – they actually did it."

"Hold it Sam . . ."

"No, let me finish – then you can tell me where I'm wrong. Now we come to the crew chief. There's no luck involved in having a fire extinguisher handy and knowing how to use it. Believe it or not, there's a lot of flight line guys running around that aren't sure how, or are afraid to use, a CBM extinguisher. This guy took the time to learn. The fire trucks were right behind him and that's no accident either . . ."

"Yeah, but Sam, that crew was damn lucky that the fuel spill had been cleaned up . . ."

"I thought about that too, Major Baldachi. It wasn't just luck. The fuel cell specialist knew enough to call for the fire trucks to wash it down because he knew what kind of hazards are involved and he stayed at the aircraft until the fire crew washed it down – and that's no coincidence."

"Have it your way, Sam. I still say that crew's number just wasn't up."

"You're sure you want to land this thing from the right seat, Sam? Metro is calling a pretty strong crosswind – twenty gusts to thirty."

"I need the practice. Besides, most of my time is in the right seat anyway. Let's go ahead and get the before landing checklist."

The '130 was crabbing ten degrees into the wind. About one mile out, the IP gave a little right rudder and dropped the left wing.

"They're calling gusts of 10 knots so I'll use 125 and 115. Be sure and use plenty of left aileron after I get it planted."

A smile played over Major Baldachi's lips.

"Sure, Sam."

As the airplane crossed the threshold, the gusty crosswind required quick and positive inputs to keep it on centerline. Captain Talbot stirred the yoke around and glanced at this fluctuating airspeed indicator. He added a little power and started easing the yoke back. The Hercules touched down, its left tires kicking up a small puff of blue smoke. As the airspeed died down, the right mains eased to the concrete, flaps were retracted, and the IP used differential power to keep it on centerline. As they slowed down to taxi speed, the loadmaster came up on interphone.

"Hey, good landing, Captain Sam!"

Major Baldachi punched the IP lightly on the arm.

"You done good, son. I got the nosewheel steering."

The IP, slightly embarrassed, picked up his checklist.

"Just lucky, I guess."

COMMUNICATE TO CLOSE THE OFF-DUTY GAP

by MSgt Edward M. Palumbo
HQ TAC/SEG

"SAFETY '76"

It's a beautiful morning here at Langley; not too hot, not too cold — pleasant. I took my time shaving and listened to some quail calling to each other across the field. It felt good to be alive — you know the feeling . . .

Around 0730, I got to work and started to review the message traffic received from bases throughout Tactical Air Command. DEATH had claimed another member of the command. "What do we do about preventing this kind of accident?", asked the boss. I reciprocated, "What do we do about it?"

A ground accident message of a fatality in TAC always gives the approximate time of death. Most accidents occur during off-duty hours. As supervisors, this should tell us there is a gap in supervision after our people go off-duty. This gap can be closed by knowing the people who work for us and through effective communications during duty hours. We supervise them during on-duty time — assist them to accomplish the job; teach them to use tech data and personal protective equipment, etc. Being concerned and involved in personal safety during the workday should be so effectively communicated to our people that we develop in them the desired "safe" attitude. This is extremely important because we want that attitude to extend itself to the "Off-Duty Gap."

Know who is operating the muscle machine; know who is running 'em hard; know who has slick tires; know who is working that part-time job. Knowing our people helps us as supervisors to identify the accident prone, the careless, and those who might be extending themselves because of moonlighting. We need to become more aware of their recreational activities and driving habits.

When it comes time for a three-day weekend, leave, pass, etc., and we brief personal safety in off-duty activities, the safe attitude that we have already established should carry over into the off-duty hours. For example — "Bill, I know you have a boss machine, but it looks like your tires are starting to show a little too much wear." Bill knows that you personally care for his welfare and are indicating to him that if he wants to have your permission to leave for the weekend, he'll get new tires. He will appreciate your interest in his welfare and at the same time, you have instilled in him a safety awareness that will carry him through the weekend. If we want to have our people around the next duty day, if we are tired of accidents and senseless loss of life (our greatest resource), it's time we COMMUNICATE TO CLOSE THE OFF-DUTY GAP. ➤

TACTICAL AIR COMMAND

AIRCREWMAN of DISTINCTION

CAPT STICKELL

Captain Rutherford D. Stickell, United States Air Force Tactical Fighter Weapons Center, 4486 Test Squadron, Edwards Air Force Base California, has been selected to receive the Tactical Air Command Aircrewman of Distinction Award for June 1974.

Captain Stickell was scheduled to perform his initial checkout in the advanced design General Dynamics YF-16. The profile for the 28th flight of the YF-16 called for a military power takeoff, gear-down climb to 15,000 feet MSL, gear cycles, climb to 30,000 feet MSL, formation, airwork and landing approaches.

The flight progressed normally through takeoff and climb. After leveling at 15,000 feet, the gear was retracted and the throttle retarded to maintain airspeed within gear extension limits. The gear was then lowered and the throttle advanced to obtain power for level flight. Airspeed continued to decrease with the engine not responding to throttle movement. With the engine power frozen at idle and airspeed decreasing, Captain Stickell elected to retract the landing gear and set up an optimum glide toward the distant runway. The aircraft was skillfully flown to a high key position where Captain Stickell committed himself to landing the aircraft.

Captain Stickell demonstrated outstanding skill in using the side force controller of the fly-by-wire flight controls. Using speed brake to adjust speed and altitude, he executed an exact pattern and safe landing.

Captain Stickell has F-100 and F-104 single engine experience and over 2550 hours of flying time, of which 334 hours is combat time. At the time of the emergency, his total time in the YF-16 was 15 minutes.

Captain Stickell's demonstrated outstanding skill and professional competence in his handling of this airborne emergency qualify him as a Tactical Air Command Aircrewman of Distinction.

TAC TIPS

...interest items,

QUOTE OF NOTE:
If you fail to plan, plan to fail.

HELMETS

"And Saul clothed David with his garments and put a helmet of brass upon his head, and armed him with a coat of mail . . . and David said to Saul, "I cannot go thus for I am not used to it, and laid them off".

1 Samuel 17:38:40

Saul, like many present-day life support technicians, evidently had some problems when it came to fitting his troops with the latest, state-of-the-art equipment. It's not too surprising that David objected to his "hard hat and flak jacket," because the early helmets were usually fabricated of bronze or iron strips and weighed about four pounds. Considering David's mission (one-on-one, rock vs. sword), maneuverability and the ability to check six couldn't be compromised by his life support equipment.

While helmet design and construction materials have changed drastically over the past few centuries, the basic problems inherent in any helmet design are still with us. Weight, vision restriction, comfort and impact protection are problems in helmet design and, as most Life Support technicians and their customers will tell you, these problems haven't been solved yet. However, some progress has been made, and the base level custom fit modification, scheduled for implementation in TAC this year, will be a significant improvement over present helmets.

The custom fit liner is designed to fit in the standard HGU-type helmet shell. This liner is made by pouring a two-part chemical mixture (plus catalyst) into a mold that has been fitted to the individual's head. The chemicals react to form a rigid polyurethane foam liner which conforms to head shape on the inside and helmet shell contours on the outside. This liner, after curing and removal from the mold, is trimmed and sanded. A layer of ¼-inch foam rubber is then glued to the inside of the liner. This is in turn covered with leather. Installation of a rubber edge roll, headset assembly, earcups, nape and chin straps, etc., complete the helmet. The helmet is designed to be worn with a cotton fabric cap to absorb perspiration and enhance comfort.

The helmet is comfortable, provides improved noise attenuation and, because of the energy-absorbing characteristics of the foam liner, improves impact protection. The weight is not significantly different from that of the present helmet, and due to the use of the HGU-type shell, any type of visor currently in use may be installed.

Two of the most frequently asked questions about the base level custom fit helmet are: "When can I get one?" and "What about the custom fit helmet I have now?" To answer the first, you can expect your life support shop to receive the necessary materials by December 1974. Some units will receive materials earlier, but everyone should have them by December. If you already have a Wright-Patterson or commercial custom fit that you're happy with, we're sure not going to make you throw it away! The whole idea of this program is to give you a good, comfortable, well-fitting helmet and if you're already satisfied, so is life support.

For the life support technicians who will be building these helmets — new equipment and procedures are bound to have bugs in them. In spite of all the kit proofing and T.O. verification in the world, there's no substitute for field experience. Let us know if you encounter problems or have questions on the fitting and molding process. If we don't have the solutions and answers here, we will get them in a hurry.

by Capt Mike Byers
HQ TAC/DOXBL

References:

1. "The Evolution of Helmets", J. A. Van Haastert, SAFE Journal, Spring 1974.
2. T.O 14P3-1-121, 15 May 74 (not yet distributed).

mishaps with morals, for the TAC aircrewman

LIGHTNING BITES MAN...

Not too long ago, a flight engineer was on the ramp turning the props on his A model '130 for a prop oil check. He was trying to complete the job before a line of thunderstorms moved over the base. He was too late... lightning hit the Herky and the engineer was knocked over backwards. Luckily, he was not seriously hurt. He did have a souvenir of his experience as an electrical conductor – thin red burn marks where the zippers on his goatskin came in contact with his skin.

It seems that lightning strikes twice – at least it struck another C-130 crew member recently; a loadmaster this time. The crew had just cranked up #4 engine when the Supervisor Of Flying interrupted the start sequence with a weather advisory which included "cloud to ground lightning in the vicinity." The aircraft commander called ground control for the latest forecast – and that's when he noticed his loadmaster lying on the ramp in front of the left wing. The AC radioed for medical assistance, shut down, and went to the aid of his injured crew member. The loadmaster received an electrical shock through his interphone cord as a result of a lightning strike near the aircraft. Luckily the medical exam revealed no sign of injury to the loadmaster.

During the lazy, hazy thunderstormy days of summer, it's best not to hang around C-130s, or other similar lightning rods – and I know at least two crew members who'll roger that.

SPO CORNER

F-4 FIRES

by Lt Col Burt Miller
HQ TAC/SEF

1. TRUE OR FALSE WARNING LIGHTS?

So far in 1974, USAF has had six F-4 major aircraft accidents involving inflight fires. Incidents of false fire/overheat warnings, with subsequent engine shutdown and single engine recovery, also occur at a high rate. It's up to the aviator to temper his knowledge that the F-4 has lots of false fire lights with the fact that the number of engine fires are occurring at an alarming and unacceptable rate. Comply with the good book and get it on the ground.

2. HURRY – BUT WITH DISCRETION

The above comment addresses an emergency, real or indicated, that requires an ASAP landing. After most inflight emergencies, the mission should be terminated. The only problem is deciding how fast to return to terra firma. Section III of the Dash One has lots of good words on this and tries to help you out. Recent accident/incident reports indicate that some pilots are trying to attain that security that goes with arrival in the dearm area a little too quickly. One bird was lost because the pilot was trying to get his weight down to acceptable landing gross after a utility failure, by running one engine in AB, the other in idle. Another intrepid jock took the departure end MA-1 on a long runway after a utility failure during a touch and go. All indications are that he just tried to do too much, too soon. Add a couple of additional minor problems and the result was a landing with no hook and insufficient brakes. One RF-4 ripped out a BAK-12 after a 200 knot plus engagement attempt. The nature of the emergency didn't require the attempt that heavy or that quick. Do it like the book says: (1) Maintain aircraft control; (2) Analyze the situation and take proper action; (3) Land as soon as practicable.

