TAC ATTACK

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MIDAIRS ......Page 4

for efficient tactical air power

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TACTICAL AIR COMMAND

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An enjoyable flight is not necessarily an unprofessional one.

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Angle of ATTACK

"check six"

How many times have you watched prop wash or a jet exhaust buffet a man standing helpless in its wake? And have you ever seen an MD-3 turned over by an aircraft pulling out of the chocks? If you've been around very long, you have probably seen your share of these fiascos. You would also think that this carelessness would be easy to control. But for some reason, it still happens.

In the past few months there have been several reports of damage caused by a pilot's disregard of people and equipment at his six o'clock. Though these reports originated in other commands, we are not immune in TAC. Here are some excerpts from the incident reports.

> The engine blast caused the trailer to jump its chocks, roll past two shelters, and crash into the inside wall of a shelter where it stopped.

> The blast from the number one engine running at full military power moved a tied down BT-400 blower approximately 20 feet before it was overturned and damaged.

> Prop blast ripped a sheet of heavy-gauge corrugated asbestos from the roof located 170 feet away. Pieces of the roofing were propelled 60 more feet up over the building and an adjacent revetment wall, and struck the right aileron of a cargo plane.

The powerful engines we use today, by their very nature, create a tornadic movement of air behind them when running at speeds above idle. It takes only one careless moment to jeopardize a human life or to destroy valuable equipment. It also takes only one moment to "check six" before you open the throttles.

R. L. Liles

R. L. LILES, Colonel, USAF
Chief of Safety

A Second Look At....

FORMATION MIDAIRS

Each year midair collisions take their toll of aircraft and people throughout the world. Until positive air traffic control from the ground up can be implemented, these collisions will continue. Their frequency should decrease as our control technology strides ahead. However, this discussion will not be concerned with random collision of airplanes airborne for unrelated reasons. Rather, we will discuss one facet of midairs, one which we have control over, and one which we can stop right now — the collision between aircraft in the same flight.

Last year Tactical Air Command suffered five of these. Their cost? Seven aircrew fatalities, eight aircraft destroyed, and two aircraft damaged. So far this year we have had two midair accidents and one incident.

With the exception of one accident, we learned nothing new from our bashes. The mistakes are the same, only the equipment differs.

The cause of the following accident is undetermined with a probable cause listed as a malfunction of the flight control system, source unknown. While crossing over from the left wing position, with lead in a right turn, the pilot felt a pitch transient that caused the nose to come up. He pushed forward on the stick to counter it and shortly, felt a thump. He had passed lead on the right or inside. The thump was his vertical stabilizer colliding with lead's nose section. He lost the upper part of his vertical stabilizer and removed the leader's radome. Both birds recovered.

The other four accidents selected might not have required an Accident Investigation Board; the causes are well known. They involve collisions that have been going on for years and fall in three categories.

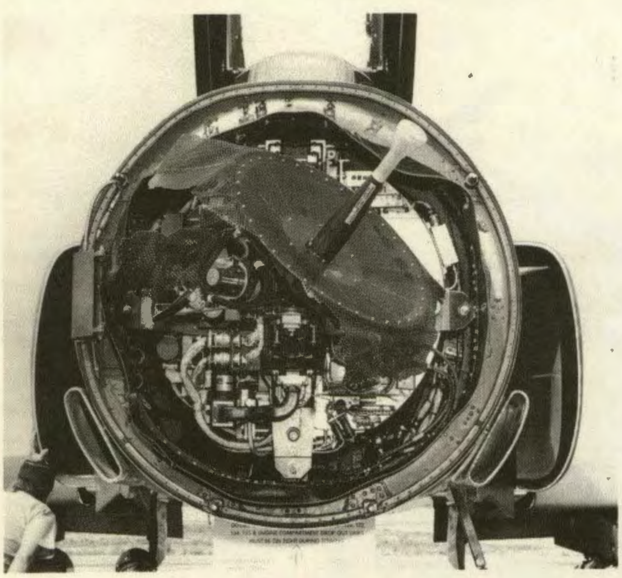
- Low aircraft pulling up and striking high aircraft as attack begins to develop into a scissors maneuver.
- During extended trail practice, Three gets out of position and collides with number two during a turn reversal.
- After break-off from two-on-two tactics, wingman from first element fails to maintain flight integrity and collides with another flight member.