INTRODUCING THE NAP-12

Capt Vaughn's contribution makes him this month's FLEAGLE T-Shirt winner.

by Capt Charles R. Vaughn
OHIO ANG, STAN/EVAL

How often have you been floundering around in the weather, only to find that your multi-thousand dollar piece of navigational gear has transitioned itself into a thirty-seven cent lump of scrap iron? However often this situation arises, you can always count on it when the weather at your destination is optimistically forecast at two hundred feet, one quarter mile with BFF, (Blowing Ford Fenders), and your Comm radio cycling brings to mind a Pin-Ball machine gone berserk!

Aviation technology has produced a veritable cornucopia of Nav equipment, including: I-NAV, R-NAV, VOR, VOR/DME, TACAN, LORAN, and DOPPLER. These systems are a pure delight when functioning properly. However, there is one flaw common to each. With all their "super-sophistication," their circuitry has been designed very much like pre-World War II series-circuit Christmas tree lights. In essence, this means that if one itty-bitty delicate transistor dies, the whole system reverts to the "El-Defuncto MODO" (Latin for Zilch).

Well, fellow birdmen, take heart! Clyde C. Coop, a long time avid hot-air pilot (balloon), has devised a universal as well as economical system which draws upon the years of experience of our forefathers, and on the incomparable reliability of Mother Nature's gift to the aves . . . homing. In a word, Clyde calls his new system: NAV-A-PIGEON.

Utilizing monies obtained through a research grant from the Brotherhood of PEEP (Pigeon Equal Employment Program), Mr. Coop has just completed final testing on the NAV-A-PIGEON prototype instrument, designated the NAP-12. (Fig. 1)

Those airfields subscribing to NAV-A-PIGEON will be sent a number of baby pigeons approximately equal in number to the total number of airport subscribers. (Conservative estimates put the number of charter subscribers at 1,350.) The fixed Base Operator or Airfield

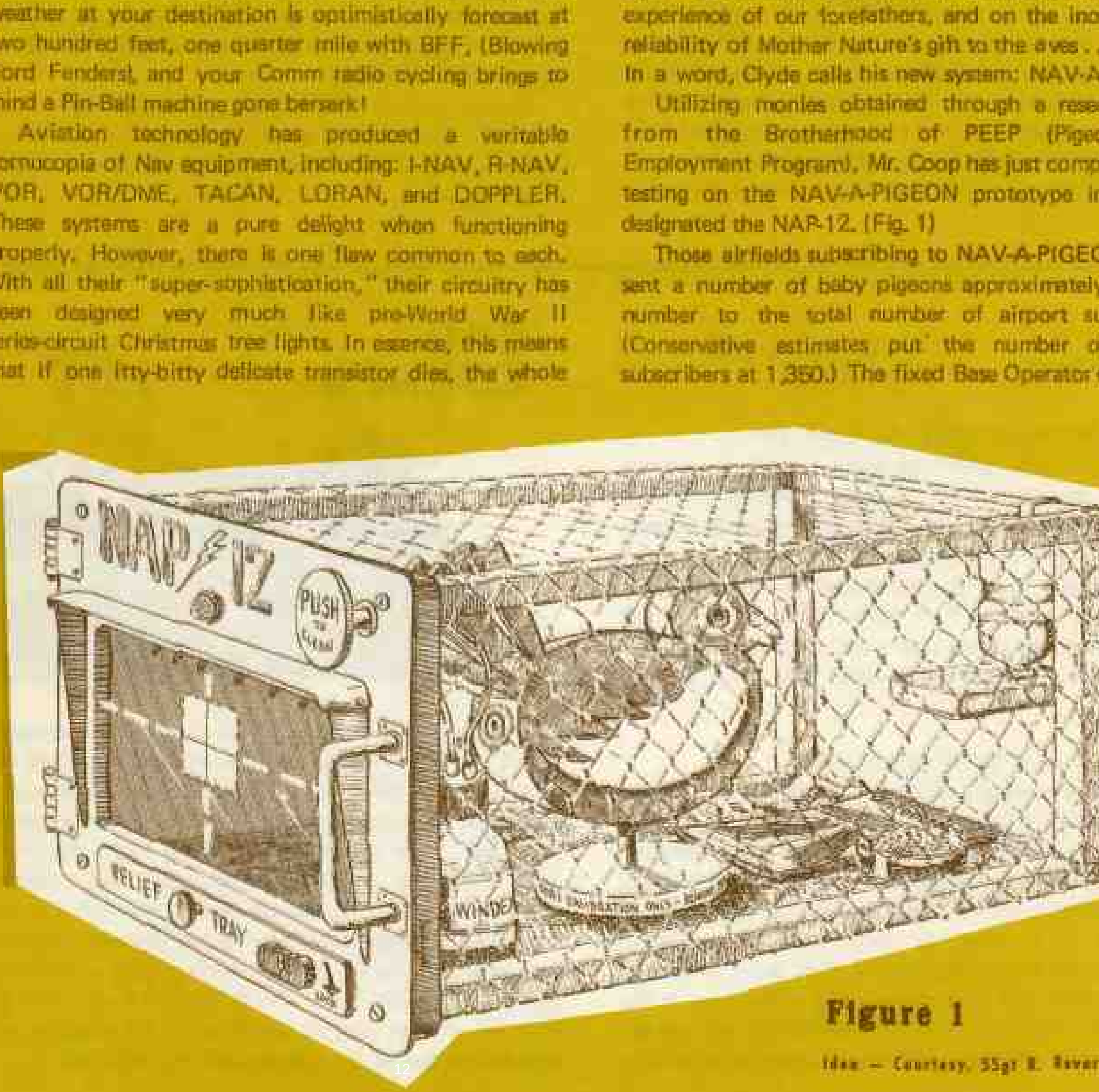
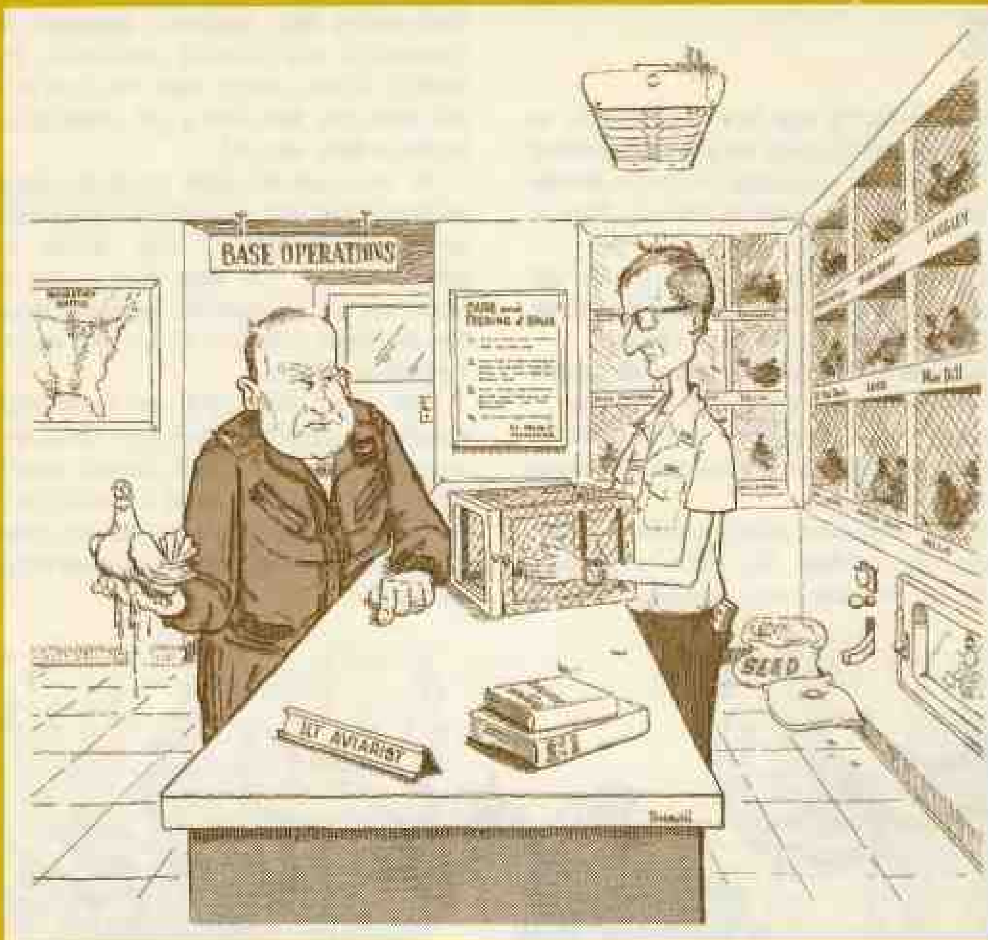


Figure 1

Idea — Courtesy, SSgt R. Revard



Officials will raise the pigeons to an age of ten months (homing age). At this time, with stencils generously provided by NAP-Inc., the aerodrome name will be affixed to the wings of each pigeon. One or more of these pigeons will then be shipped to all other subscribing airport operators. During this setup period, the NAP-12 instrument will be made available to all aviation enthusiasts desiring such an economical, fool-proof system. Installation is simple and will fill the holes left in the average instrument panel after removing obsolete directional indicators and omni equipment.

When the pigeons are all in place, the entire NAP system will be commissioned and, hopefully, fully approved by the FAA.

What will this system mean to the average pilot? Let's take a hypothetical cross-country excursion using the NAV-A-PIGEON system.

Suppose we're at Rickenbacker AFB Ohio and we wish to fly to Seymour Johnson. The weather en route and at destination is forecast IFR – surface to 20,000 ft. Assuming both airports subscribe to NAP, we fill out a simple IFR flight plan specifying "NAP direct GSB". After filing with dispatcher, we pick up a pigeon bearing "Seymour" on each wing, grab a Hershey bar, and head out to our flying machine. After the preflight has been completed and we've strapped in, we simply open the front of the NAP-12 and insert the bird. After allowing a two minute warm up period for "Pigeon orientation", we're ready for takeoff.

After takeoff, we turn aircraft in either direction to align the vertical needle (heading) squarely on Seymour's Gluteus Maximus while maintaining the horizontal needle (pitch) in the same place. The NAP-12 will automatically indicate the level-off altitude when the pigeon senses the least amount of adverse wind effect. Now there's nothing to do but relax and make minor corrections until arriving at our destination.

As we pass over GSB, the indication of Station Passage on the NAP-12 will be similar to that of any standard omni; that is, the head will replace the tail. Now we start a descent and a procedure turn back toward the airport, again aligning the needles squarely on the center tailfeather of the bird. The amount of turn will vary with the runway being used. (All birds land into the wind.)

NAP-12

When the pigeon extends his legs, this is a reminder to lower our landing gear; at this time, we will be positioned on short final. Flapping of the wings will come shortly thereafter and will be the indication to start our flare to touchdown.

After taxiing in, we remove the pigeon from the NAP-12 and turn it in to the Seymour Johnson dispatcher. To quote Mr. Coop, "What could be more simple?"

As with all navigational equipment, there are certain design limitations inherent even to the NAP-12 system:

During testing, it was discovered that if pilot or passengers were eating popcorn or peanuts, station passage would be erroneously displayed.

The NAP-12, unlike present instrumentation, is not equipped with an off-flag to show equipment malfunctions. It is, however, very obvious when a malfunction has occurred, especially when tracking inbound to the intended destination. In the event of NAP-12 failure, simply open the door of the instrument and clean the lens with a soft cloth or tissue, and your system is fully restored.

In the quest for total reliability, Dual NAP-12 was experimented with extensively. Unlike conventional dual omni, Dual NAP-12 was found to be totally unsatisfactory. This was mainly due to the mutual attraction of the pigeons, especially between male and female, which produced all kinds of erroneous pitch and heading indications.

The above limitations are considered but minor annoyances when compared with the total benefits to be derived from such a safe, simple, easy-to-use system. Felonious Farquardt (chief test pilot for NAP-12), prior to his tragic death*, made the following statement, "With reasonable care, this system would be the most reliable in the world."

***Two months prior to final prototype development, Mr. Farquardt was flying a full IFR NAP-12 evaluation. As a practical joke, a mischievous NAP technician had substituted a common park pigeon in place of the test bird. Mr. Farquardt was fatally injured when his aircraft impacted the head and shoulders area of a large stone statue depicting General Cornelius Merriwether astride his horse. The statue was located in a park 12 miles northwest of the test airport.**

TACTICAL AIR COMMAND

Maintenance Man Safety Award

Technical Sergeant John B. Watkins, 35 Organizational Maintenance Squadron, 35 Tactical Fighter Wing, George Air Force Base, California, has been selected to receive the Tactical Air Command Maintenance Man Safety Award for June 1974. Sergeant Watkins will receive a certificate and letter of appreciation from the Vice Commander, Tactical Air Command.

TSgt Watkins

TACTICAL AIR COMMAND

Crew Chief Safety Award

Staff Sergeant Daniel Cantu, 58 Organizational Maintenance Squadron, 58 Tactical Fighter Training Wing, Luke Air Force Base, Arizona, has been selected to receive the Tactical Air Command Crew Chief Safety Award for June 1974. Sergeant Cantu will receive a certificate and letter of appreciation from the Vice Commander, Tactical Air Command.

SSgt Cantu

TACTICAL AIR COMMAND

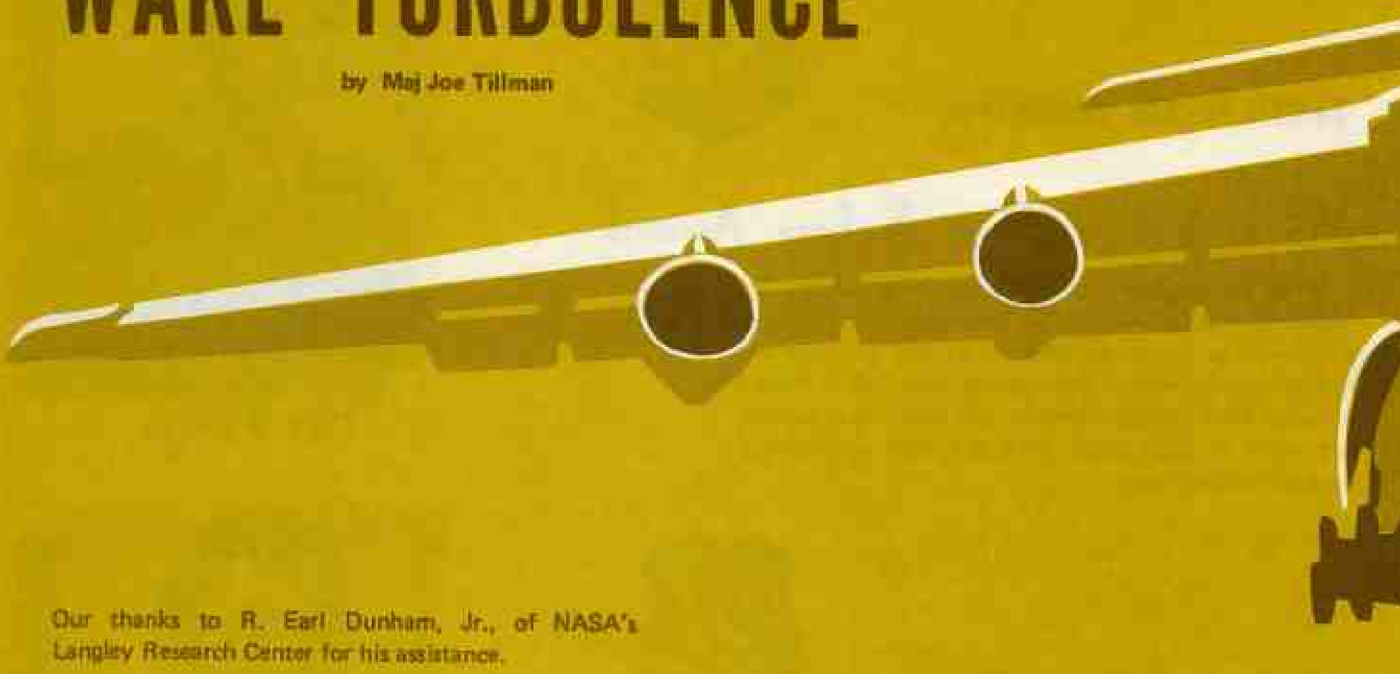
Ground Safety Man of the Month

Technical Sergeant William W. Fogel, 94 Tactical Fighter Squadron, 1 Tactical Fighter Wing, MacDill Air Force Base, Florida, has been selected to receive the Ground Safety Man of the Month Award for June 1974. Sergeant Fogel will receive a certificate and letter of appreciation from the Vice Commander, Tactical Air Command.

TSgt Fogel

WAKE TURBULENCE

by Maj Joe Tillman



Our thanks to R. Earl Dunham, Jr., of NASA's Langley Research Center for his assistance.

The F-4D, #3 in a four-ship recovery, rolled out on final and encountered mild turbulence. The buffeting stopped momentarily and then, at about 700 feet AGL, the Phantom encountered severe wake turbulence. The aircraft rolled rapidly to the right, about 90 degrees, nose low; then for a second, seemed to recover. Suddenly, it rolled right again and the nose dropped about 20 degrees. Recovery attempts were made but the aircraft continued to descend in a steep, right bank. The pilot applied military power and then AB and finally recovered — but not before the F-4 hit a 70 foot high tree one-half mile short of the runway. As a result of the "tree strike," the bent-wing suffered a burner blowout, unsafe nose gear indication, unsafe indication on both the leading and trailing edge flaps, and a utility hydraulic pressure loss, and the right generator went off the line. Using emergency gear extension, the Phantom was configured for an approach and barrier engagement (yes, it's still flying). It touched down at 160 KCAS, 500 feet short of the first barrier, but no engagement was made. The drag chute was deployed and emergency brakes used to keep the bird on the runway. The second barrier was successfully engaged.

Findings? The aircrew did everything right except for one thing — they entered wake turbulence. The accident investigation board reported: "One finding (cause) was a miscellaneous unsafe condition. Severe wake turbulence was encountered which rendered the aircraft momentarily uncontrollable."

That short quote underlines the real hazard of wake turbulence — it renders your aircraft temporarily uncontrollable. Wake turbulence has accounted for a bunch of smokin' holes, lots of incidents, and plenty of white knuckle flying time. Let's take a closer look at the nature of wake turbulence and how to avoid it, and touch on future plans to reduce the severity of wing tip vortices by generating aircraft.

What is Wake Turbulence?

Any mechanical disturbance of air, caused by a moving aircraft, is known as wake turbulence. Before research was begun on the problem, most pilots figured the turbulence was caused by a power plant — and to a certain extent, it was. "Prop wash" and "jet wash" have been blamed for early accidents when, in fact, aircraft vortex wakes were the culprits. In fact, the jet stream velocity of a C-5A engine, using takeoff thrust, is only about 35 mph 1200 feet behind the aircraft. The jet wash dissipates rapidly, presenting no significant hazard, and won't be discussed any further here. Research has proven that the wing tip vortices are the real dangerous critters — the "miscellaneous unsafe condition which renders the aircraft uncontrollable." For our purpose the term "wing tip vortices" is synonymous with "wake turbulence"

and "aircraft vortex wake."

VORTEX CHARACTERISTICS

Basically, wing tip vortices are made up of two counter-rotating, cylindrical air masses, about one wing span apart, extending aft along the flight path of the generating aircraft. The airfoil produces lower pressure over the top surface of the wing and higher pressure at the bottom. As these pressures try to equalize, a spanwise flow develops from the wing root to the tip. A rotary airflow motion results, which forms as a vortex sheet and departs near the wing tip as a vortex core about two to four span lengths behind the airplane. These vortices can sometimes be seen as wing tip condensation trails behind fighter aircraft during high "G" maneuvers.

Vortex Velocities

Flight tests conducted by NASA point out the most dangerous aspect of the vortices – the velocities of the rotating air masses. These tests found tangential velocities of the vortices to be on the order of ±3600 FPM up to 1-1/2 miles behind the C-5A (see Figure 1). The thing to note is that the vertical velocities about the rotating air masses of a vortex system can vary as much as ±3600 FPM over a very short distance (a fraction of a wing span), and that's what induces the awesome rolling moment in the penetrating aircraft.

Vortex Direction

Wing tip vortices depart the generating aircraft, descend at about 400-500 FPM, then tend to level off at about 1000 feet below the aircraft's altitude. This is important to remember in avoiding wake turbulence. Besides decending, the vortices move outboard at about 5 knots, at or near ground level.

Wind Drift

On the ground, the maximum lateral travel of the vortices is over 3000 feet – that is, vortices may be displaced that far by wind drift and still be a threat to other aircraft. Maximum drift occurs with a crosswind of 10 to 20 knots because greater wind speeds tend to break up the vortices. The higher the wind speed, the shorter the vortex life. Since wind drift often opposes the natural outward direction of the vortex, a 30 degree, 10 knot crosswind can keep a vortex on the runway for up to two minutes after

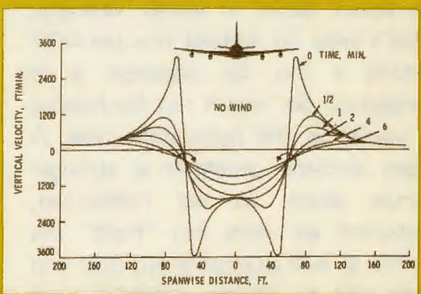


Fig. 1 – Vortex system velocities of representative heavy transport aircraft for several time increments after generation

WAKE TURBULENCE

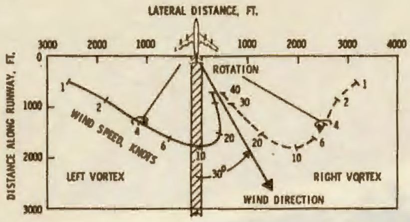


Fig. 2 — Vortex movement near ground with wind from 30 deg port

generation (see Figure 2).

Vortex Life

Normally, the vortex dissipates rapidly after about three minutes, but tests indicate that strong vortices, produced in calm air above ground effect, may last up to six minutes. The vortices decay rapidly in convective currents and when the ambient air is affected by mechanical mixing at the surface. Without outside interference, the decay of vortex strength is due to the transfer of momentum from the core to the outer area of the vortex. Thus, you can anticipate less severe turbulence, but turbulence over a larger area, as your distance from the generating aircraft increases — a fair trade-off.