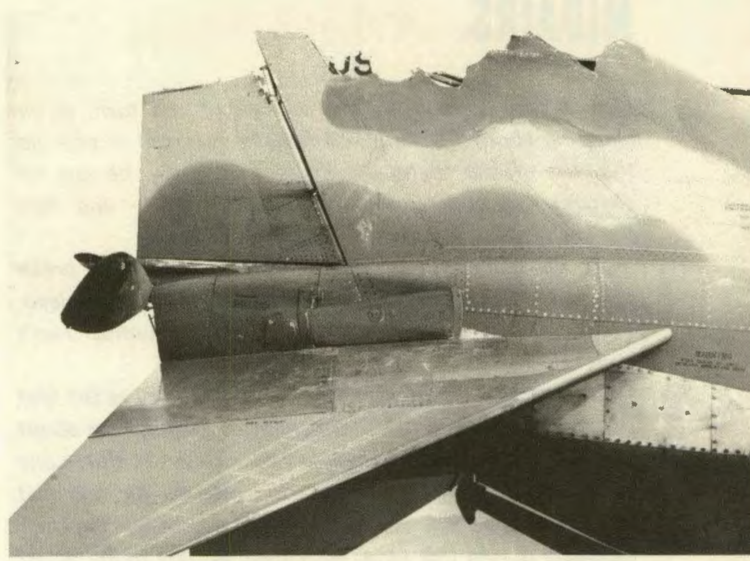
The first situation involved a flight of two who were doing ACM with the attacker starting from perch position. ***Number two started his attack from the left side of the leader and called in, the leader acknowledged. Lead turned into the attack and as an overshoot developed,***

Two initiated a yo-yo. As Two passed through the high 6 o'clock position of lead, the latter performed a hard, nose-high reversal and pulled up into the attacker. Number two was banking into lead when he recognized a collision developing, so he decided to stay high and rolled out his bank. The leader kept closing in his right climbing turn. The last Two saw of him was as he passed low and aft, just before impact.

We'll never know why the leader didn't break off. Perhaps he thought, as Two did, that they would not collide. At any rate, both aircraft ended up in a position where collision was inevitable unless some action was taken to avert the outcome. Situations such as this pop up almost before you realize what's happening when two aircraft go into a maneuver with high energy potential and are being flown to optimum performance.

The next situation develops insidiously due to lack of a reliable reference to judge overtake and interval. It involves a flight of four in-trail. *The leader pitched out using three-second spacing to get the flight into extended trail formation. Number two accomplished a sight check, then as lead was making a gentle left turn, Two noticed that he was getting too close. Lead reversed his turn so Two stayed on the outside to gain separation. Just prior to lead's reversal Three detected an excessive closure rate on Two and slid high and to the outside of the left turn. As the direction of turn reversed, Three found himself high and on the inside of the right turn and abreast or slightly ahead of Two. At this time he encountered jet wash and was unable to maneuver. Three could see that he was very close to Two and transmitted to Two, "Look out!" Three's aft section then contacted the nose section of Two and broke off everything forward of the cockpit. The horizontal stabilizer also was torn off of number three aircraft. Both pilots punched out.*





Extended trail formation should be recognized as being more difficult than close trail. You can't relax for a second even though it may feel more comfortable than being in close. Hark back to your ACM briefings and you'll have all the reasons why you should stay on your toes.

Our last situation falls into the category of the taxi accident. It seems odd that we brief as a flight, takeoff as a flight, and land as a flight, yet allow loss of flight integrity to occur and just wait for it to correct itself. Also, we fly as a flight for, among other things, mutual protection from those who would sneak in and attack. Yet we counted two accidents last year where a member of a flight practicing combat maneuvering, ran into another aircraft without being seen in time to avert the collision!!! In one of the narratives that follow, there were EIGHT PAIRS OF EYES IN FOUR AIRPLANES, yet two aircraft collided.

The accident occurred during the first attack of the pursuit curve training portion of the mission. Initial visual contact at rendezvous was by the second element, they were on opposite sides of a left hand orbit at this time. Number three initiated the attack by lighting burner and pulling up to 17,000 feet to close on the lead element as they continued their orbit in a 30-degree bank. By the time lead had completed a "180," Three was in an attacking position on a pursuit curve. At this time Three was tracking the leader, and both wingmen were in good fighting wing position on the outside of the turn.

When the attacking element was about 5000 feet out, the leader indicated that he had them in sight at 7 o'clock. Shortly, Three called, "It's too late . . . I've got you." The leader then called to break it up and set up for another attack. Almost immediately Four lost sight of number two in his 2 o'clock low position at about 400 feet. He *then broke up and to the outside of the turn. After climbing about five hundred feet, he reversed to pick up the rest of the flight. As he looked down, he saw his element lead and number two superimposed — and then the collision.*

It was assumed that Three loosened his turn to break off and Two was pulling it in to get back with lead. Impact was between Three's right drop and number two's right wing.

The second engagement was begun the same as the first with a 90-degree separation maneuver. Turn-in was about 10 NM. As the elements passed each other at about one mile in a quartering head-on attack, air combat maneuvering began. The two wingmen were leading their elements during this time, with their leaders flying off of them. During the hassle, number four gained an advantage on Two, due to a poorly timed reversal by the latter. It put Four into an easy tracking situation and threw the leader (who was flying Two's wing) wide to the left. At this point a sandwich situation began to develop with Four gradually beginning to slip between the leader and number Two. The instructor pilots flying One and Three then called off the engagement. After the break-off command, everyone except number two rolled out on an easterly heading. Two continued in a right turn and went out of sight, although he seemed to understand the breakoff call — he was never seen again.

The remainder of the flight continued east for a short time, and then began a left turn to the north. During this time, the element leads took their positions back from the wingmen. When Three and Four were half way through the turn to a northerly heading, number two collided with four, striking him from the left and below. Both aircraft went down. The only survivor was the A/C in the number four aircraft.

As was mentioned earlier, we learn nothing new from this type of midair collision. All the accident boards probed soundly and deeply into the causes of these mishaps, but were hampered by the lack of survivors. With exception of the in-trail accident, there were no survivors in the colliding aircraft. So where does that leave us? We must go deeper than "rebrief all pilots," but what else is there? Perhaps someday all pilots will have an electrode implanted in their brain and can be controlled by a computer on the ground — but then, the computer will be made by man, won't it?

Air fighting is a hazardous part of our profession, as is training for it. We should not lose sight of the basics of formation flying. When you fly with a flight, with other people, you assume a lot. This is necessary. Just as you trust others to do their job, they trust you. If but one of you slack off or relax, everyone in that flight is jeopardized.

And when you hurl your aircraft at another you have a responsibility. Your personal desire to be aggressive while training must be subordinate to your opponents well being and continued long life, even if you don't value your own.

In short, everything you do should be directed at the man you fly on and commands of the leader, whether they were given in your briefing, by signal, or over the R/T.

No matter what the future brings, the lesson has been taught us over and over. Some will learn it, others will eat their books — what's your choice? →

TACTICAL AIR COMMAND

Pilot of Distinction

Major R. L. Norman

Major Raymond L. Norman of the 4th Tactical Reconnaissance Squadron, Bergstrom Air Force Base, Texas, has been selected as a Tactical Air Command Pilot of Distinction.