Factors Affecting Vortex Strength

If you are behind an aircraft that is heavy, clean, and slow — watch out! Of these three variables, weight is the dominant factor in vortex strength. That's why an airfield mix (an A-37 behind a C-5, for instance) is so dangerous. So, watch out for heavies if you're in the lightweight class. A clean airplane generates a stronger vortex since, as we mentioned, turbulent air does not "hold" the vortex as well as smooth air. Gear and flaps add to airflow instability and mechanical devices that intentionally disrupt the vortices are now being tested by NASA. The lower the airspeed (and higher the angle of attack), the stronger the vortices generated. Basically, on takeoff roll, the vortices become significant at rotation speed (high AOA). On landing, they are a factor until the nosewheel is lowered. Once all the gear are on the ground, most of the lift is dumped and mechanical mixing of the air reduces the severity of the remaining vortices.

VORTEX EFFECTS

Basically, there are three types of encounters and resulting problem areas.

1. A traverse crossing through the vortex centers is most likely to occur at altitude and can impose great structural loads on your aircraft.

2. A penetration into the downwash region between the two vortices can cause a rapid loss of altitude.

3. Entry into the vortex core where you can expect high rolling rates.

Traverse Encounter

Diagram 3 shows the path you can expect to take if you cross behind a "heavy." The initial entry forces a rapid climb, followed by a sudden descent and then another climb. It

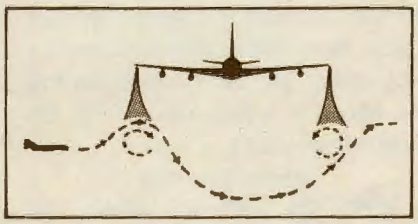


Fig. 3 — Expected flight path with traverse encounters

happens quickly (depending primarily on your distance behind the generating aircraft). Structural loads are high and it's possible to overstress your aircraft. Figure 4 shows the loads involved. Note the vortex age. If this occurred behind a C-5 or a 747 at cruise speed, your distance would probably have been about 3-1/2 miles back. The pilot's initial reaction to counteract his aircraft's change in attitude and altitude can impose even

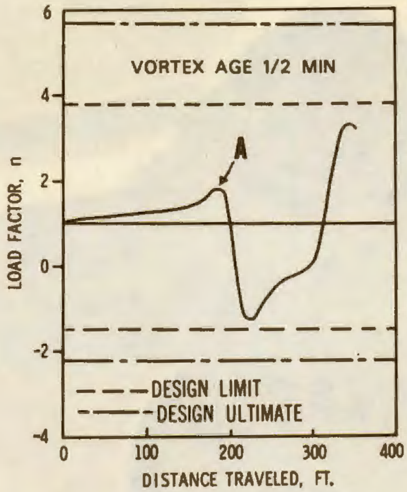


Fig. 4 — Vertical loads imposed on light aircraft crossing vortex wake of heavy transport (NOTE: Rapid load changes at A)

larger loads. As you enter the first vortex, the aircraft begins an ascent — which results in forward stick. The lifting effect increases and about the time the pilot applies full forward stick, his bird hits the downward side of the vortex — and the rapid change in forces takes place as indicated at point "A," Figure 4. Another reaction occurs, opposite in direction, as the aircraft enters the second vortex.

A large aircraft (C-5, 747 class) can produce downwash velocities on a 36-foot wing span aircraft from about 600 FPM at a vortex age of six minutes to 1800 FPM at a vortex age of 1/2 minute. It is interesting to note that at normal cruising speed, a downwash of 600 FPM could occur as far as 42 miles behind the "heavy". It is not likely a traverse entry would occur at traffic pattern altitudes, but if it does, the results could be catastrophic.

Between the Vortices

As we mentioned, the down force between the vortices can cause your aircraft to descend rapidly. If you get into this area from behind, the descent time will be much longer than for a traverse crossing — and on approach or takeoff, this can be fatal.

Unlike crossing through the wake, being trapped between the vortices does not impose great directional changes on your aircraft although the down force is high. If your altitude does not permit you to continue your descent and a directional change is necessary, you can anticipate strong rolling forces getting out from between the vortices. Remember, too, the vortices themselves descend at 400-500 FPM so they will tend to force you lower than the effective size of the vortices might indicate.

Vortex Core Penetration

This is where you may find your aircraft performing uncommanded aileron rolls – not recommended on short final! The vortex core, where the most violent tangential speeds occur, is never very large – but can induce rapid roll rates. For example, in Figure 5, the aircraft indicated as "3" would roll left at about 30° per second, assuming the vortex were two minutes old. Pilot disorientation is a possibility, especially in weather. During approach or takeoff, pilot and aircraft response times may not be fast enough to prevent ground impact. Again, not only are the vortices creating a rolling motion, they are also descending, taking the aircraft with them.

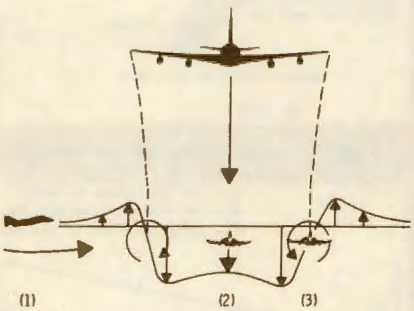


Fig 5 – Types of vortex system encounters and principal reactions of light aircraft

HOW TO AVOID WAKE TURBULENCE

Separation

OK, we know a little about the problem – now what can we, as pilots, do about it? Well, there's not much we can do once we're in it – but we can stay out of it. Hazards of wake turbulence are prevalent during all phases of flight, but the dangers are greatest during takeoff and landing – and as our introductory accident points out, the hazard is greatest in the traffic pattern since the altitude available for recovery is at a minimum.

Whether during approach or at altitude, the best avoidance technique is adequate spacing, since in all cases the vortices diminish rapidly with time. Looking back at Figure 1, we note that the vortex vertical velocity strength is reduced greatly as vortex age increases. So, get plenty of distance between you and heavy aircraft. William A. McGowan, NASA, sets a minimum time separation of three minutes for a light aircraft following a large one. This is a minimum time interval, however, and one instance where "more is better."

Stay Above the Wake

Since the trailing vortices drop at 400-500 FPM, if you maintain a position at or above the generating aircraft's altitude, you should be safe. The vortices seem to level off at about 1000 feet below the generating aircraft, so if you must pass beneath and behind a "heavy," maintain at least 1500 feet lower (see Figure 6). If your formation recovery procedures permit, stay above the man in front of you as long as possible.

Takeoff Short of the Heavy Aircraft's Rotation Point

As illustrated in Figure 7, the smaller aircraft should lift off no less than 3000 feet shorter than the "heavy." This buffer should give the lighter bird plenty of room to lift off before, and maintain a flight path above, the vortice's trail – even with a tail wind. After takeoff, the lighter aircraft should keep upwind of the bigger aircraft's flight path in crosswind conditions. Mr. McGowan recommends a takeoff interval of no less than 30 seconds. To this, we might add 30 seconds for the wife and kids. A small aircraft that needs a long takeoff roll must wait for vortex dissipation since the 3000 ft distance criteria cannot be met. Again, a one minute minimum spacing should be used, but take all you can get. A NASA study published in 1969 points out that if your takeoff distance is longer and climb rate flatter, a 1-1/2 to 2 minute separation should be used.

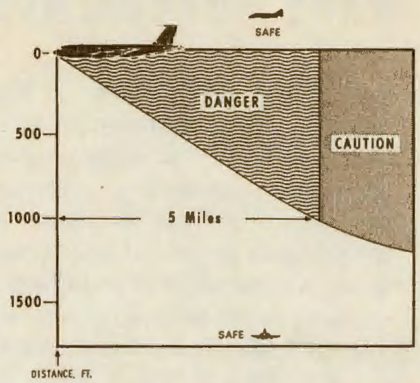


Fig 6

Land Long

Again referring to Figure 7, try to land at least 2500 feet past the "heavy's" touchdown point. There are times when the length of your

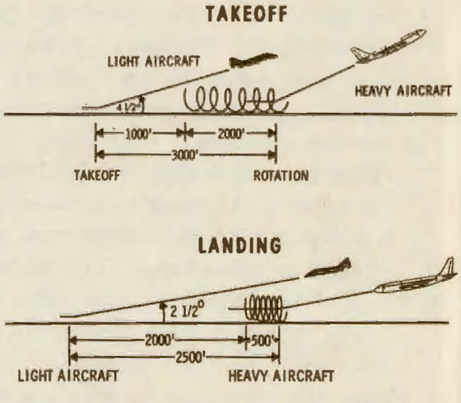


Fig. 7

landing roll won't permit a long touchdown so let discretion prevail — take it around. We suggest, when operational requirements permit, a one-minute minimum for separation behind larger aircraft. If you happen to be unfortunate enough to have a tail wind during landing, you should plan on at least a two-minute interval.

Can the Vortex Problem Be Eliminated?

Probably not, but studies at NASA have shown that vortex strength can be reduced significantly. Since wing tip vortices are really just an end result of a moving airfoil, when we try to reduce the severity of these little monsters, we are also messing with a critical aerodynamic function — lift. Among the designs tested were rearward and forward blowing wing tip jets, reverse ogee wing tip modification, cabled drogues and vortex generators. The conclusion of the earlier tests was that although the vortices could be modified considerably, some of these devices adversely affected the aerodynamics of the tested aircraft and were unacceptable. Generally, the findings of the tests were inconclusive — but there exists a brighter light on the horizon. An informal paper published by NASA, January 7, 1974, "Model Tests of Various Vortex Dissipation Techniques in a Water Towing Tank," is somewhat more optimistic than earlier reports. The paper is a progress report to determine the feasibility of reducing the hazard caused by aircraft trailing vortices. The basic test equipment consisted of a 0.03 scale model of a 747 towed by an overhead carriage system in a water tank 95 meters long (see Figure 8). The 747 model was equipped with gages to measure lift, drag, and pitching moment. For flow visualization, dye was injected several places along the wing trailing edge. A wing-following model, instrumented for lift, drag, and rolling moment, was rigged to follow the 747. Since the most dangerous phase of wake turbulence occurs during takeoffs and landings, no attempt was made to test the model for traverse entry of the vortices. A trailing model was used with a wing span and aspect ratio of a Lear jet on the same scale ratio as the 747 model. Another larger model was used, but for simplification, we will show only the results of the smaller model. The trailing model recorded induced rolling moment as a measure of the vortex hazard potential. All data was based on a landing configuration for the 747 model. Three basic vortex dissemination concepts were tested: the spoiler and spline devices; variation of engine placement; and the alteration of span-load distribution (removal of outboard flaps).