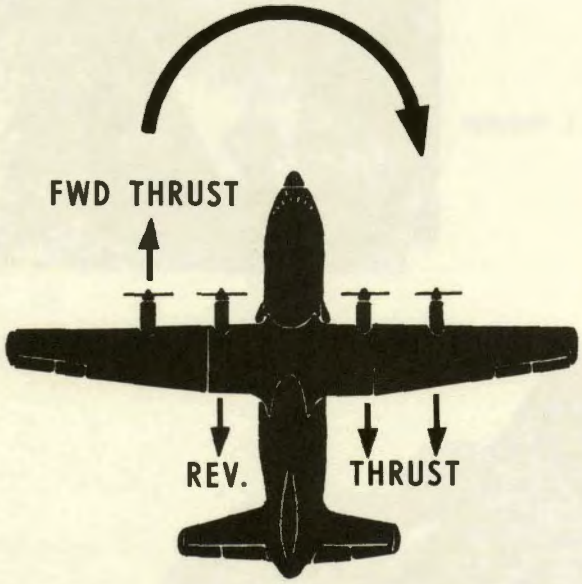
Major Norman was flying an RF-4C on a low altitude training mission with a student navigator in the rear seat. The aircraft struck a flight of ducks while in a 45-degree bank at 1200 feet and 420 knots. One duck struck the right quarter panel of the windscreen and continued into the cockpit, glanced off the instrument panel, and struck Major Norman on the right shoulder and head. Although partially stunned and blinded by the debris that had blown under his visor and into his eyes, Major Norman realized he was at a high angle of bank at very low altitude. He rolled the aircraft to what he thought was level flight and initiated a climb to safe altitude.

Major Norman wiped some of the debris from his eyes in the climb, gained minimal vision in his left eye, and headed for home. He dumped fuel to lighten the aircraft for an immediate landing.

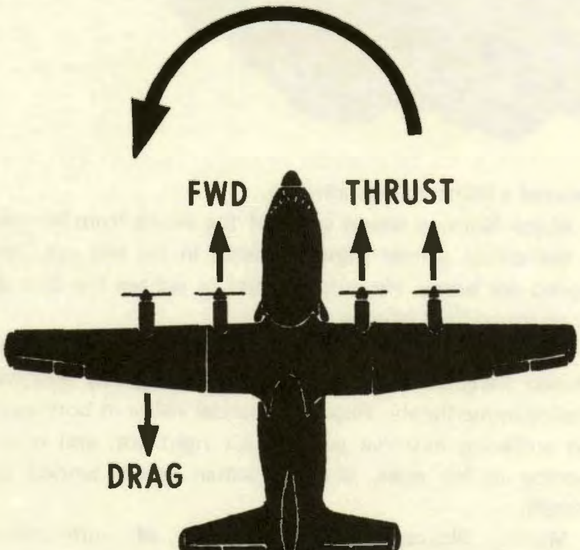
Shouting over the high wind noise, Major Norman advised Bergstrom tower he had an emergency and was landing immediately. Regaining partial vision in both eyes, but suffering extreme pain in his right arm and severe burning in his eyes, Major Norman safely landed his aircraft.

Major Norman's demonstration of outstanding airmanship in a critical situation qualifies him as a Tactical Air Command Pilot of Distinction.

TURBOPROPS ARE QUICK!!



LANDING



TAKE-OFF

Turboprop power plants are noted for quick, precise, response to the pilot's commands. The C-130 measures up to all expectations with the throttles under the pilot's palm producing instant acceleration or deceleration in flight or on the ground. Changes in thrust are immediate. However, propeller malfunctions may also produce immediate results. Safe handling of power plant emergencies requires accurate analysis of the problem and rapid corrective action by the pilot.

Let's review a couple of case histories. First, the effect of an attempted C-130 takeoff with an outboard propeller apparently in ground operating range (beta) and the other propellers governing normally. In one representative accident, pre-takeoff power checks indicated that the number one engine was not developing full power as evidenced by reported high RPM, low torque, TIT, and fuel flow. The crew finally elected to go with "low power output."

The runway was 8300 by 200 feet at near sea level. Approximately 2,000 feet from the start of takeoff roll, the nose gear began skidding left. At this point, the aircraft was rotated to takeoff attitude. At 3800 feet the aircraft left the runway in a skidding left turn, nose high, left wing low, traveled a short distance on the grass, then became airborne for approximately 150 feet. The aircraft settled back to the ground on the left main landing gear for a distance of approximately 50 feet, then became airborne again for about 1,000 feet at which time the left wing contacted an obstruction causing it to separate near number one engine.

Thrust that gets out from under the pilot's palm can also cause problems on landing. Let's look at an accident which is typical of one propeller not reversing during landing. This was a C-130B, VFR, landing on a 4225 by 98-foot strip of uneven, pierced plank. The aircraft flew a 4,000-foot pattern and made a short field landing approach with a threshold speed of around 145 KIAS.

Touchdown was made approximately 1,500 feet from the threshold. The aircraft bounced, and while still airborne, yawed about 15 degrees right. When ground contact was again made, the aircraft immediately swerved to the right, leaving the runway nearly 2,000 feet from the threshold. Control was apparently regained because the aircraft paralleled the runway 20 feet to the right. The aircraft commander was unable to return to the runway and the aircraft continued on this track until the nose gear dropped into a ditch.

There are a number of factors which effect directional control of an aircraft during takeoff and landing. How they are handled determines who ends up in control of the aircraft; the pilot, or the accident investigating board. It boils down to this: asymmetric thrust and controls available to the pilot for corrective action. The difference between these two is available controllability.

Asymmetric thrust results from uneven power output from engine and propeller combinations. Normally, there are only slight variations between engines. However, if we have a prop feathered, asymmetric thrust produced by the opposite operating engine can become quite large. Throw in drag or thrust of a malfunctioning prop and it is easy for the situation to get out of hand.

Asymmetric thrust results in a turning moment on the aircraft which is the product of the asymmetric thrust and the distance between the aircraft centerline and the thrust line. As an example, take the case of landing and reversing with a pitch-locked propeller. The turning moment acting on the aircraft can be extremely large, since it will be the sum of the moments produced by forward thrust from one propeller and reverse thrust from the others.

The pilot's available controls are throttles, aerodynamic controls, nose wheel steering, and brakes. Since asymmetric thrust is the producer of the adverse turning moments, placing the throttles in a position of least unbalanced thrust is the most effective control. <u>If movement of throttles cause a problem, they should be returned to where they were previously</u>!

Rudder effectiveness is a function of speed and rudder boost pressure. At slow speed, rudder is virtually ineffective. Nose wheel steering capability varies with weight on the nose gear and condition of the runway. Brakes may help in maintaining directional control, but again braking is a function of runway surface.

Thrust is the end result of the pilot's throttle movements, but what he sees on the C-130 engine instrument panel is indicated torque. During normal takeoff and cruise, the relationship between torquemeter readings and thrust follow a given relationship. However, remember that the torquemeter reads <u>positive</u> torque during reversing and it may indicate proper positive torque when the power-plant is producing drag with the propeller actually in reverse. Since torquemeter indications may be misleading in some cases, it is mandatory that the flight crew accurately interpret the engine run-ups and in handling power plant emergencies during takeoff and landings. TIT, RPM, and fuel flow should be monitored as well as torque. Cross checking a malfunctioning engine against the other three engines in most cases will reveal the problem.

To better understand the magnitude of forces involved in C-130 power plants, we should look at the distribution of power through the turbine to the propeller. The propeller on a T56-A-7 engine absorbs 4200 horsepower, gearbox and accessories about 100 horsepower, and the compressor uses up a whopping 5500 horsepower. So the turbine must produce 9800 horsepower. Should the engine flame out, the propeller attempts to drive the power plant at an on-speed RPM when airspeed is sufficient.

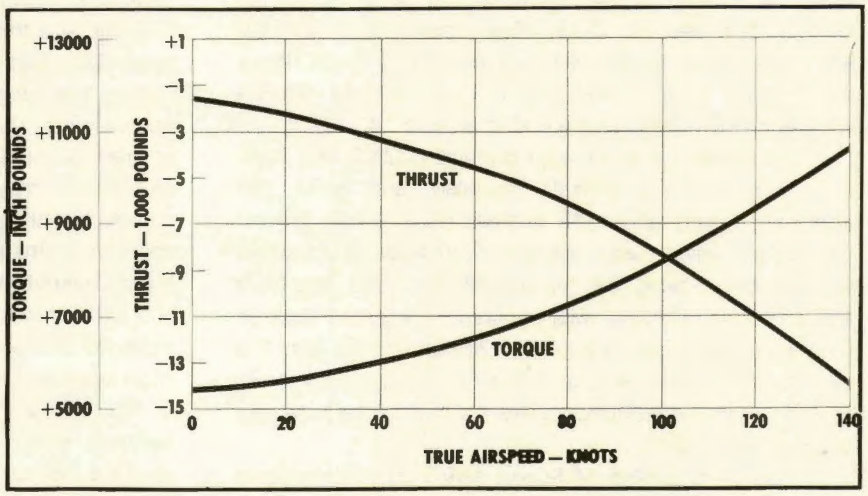
To prevent severe asymmetric drag on the aircraft, the negative torque system and the safety coupling were incorporated into the power transmission system. The negative torque system (NTS) limits negative torque to a nominal minus 1260 inch-pounds or minus 275 horsepower. Backing up the NTS is the safety coupling, located between the gearbox and the torque shaft, which disconnects the propeller and gearbox from the engine at about minus 6000 inch-pounds.