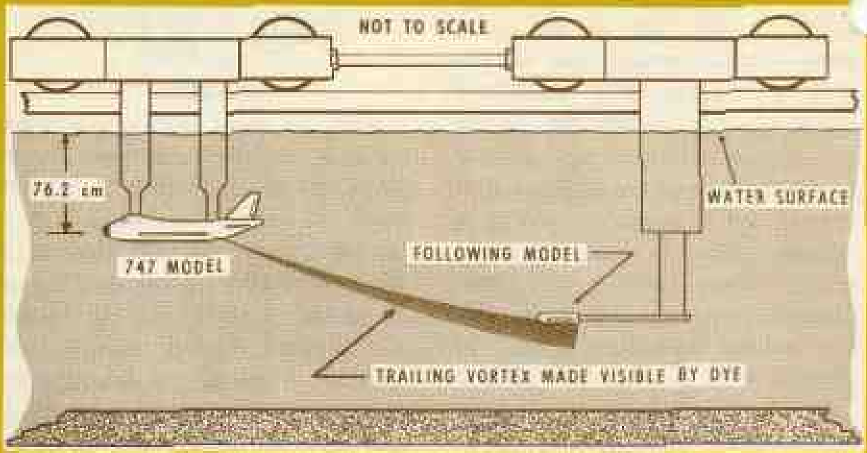


Fig. 8 — Diagram of test technique

Spline and Spoiler Devices

The trailed spline and spoilers are both drag/turbulence producing devices (see Figure 9). Diagram 10 shows the lift and drag coefficients of the two systems. At the test lift coefficient of 1.2, the spline increased the basic model drag about 20 percent while the spoiler increased the drag about 40 percent. Operation with the spoiler required a three degree increase of angle of attack to achieve the same lift coefficient as the basic

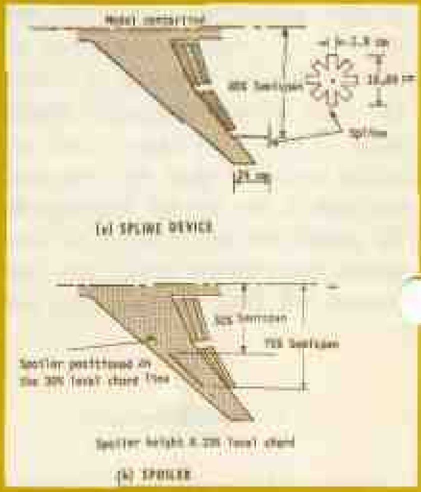


Fig. 9 — Spoiler and spline devices

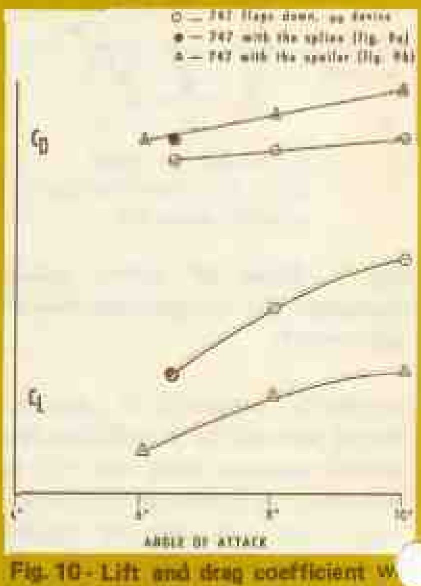


Fig. 10 - Lift and drag coefficient vs angle of attack for the 747, flaps down with and without the spoiler device

model and apparently reduced the maximum achievable lift coefficient. The spline device added drag only. The results of the vortex dissipation tests are shown in Figure 11. Although it clearly shows the favorable vortex dissemination by the spoiler, it is important to remember the trade-off in lift loss shown in Figure 10.

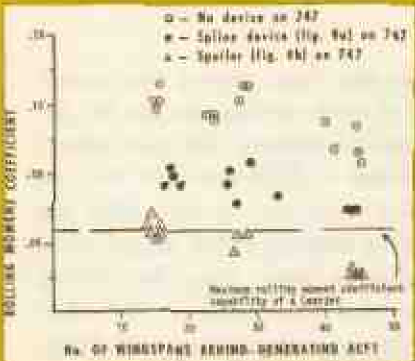


Fig. 11 – Vortex induced rolling moment coefficient variation with distance behind the 747 model with either the spline or spoiler device installed as measured by following model

Variation of Engine Placement

To test engine placement, two streamlined, movable struts, positioned ahead of the model, directed water under pressure to simulate engine thrust. Without going into detail, test results found that the greatest effect on reducing the severity of induced rolling was found with the engines placed on top of the wing within the outboard 10% of the wing. The data tends to indicate that a reduction of 20 to 40 percent reduction of imposed rolling rate was possible in this configuration.

Span-Load Alteration

Quite simply, the model's basic lift configuration was changed by removing the outboard trailing edge flaps while retaining the inboard flaps and leading edge slats. This shifted the load inboard and was by far the easiest model change. With the

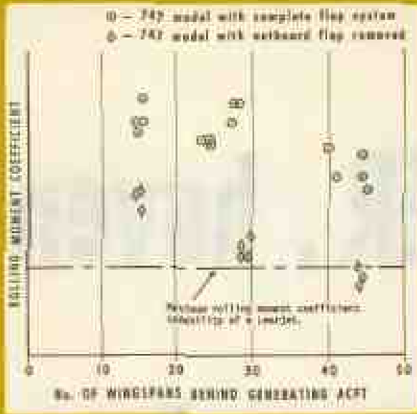


Fig. 12 – Maximum vortex induced rolling moment coefficient on following model behind a 747

outboard flaps removed, the change in the vortex strength can be seen in Figure 12. This configuration produces a fairly large, but seemingly quickly diffusing, vortex from the outboard edge of the inboard flap as well as a small, well defined vortex from the wing tip. As you can see in Figure 12, there is approximately a 50% reduction in imposed rolling moment over the normal flap configuration. Effect on aerodynamics of the model? Check Figure 13. It seems at this stage of the game that if we are to reduce the trailing wake hazards, we may have to trade-off some lift and increase the drag. In the overall safety picture, this could be a bargain.

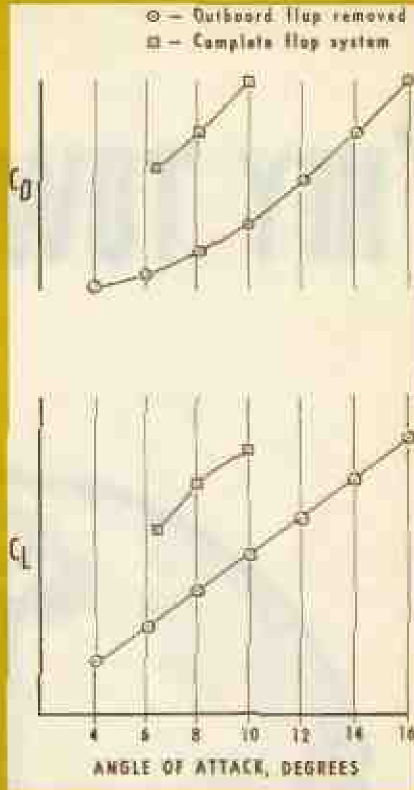


Fig. 13 – Lift and drag coefficient variation with angle of attack for the 747 model with and without the outboard flap

Scientists are still working for the solution and their results could affect future aircraft designs. Until that happens, it's still up to you to avoid the trap of the usually invisible, always present, and often deadly "horizontal tornado" — wake turbulence. ➤

Editor's Note: The minimum time and distance separation figures in the article are for operations outside radar controlled areas. The spacing requirements of military controllers are found in FLIP, SECTION II.

REFERENCES

1. John P. Reeder, John A. Zalovcik, and R. Earl Dunham, Jr., Vortex Wakes and Their Influence on Aircraft Terminal Area Separation Requirements, 8 Jan 69.

2. William A. McGowan, NASA Aircraft Trailing Vortex Research, presented at the Federal Aviation Administration Symposium on Turbulence, 22-24 Mar 71.

3. William A. McGowan, Aircraft Wake Turbulence Avoidance, presented at the 12th Anglo-American Aeronautical Conference, Calgary, Canada, 7-9 Jul 71.

4. R. Earl Dunham, Jr., Langley Working Paper No. 1146, Model Tests of Various Vortex Dissipation Techniques in a Water Towing Tank, 7 Jan 74.

"HEY TOWER, haven't you got

Not too many years ago, there were a few outfits which required sort of a cross-training program for air traffic controllers and aviators. The idea was to strap a young tower or GCA controller into the back seat of a Hun and let him enjoy the thrill of a dwindling fuel supply while trying to work into the landing sequence. The pilots, on the other hand, were required to visit tower, GCA, or RAPCON on a recurring basis so they could see how much fun it was to handle a mix of fast airplanes, slow airplanes, IFR traffic and VFR traffic with only one or two runways to play with and no less than a million people talking at the same time.

The result of the program was a healthy respect for the other fellow's problems. Unfortunately, the decrease in available cockpit/flying hours and the increase in recurring ground training duties make it tough to keep that kind of program alive.

The need for mutual respect within the air traffic control/aviator team hasn't decreased at all.

There seems to be a natural law which demands that the growth of air traffic shall always outpace the supply of modern equipment and experienced controllers. Given this fact, the best thing the pilot can do is to help ease the situation with some plain, old-fashioned radio discipline — well tempered with courtesy, consideration, and composure.

When I hear a pilot arguing with an air traffic controller, it always prints out in my mind as "adolescent aviator." If an airborne pilot has a valid reason for not accepting a clearance or lack of same, there are procedures, such as declaring an emergency, for seeking resolution.

If safety considerations are not involved, the only place to pursue an air traffic disagreement is ON THE

my clearance yet....?"

GROUND, not over the radio.

There are two major reasons for this. First, the pilot is usually tuned in on only one frequency. Thus, he may not have as great an awareness of the total traffic situation as the controller who is listening in on several frequencies plus a couple of landlines. Lacking this appreciation, the wrong chatter, argument, or delay at the wrong time could very well be putting another aviator in a bigger pinch than the first aircrew thinks he's in.

Secondly, if a situation is getting so sporty that a crusty old aviator of 5 or 6 (or more) years experience blows his cool with a blast at the controller, consider this: If the pilot is THAT rattled, how will his blast affect the rattle-factor of the first term controller who possesses limited experience in aviation?

Good radio discipline is not entirely a matter of composure and minimum verbiage. It also includes waiting until you're sure the frequency is clear before transmitting after a channel change, and it includes letting the arrival controller know your complete intentions without making him play "20 Questions."