Going back to the example of the takeoff accident, let's assume that the propeller was below low pitch stop with no ability to hold or increase blade angle, say at the minus 4-degree angle. (Fig.1.) During run-up, the torquemeter would read less than one third normal takeoff torque and there would be a slight reverse thrust generated prior to brake release. RPM would be about 105 percent or fuel-topping. As velocity increases down the runway, torque increases and RPM falls off, indicating an improving situation. This assumption is wrong. Reverse thrust, or drag, will increase as airspeed increases, causing the aircraft to become more and more out of control. High RPM accompanied by low torque should alert the crew to a problem as takeoff power is set.

Figure 2 reveals what the pilot must cope with in the above takeoff case. Asymmetrical thrust produced by three engines operating at takeoff power (19,600

Figure 1

PROPELLER, TORQUE & THRUST —4° BLADE ANGLE & FUEL GOVERNING



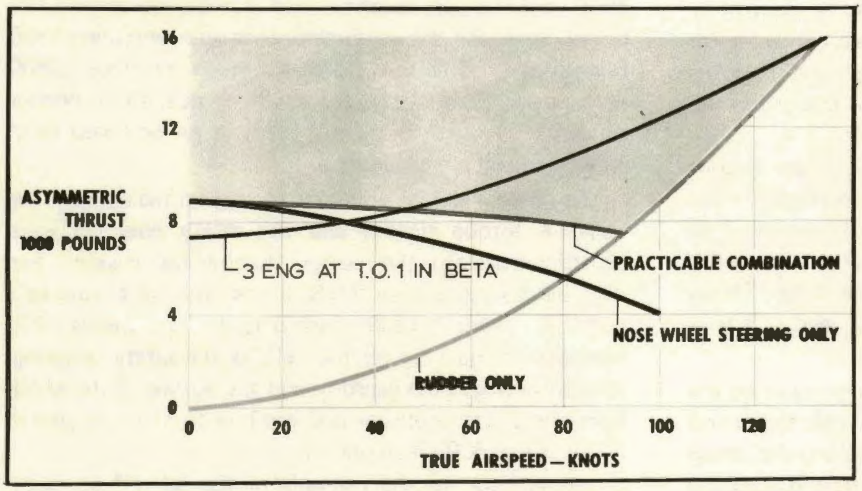
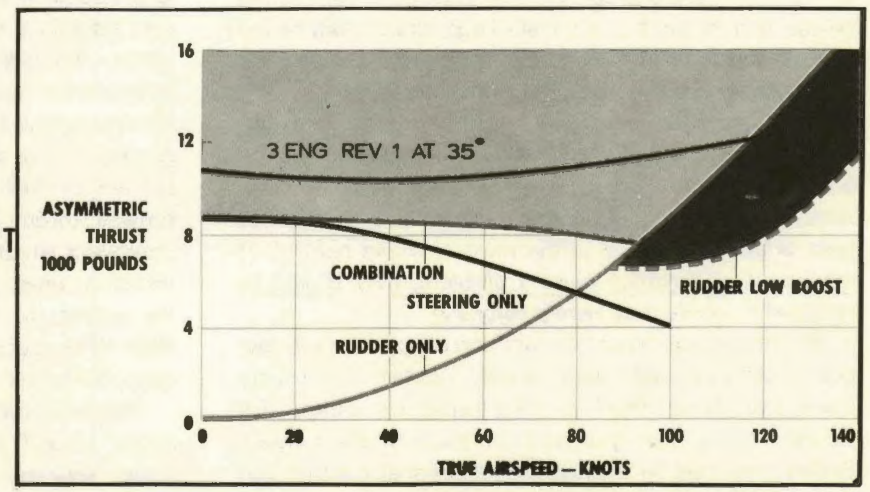


Figure 2

T.O. ASYMMETRIC THRUST vs CONTROLLABILITY

Figure 3

LANDING ASYMMETRIC THRUST vs CONTROLLABILITY



inch-pounds torque) and the number one propeller remaining in the ground operating range (beta) is shown by the line so labeled on the chart. The light area at the top represents the uncontrollable range. The light line shows capability with nose wheel steering on dry runway only, and the bottom line is rudder only. The border of the light shaded area depicts the practicable combination of rudder and nose wheel steering which the pilot is able to attain. In this case, most of the nose wheel steering capability is required to prevent the aircraft from swerving at brake release. As the takeoff roll progresses to 40 or 50 knots, the asymmetric thrust has increased so that it exceeds the available control capability and the pilot is no longer in command of the aircraft.

Looking at asymmetrical thrust of the typical landing accident where number one propeller remained in the flight range (as an example, pitch-locked at 35 degrees) and the other three propellers fully reversed after touchdown, (Fig. 3) we see that the aircraft is uncontrollable at all speeds below 120 knots. To recover from this situation, the pilot must return throttles to ground idle to reduce the unbalanced thrust condition. The area on the chart bounded by the dashed line represents rudder effectiveness in the rudder low boost operation with the flap lever above 15 percent, or with the loss of one hydraulic system.

Propeller malfunctions will usually be detected by the crew that performs an engine power check before each takeoff. It should be standard procedure to investigate any unusual differences shown by engine instruments during run-up. If there is any doubt as to whether you have an engine or propeller problem, your best bet to become an "old, bold pilot" is to taxi back and let the maintenance crew investigate.

When these emergencies do occur during takeoff or landing, there are certain proven steps to follow:

BEFORE REFUSAL SPEED

If a suspected propeller malfunction occurs on the takeoff roll prior to refusal speed:

1. Retard all throttles to flight idle and pull the fire emergency control handle for the affected engine.
2. Retard all throttles to ground idle.
3. Use symmetrical reverse and brakes to stop.

AFTER REFUSAL SPEED

If a propeller malfunction occurs after reaching refusal speed, continue the takeoff. If the malfunction was caused by electronic governing, placing prop governor control switches in mechanical governing will normally correct the problem. If not, a check for pitch-locked propeller, as outlined in the Flight Manual Emergency Procedures, should be followed.

DURING FLIGHT

A rare malfunction which has occurred and requires proper handling during flight is propeller pitch-lock, or fixed-pitch propeller. There is always the possibility of high drag up to the point of safety-coupling disconnect or high propeller overspeed after decoupling. Under certain combinations of blade angles and aircraft operating conditions, drag produced by a windmilling propeller coupled to the power section can be about six times higher than decoupled drag. For this reason, the Emergency Procedures recommend slowing to 150 knots true airspeed before securing the engine. This speed is high enough to generate the necessary negative torque to decouple but not high enough to produce an excessive overspeed on the decoupled, windmilling propeller.

LANDING

Landing with a malfunctioning propeller, as one of the accident examples indicated, can present the pilot with a handful of control problems. Placing throttles in full reverse with one propeller remaining in flight range (as when pitch-locked) presents a completely uncontrollable situation! If the aircraft swerves when throttles are placed in reverse, it should be handled this way:

1. <u>Immediately return throttles to ground idle</u> to reduce asymmetric thrust.
2. Make maximum use of nose wheel steering, rudder and aileron, differential power, and differential braking to control the swerve.
3. When control is established, apply maximum brakes.
4. If the engine instruments indicate which propeller is malfunctioning, pull the fire emergency control handle.
5. Use symmetrical reverse to aid stopping.

The C-130s turboprops are always ready. With a little respect and close attention to engine instrument indications, they'll remain a faithful servant and not become master of the aircraft.