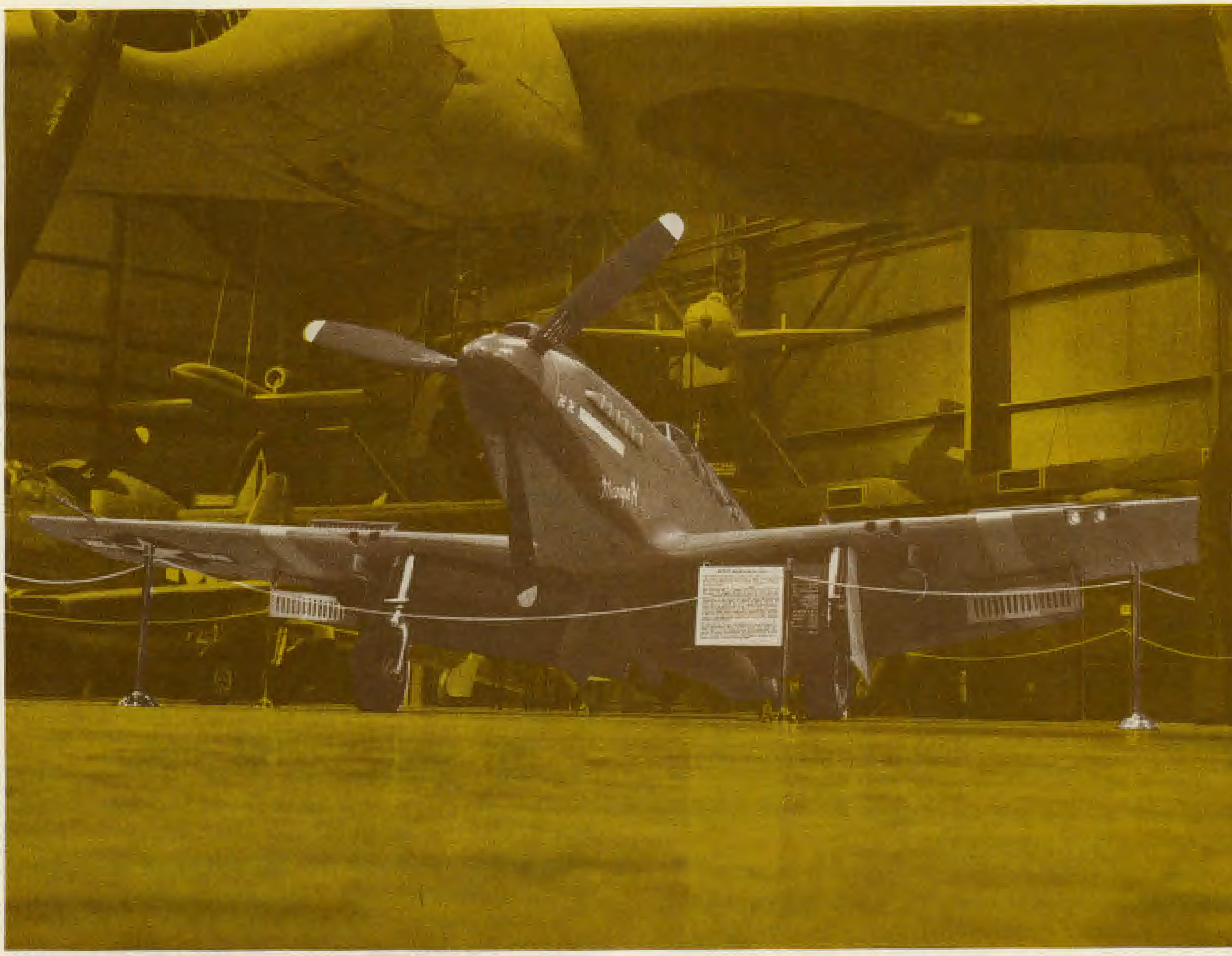
The courtesy and consideration part of the formula doesn't necessarily pertain to the use of "yes sir," "thank you," and "good evening." These are good phrases if you happen to be calling Salt Lake Center around midnight; but definitely out of order at 1100 hours local in the Washington Terminal Control Area.

The increase in air traffic and corresponding radio traffic, as you know, has resulted in reduced mandatory reporting and clearance read-back requirements. But occasionally, radio discipline means talking a bit more than required by the rules. When it's obvious that a center controller is straining to sandwich other traffic into airspace I'm vacating, it's good common courtesy to read back the altitude clearance. It's also a good idea to put yourself in the shoes of the tower controller who, in an effort to expedite traffic, clears an aircraft to "Taxi into position and hold." While a simple "Roger" will do (WILCO would be more appropriate), an "active AND HOLD" acknowledgment would be better and will significantly reduce the air traffic control pucker factor. (I also acknowledge "holding short," when appropriate.)

One more pet peeve: There is no control tower in existence that can manufacture an ATC flight clearance, and probably darn few which would intentionally conceal or withhold a valid clearance. When a pilot is strapped into a 115 degree Fahrenheit cockpit, waiting to start engines, he can be excused for making an occasional query on the status of a clearance delay. On the other hand, I've heard aircraft commanders translate their embarrassment for late takeoffs by getting tough with ground control. The reaction simply means that the tower crew has to discontinue supervision of the younger controllers while he tries to reduce the noise from the irate aircraft commander. If a real problem is developing in the traffic pattern, cross off one pair of experienced eyes that could be helping to resolve a more pressing problem.

To this point, I've been painting the aviator as the villain of the radio discipline team, but it works the other way, too. Someday, I'd like to disabuse that fellow in RAPCON of the idea that I possess a photographic memory. I refer to the scene where I'm in the soup, in a descending turn, and I'm handed off from center to approach control. Initial contact is made and, in one mouthful, I'm given a new altitude clearance, a new vector, altimeter setting, active runway, ceiling, visibility, winds, remarks, and missed approach procedure. It would be nice to claim that I'm smart enough to consistently assimilate all that. But to be honest, 8.4 flying hours per month just doesn't equip some people with that ability. WHEN TIME PERMITS, friend controller, please give me all those numbers a few at a time.

by Col. Robert E. Darlington
AFSA 116 TFW
Ga ANG, Dobbins AFB



THE A-36 DIVE-BOMBING MUSTANG

by William G. Holder
photos by Robert Shenberger

A new warbird recently made her appearance on the exhibition floor of the Air Force Museum. When she rolled in, everybody wondered why a second P-51 Mustang was going to be displayed. The bird definitely had a Mustang heritage from her pencil-thin fuselage and characteristic lower scoop. But it took the most discerning aircraft buff to tell that she didn't carry the P-51 label. The beautifully restored aircraft was an A-36 — a special breed of Mustang designed for a dive-bombing mission.

As is well known, there were a multitude of Mustang variants turned out during WW II. The first breed of 150 that were produced were designated as Mustang 1As and went to England. The A-36 followed as the next, and probably least known version, of the P-51.

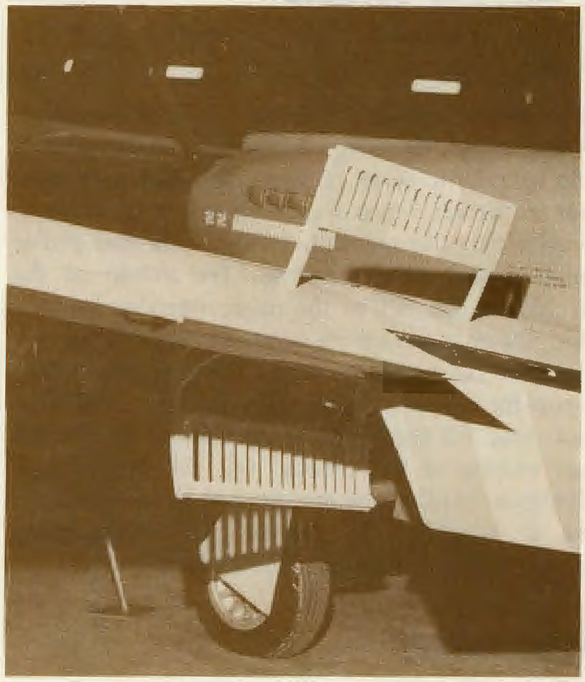
The mods necessary to change the Mustang into a dive bomber were extensive and quite interesting. Incorporated were four hydraulically operated drag brakes, one above and one below each wing (see photo). Initial A-36s were equipped with six .50 calibre machine guns, two being synchronized to fire through the prop. Later versions carried four wing guns and racks for carrying either drop tanks or two 500 pounders. The power plant was a 1325 horsepower Allison inline.

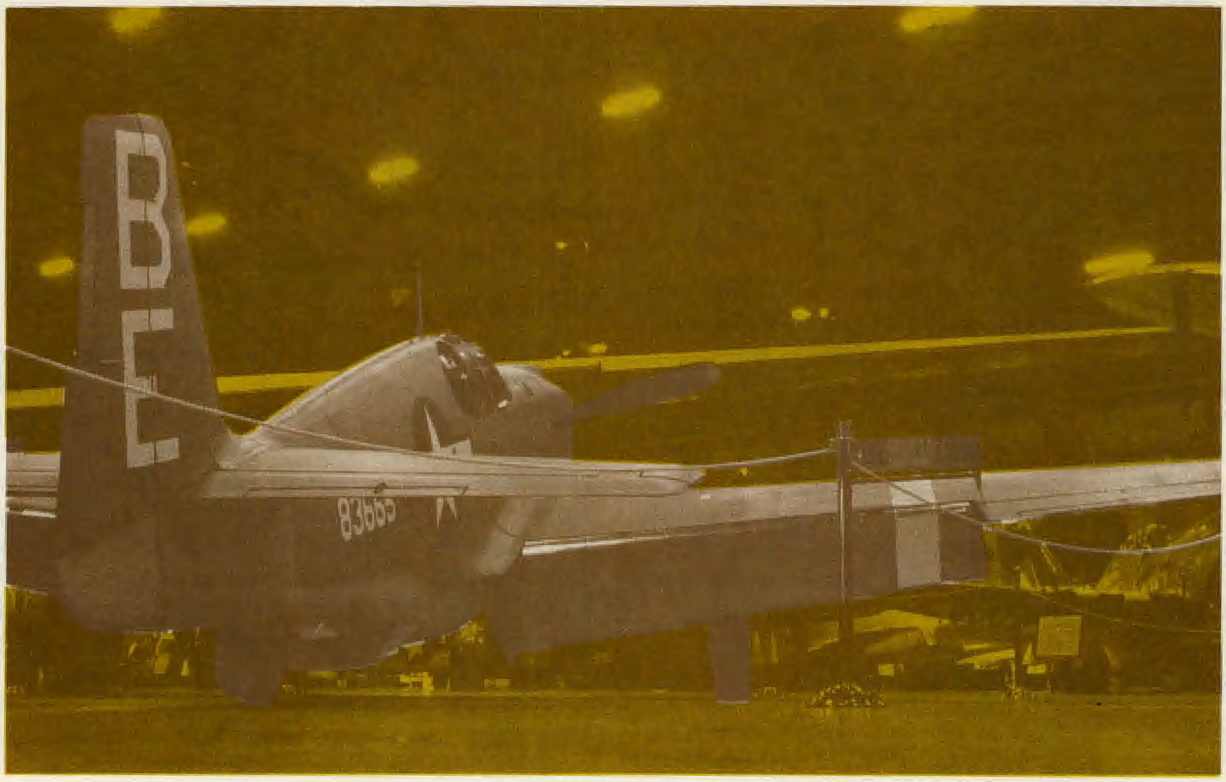
Work actually began on the A-36 conversion in early 1942 with delivery beginning in September of that same year. Five hundred were produced, and this unique bird had the honor of being the first Mustang to see combat action.

These INVADERS (the A-36's little-known nickname) equipped two groups in Sicily and Italy in 1943. During one stretch of action, A-36s piled up over 1,000 sorties in 17 days. During this time, an A-36 was also responsible for sinking a 50,000 ton Italian transport vessel.

The dive-bombing tactics of the A-36s had been preceded by the older but deadly German STUKAS, but these Luftwaffe machines certainly could not compare with the powerful INVADERS. The famed war correspondent, Ernie Pyle, once remarked while watching the A-36s at work "... The German STUKA could never touch them, even for sheer frightfulness of sound."

The A-36 was a one of a breed and the model was discontinued after the initial production. The Mustang's strong suit was definitely that of a high-altitude fighter and all the remaining Mustang versions that would follow were designed for that purpose – but the A-36 and its dive-bombing role proved its tactical effectiveness throughout the remainder of the war.





CHOCK TALK ...incidents and incidentals with a maintenance slant.

chock talk

F-4 MANUAL CLOSING
by TSgt Whiting
HQ TAC/SEG

Two airmen were working on an F-4 when it began to rain. They closed the canopy, but due to low air pressure on the aircraft, it failed to lock. One man positioned himself on the left intake in order to hold the canopy in place while the other manually locked it. By now you've probably guessed what happened. The airman on the intake slipped and fell to the ramp, receiving multiple injuries. Failure to use a work stand and performing a task that was not TO authorized caused this accident. There's no excuse for not using a work stand, but there is a reason for not using TO procedures — there aren't any for the manual locking of the canopy. Our F-4 people have advised Ogden ALC of the problem and since the manual closing is in widespread use by maintenance crews anyway, you should be seeing more on this soon.

WATER SAFETY
by TSgt Whiting
HQ TAC/SEG

During recent years, our country started a mass move toward water sports, a fabulous, fantastic pastime. Unfortunately, the increase in water sports led to a like increase in water related fatalities. Almost 90 percent of Air Force's sports and recreation fatalities involve water activities. Most fatalities occur off-base and during off-duty hours where Air Force supervisory influence is least effective.

A few years ago, the Air Force ran a survey and discovered that about 11 percent of the officers and 21 percent of the airmen would have difficulty surviving a water mishap which occurred 20 or more yards from a point of safety. The full accountability for drownings, however, cannot be attributed entirely to poor swimmers. Instances occur wherein strong swimmers perish as a result of overextending themselves, or through acts of indiscretion. The obvious point is that everyone should be able to swim and those who can should know their limitations. If you can't, learn — if you can, take it easy.

T-39 FREEZIN' GREASE

The pilot of a T-39 experienced a stuck throttle at FL 260 and all efforts to free it failed. The throttle was stuck at about 88 percent and all other engine instruments were normal for that power setting. The flight was continued to the destination airfield. On base leg, the engine was shut down with the engine master switch. Shortly thereafter, the crew found the throttle could be moved normally, so they fired it up for an uneventful landing.

The throttle binding couldn't be duplicated during the post flight inspection. During phase inspection, however, it was discovered the throttle crossover shaft had been greased with an improper lubricant. The technicians, suspecting the grease had frozen at the high altitude ambient temperatures, removed the linkage and refrigerated it. Sure 'nuf — the frozen lubricant would not allow movement of the shaft. How come the thing worked OK in the traffic pattern? — the warmer temperatures near ground level thawed out the grease!

This is a good example of sharp trouble-shooting on the part of the phase guys but it doesn't speak too well for the guy who greased the component. What was probably a matter of convenience for him ended up as a great inconvenience for the unfortunate crew who experienced the incident. Enough "inconveniences" like this can scratch crews and aircraft from our inventory — and who needs that?

THE CASE OF THE MURPHIED DUST COVER
by Lt Col Ronald A. Berdoy
58TFTW/SE

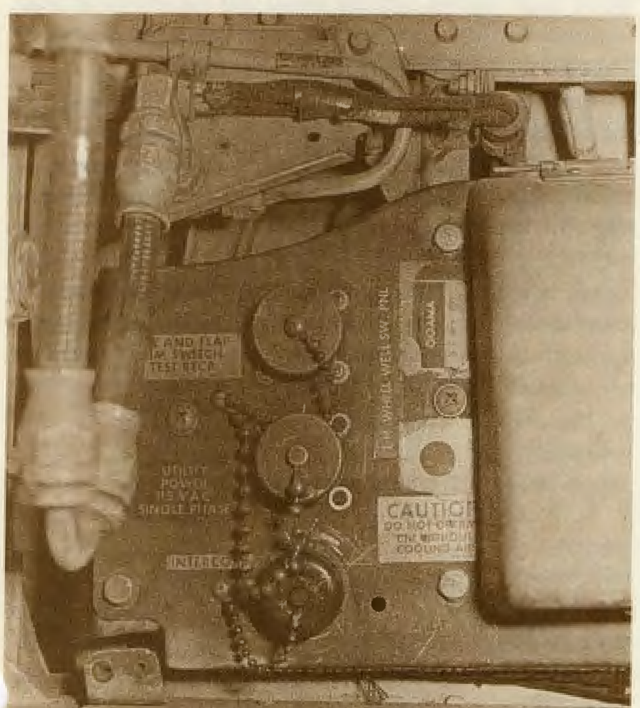
The F-4C was making overhead patterns and after the gear and flaps were down, neither the pilot nor the WSO was able to move the stick left of neutral. They climbed the Phantom straight ahead, cleaned it up and checked the controls with the stab-aug off - with no success. Using the rudder to maintain wings-level, the pilot then climbed to a safe altitude for a controllability check. After the gear and flaps were again lowered, everything checked out OK. The problem (and the white knuckles) disappeared, and a straight-in approach and landing were accomplished without further incident.

Then the trouble-shooting began. It seems that sometime in the past, the safety chain for the interphone receptacle dust cover had broken at its attachment point.

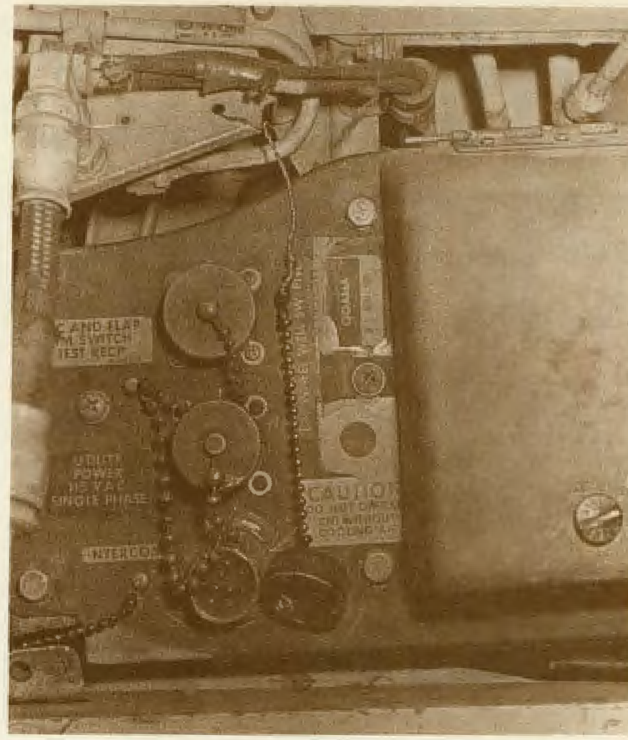
A friendly fixer repaired it by wiring the chain to a 2-½ inch piece of safety wire - and attached the safety wire to a handy hole in the bracket above the switch panel. At a later date, the switch panel was removed for repair and when it was reinstalled, the wire, chain, and dust cover were trapped behind the panel . . . and you guessed it. Our wayward plug ended up lodged in the aileron control rod behind the panel. Result? No left aileron available to the unfortunate crew who flew this bird on that fateful day. They regained control during the controllability check when they used right aileron — which freed the dust cover. Lucky.

A jury-rigged dust cover chain, a bit of work that wasn't properly QC'd and you've got the makings of an accident. This unit inspected all their aircraft and didn't find any other misplaced dust covers; all the flight chiefs were briefed on the incident, and an educational program was initiated to stress the importance of following proper tech data. Unfortunately, all of these after-the-fact actions help but they can't prevent another Murphyism — only you can. There are no unimportant jobs in TAC. Mistakes you make might not be as catastrophic as this one could have been, but all goofs cost all of us something. Let's work for conservation through accident prevention. It just makes good sense.

NOTE: These photos were not made of the actual incident aircraft, but simulated on another Phantom.



1. Correct Dust Cover Installation



2. Illustration of Jury-Rigged Dust Cover Chain

3. Jammed Aileron Control Rod (Switch Panel Removed)

*Question — See any other mis-rigged components?**

** Answer — Incorrectly repaired chain in Fig. 1.*

PHYZ-BIZ
PHYZ-BIZ
PHYZ-BIZ

"Don't Mess With Stress"

by Lt Col Andersen
TAC Physiological Training Coordinator

One of the simplest of arithmetic operations is addition. As children, we all learned this concept, which began: "One and one is/are two, two and one . . . etc." In view of the ease with which this operation was learned, it has always been amazing (to me, at least) that adults often exhibit little carry-over into "real life" situations. Apparently, some aircrews have never understood (or if they understood, promptly forgot) that this same concept applies in the area of physiological stresses. The effects of such recognized stresses as overindulgence in alcohol and tobacco, excessive fatigue, self-medication, improper diet, etc., are, indeed, all additive in their effects – all tending to reduce aircrew efficiency to the point where survival may be seriously compromised.

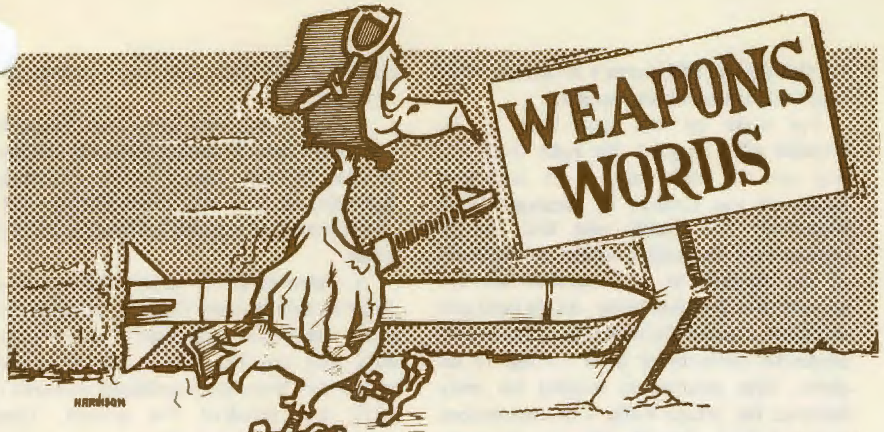
Most aircrews remember that inhaling tobacco smoke introduces significant levels of carbon monoxide (CO) into the smoker's blood stream, reducing its oxygen carrying capacity by crowding out the O_2 and resulting in a hypoxic condition. They may also remember that ingestion of ethyl alcohol, even under "social" or moderate drinking conditions, leads to a buildup of the substance in the blood stream. Its presence there interferes with the chemical reactions of brain and other body cells, and also causes a hypoxic condition. And some may even remember that self-medication with patent medicines containing substances such as acetanilid or phenacetin (in combination with aspirin and/or other

chemicals) can alter the hemoglobin in the red blood cells to a form which cannot carry oxygen – still another hypoxic condition.

It is important for each man to realize that not only are these three hypoxic conditions additive to one another, resulting in inadequate oxygenation of brain cells, but that even low grade hypoxia can become an important factor if the aircrew is subjected to repeated or sustained "+G" loadings (even if only moderate in intensity) or if hypoglycemia is present (TAC ATTACK, July 74). AFM 160-5 indicates that, "Since effects of low blood sugar (called hypoglycemia) and the effects of brain hypoxia reinforce each other, any significant degree of hypoglycemia must be avoided in the flyer."

Pulling "+Gs" reduces blood flow to the brain by causing blood to pool in the large blood vessels of the legs and abdomen (stagnant hypoxia). It almost goes without saying (but I'd better say it) that the additive effects of the low grade hypoxia induced by cigarette smoking, alcohol, etc., will reduce your TUC (Time of Useful Consciousness). TUC is the period of time between the interruption or loss of the oxygen supply until useful function is lost, (i.e., you can no longer help yourself). At altitudes of FL 350 or above, TUC is expressed in seconds – the average being about 90 sec. at that FL, and decreasing rapidly as altitude increases until at FL 400, about 15 seconds is all the average man can expect!

Is it so difficult to realize that the few precious seconds of TUC that are lost by indulgence in the self-imposed stresses (smoking, drinking, etc.) might – just might – be the difference between a safe recovery from an emergency situation and becoming a statistic? No more so than recognizing the additive nature of the self-imposed stresses and remembering that an understanding of these two concepts can be the difference between being an "Ace" or being an "Ass!"



WE DON'T KNOW ALL ABOUT 20MM TP AMMUNITION

by Lt Col William R. Barrett
HQ TAC/SE

So you know all about guns, but maybe not too much about 20MM target practice (TP) cartridges, which have for the past couple of years had our attention. The problem is that the TP cartridge separates at the neck and a part of the cartridge case is not extracted from the gun barrel. This could cause catastrophic failure when the next round tries to fire.

A tri-service Cartridge Case Neck Separation (CNS) Team was established in May 1973 to coordinate efforts in resolving the problem. Testing is being conducted on several theories developed through the tri-service team. Most important are differences in cartridge case manufacturing processes and the use of nonconforming gun barrels. Thousands of rounds of 20MM TP have been test fired under a variety of conditions, including gun barrels with different chamber diameters.

A recent and very plausible explanation of CNSs has been presented: A training cartridge case, when compressed 1/16 inch, causes a serious buckle in the neck-shoulder area of the cartridge case. However, an HEI cartridge case experiencing the same compression is not affected because the aluminum fuze cover takes the complete brunt of the force. This theory would account for the absence of such separations in HEI, but not for the fact that separations occur more frequently with some aircraft types than others. Approximately 70 percent of recently reported CNSs have been in A-7s.

One specific phase of the investigation is to determine if the A-7 rounds repositioner is causing compression of cartridges. AFLC and the Navy are investigating the A-7 rounds repositioner. The Air Force Materials Lab, Wright–Patterson AFB, and an independent laboratory in Kentucky are both continuing metallurgical investigations. In addition, the Lake City Army Ammunition Plant is doing test firings of suspected lots. The cause of CNS has not been found but the problem is being attacked from all sides. With all these people striving to give us better bullets, we are sure one day the M-61 gun system will be safer and the CNS problem will be solved. →

WEAPONS MISHAPS

TAC JUNE	TAC THRU JUNE 1974	TAC THRU JUNE 1973		ANG JUNE	ANG THRU JUNE 1974	ANG THRU JUNE 1973
			EXPLOSIVE			
8	44	91	TOTAL	0	10	28
4	20	30	Personnel	0	5	18
2	21	45	Materiel	0	5	9
2	3	16	Other	0	0	1
4	5	11	MISSILE			
4	15	2	NUCLEAR			

Letters to the Editor

Editor:

Recently I had the pleasure of meeting a TSgt Joe Evans from the 35TFW, George AFB, California. He was ingested into an F-86 engine in 1955 and lived. The attached article was written not only to highlight Joe's experience but also to stress maintenance safety and FOD prevention. I thought this may be of interest to you.

Travel to almost any United States Air Force Base in the world and somewhere in a flight line maintenance shop will be a display showing all the bolts, screwdrivers, safety pins and other assorted items that have been ingested into aircraft jet engines. These foreign objects do considerable damage to aircraft engines and replacement of engines cost thousands of dollars. In fact, one thin dime was drawn into an aircraft engine and resulted in ten thousand dollars damage. Yet, one item pulled into an aircraft engine can cost more than just money.

In September 1955, Airman Joe F. Evans, United States Air Force, was on temporary duty at Wheelus AFB, Libya, North Africa. Joe was a weapons technician performing duties as a weapons loading crew member. With only one year of service under his belt, Joe was not greatly experienced in the weapons systems of the F-86 aircraft. But he was enthusiastic and a willing learner. Little did he know that he would almost lose his life.

The F-86 had just landed at Wheelus AFB after a gunnery mission. Along with other loading crew members, Joe hurried to the flight line to remove the side access panels exposing the gun systems. His immediate task was to record the number of rounds of ammunition used during that mission. The pilot was aware of the ammunition counting requirement. With the single engine still running at approximately 60% capacity, the aircraft continued its noisy whine. The left panel was removed and rounds counted. As Joe moved near the front of the aircraft, his mind went blank. To this day he still doesn't remember what happened at that exact moment.

Joe woke up two days later in the Wheelus AFB hospital. His right thigh was sore and his ankle hurt. A six inch long facial cut was covered by bandages. What happened? Joe finally was told. As he hurried past the engine intake at the front of the aircraft, he was ingested into the aircraft. But Joe was lucky. As his head and shoulders entered the outer lip of the engine intake, he instinctively drew his legs to his chest. This resulted in lodging his body between the intake walls. This unconscious action helped save his life. At the same moment of Joe's ingestion, the pilot was preparing for engine shutdown. Suddenly he heard a "thump" within the aircraft. Aware of maintenance personnel around the aircraft, he immediately cut power to the aircraft engine. This action also helped save Joe's life.

Joe Evans is a very lucky man. Today he is an Air Force Technical Sergeant assigned to the 35TFW, George AFB, California. Basically, he is in fine physical shape with only superficial scars on his head, thigh, and ankle.

A review of USAF accident records from 1969 to date indicate there are possibly two other Air Force technicians still on active duty who have been drawn into an aircraft engine and lived. Both accidents occurred in 1970 and involved F-4 aircraft. These individuals join Joe in living testimony that carelessness around running aircraft engines is extremely costly and dangerous.

John E. Lee III Capt USAF
USAFTAWC Weapons Safety Officer

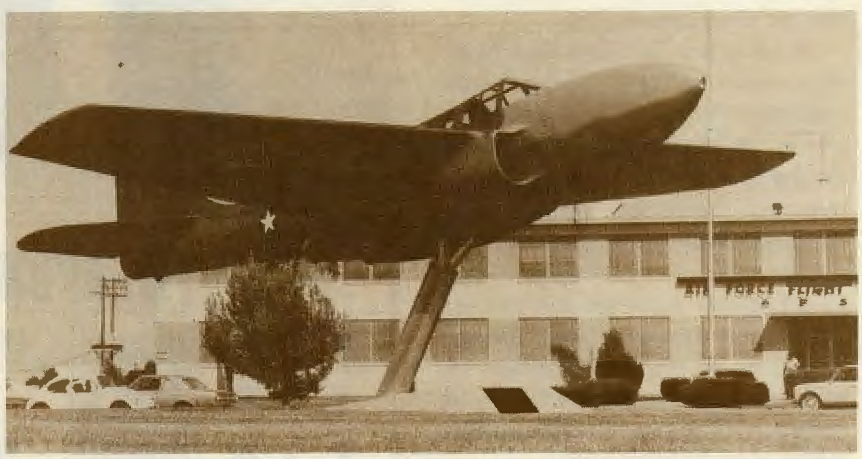
Editor:

It was interesting to read the article on the P-59 in the May issue. The advancement in jet aircraft and engines has been significant since that time.

It might be of interest to know that the first military pilot flew the XP-59A on its third flight. We are seeing this same early participation of military pilots in the testing of new aircraft today. The five new tactical aircraft being flown at Edwards AFB have Air Force pilots flying and working together with the contractors from day one. We also have seen a significant change to the point that Tactical Air Command pilots, as the using command, are flying in early development phases.

Currently, the XP-59A stands on a pedestal in front of the Air Force Flight Test Center Headquarters and this represents the start of the "Jet Age".

FRANCIS W. BLOOMCAMP, COL, USAF
Commander, 4486 TEST SQUADRON (TAC)
Edwards AFB



REUNION

Air Commando Association, 11-13 October 1974, Ft. Walton Beach, Fl. All former and present members of air commando/special operations units and their support organizations are invited to attend. For further information write F. G. Owens, P. O. Box 7, Mary Esther, Fl. 32569

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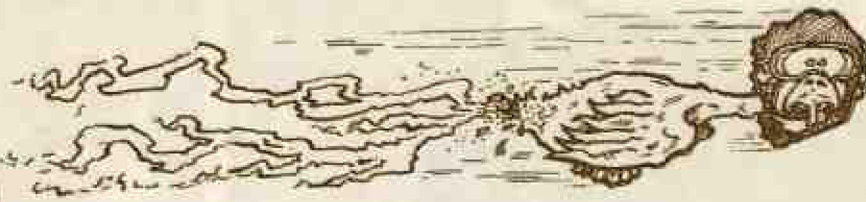
TAC TALLY



	TAC JUNE	TAC Thru Jun 1974	TAC Thru Jun 1973	ANG JUNE	ANG Thru Jun 1974	ANG Thru Jun 1973	AFRes JUNE	AFRes Thru June 1974	AFRes Thru June 1973
TOTAL ACFT. ACCIDENTS ►	2	13	24	1	9	12	0	4	1
MAJOR ACFT. ACCIDENTS ►	1	11	18	1	9	8	0	3	1
AIRCREW FATALITIES ►	0	6	12	1	7	1	0	1	2
TOTAL EJECTIONS ►	2	12	17	0	4	7	0	1	1
SUCCESSFUL EJECTIONS ►	2	11	11	0	1	6	0	1	0

TAC'S TOP "5"

FIGHTER/RECCE WINGS		
ACCIDENT-FREE MONTHS		
75	33 TFW	TAC
42	4 TFW	ANG
27	127 TFW	TAC
24	31 TFW	ANG
22	121 TFW	ANG

AIRLIFT/REFUELING WINGS		
ACCIDENT-FREE MONTHS		
108	440 TAW	AFRES
107	136 ARW	ANG
71	316 TAW	TAC
60	126 ARW	ANG
59	463 TAW	TAC

SPECIAL UNITS		
ACCIDENT-FREE MONTHS		
138	130 SOG	ANG
118	2 ADGP	TAC
99	143 SOG	ANG
87	DET 1, D.C.	ANG
63	135 TASG	ANG

MAJOR ACCIDENT COMPARISON RATE 73-74

		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
TAC	73	5.0	5.1	5.1	4.2	4.3	5.0	4.8	4.4	4.2	4.1	4.2	4.1
	74	4.5	5.4	5.6	4.5	4.0	3.6						
ANG	73	8.5	8.6	6.8	5.0	4.7	5.1	4.3	4.2	4.6	4.2	3.9	3.7
	74	7.2	8.6	8.2	5.7	6.9	6.3						
AFRes	73	14.9	6.7	4.1	3.2	1.8	1.5	1.3	1.1	1.0	.9	.9	.8
	74	0	16.4	8.9	8.8	6.7	5.3						


FLEAGLE
HARDISON
FLEAGLE IN THE BREAK.
ROG, USE CAUTION... BIG BIRD ON FINAL.
HAMFISTED ?
NO, WAKE TURBULENCE.
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