By

Glen Gray
Lockheed Engineering Flight Test Pilot

William Miller
Lockheed Flight Test Operations Engineer

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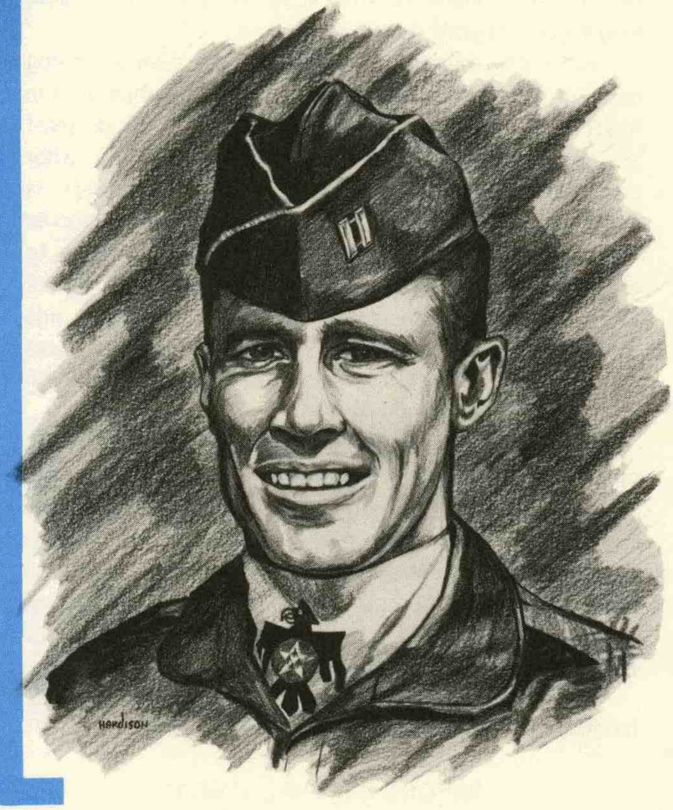
Lockheed C-130 Project Engineering Specialist

Bob Madsen
Hamilton Standard Propeller Installations Project Engineer

Thunderbirds

PHANTOM II

by Capt Mike Kerby
Solo Pilot



Captain Kerby graduated from Pilot Training at Webb AFB in November 1960, and completed advanced Fighter Training at Luke AFB. After a brief assignment to Nellis, he joined the 417th Tactical Fighter Squadron at Ramstein flying the F-100. In 1965 he was assigned to the 615th Tactical Fighter Squadron at England and deployed with the squadron to Phan Rang, RVN.

After two months he was reassigned to the Air Force Advisory Group and received an in-country checkout in the A-1H. He flew 100 combat missions as an advisor to the South Vietnamese Air Force. His decorations include the Distinguished Flying Cross, Bronze Star, and the Air Medal with six Oak Leaf Clusters.

Captain Kerby returned to Nellis in July 1967, and attended the USAF Fighter Weapons School. Following graduation he remained as a flying and academics instructor until he joined the Thunderbirds in January 1969.

In March of this year the USAF Aerial Demonstration Squadron "Thunderbirds" transitioned into the F-4E, and opened their show season in the Phantom II at the Air Force Academy on the 4th of June. As we had anticipated, the F-4 is an excellent demonstration aircraft. The equipment the team now uses is the stock F-4E with a few minor modifications.

For an aircraft built as a Mach II fighter-interceptor, the McDonnell Douglas F-4 has come as close as any modern day fighter to fulfilling the elusive concept of the "all purpose" tactical aircraft. The extraordinary job being done in SEA by the F-4 as both an air-to-air machine, and a long-legged fighter bomber is ample testimony to its versatility and adaptability, and ultimately to its excellent design concept.

The Thunderbird aircraft are blocks 31 and 32, the first F-4Es built, and were not originally equipped with radar. The team maintains them in the radar-less configuration, and uses the extra space in the nose for baggage, and for two 300 cubic inch bottles which provide air pressure for the smoke generating system.

The F-4E is powered by two J79-GE-17 turbojet engines with a modified afterburner control to permit instant first stage AB selection at 89 percent RPM or above. A modified variable area exhaust nozzle pump is incorporated on each engine, extending the negative-G flight capability from 30 to 50 seconds.

Additionally, the Thunderbird aircraft have been equipped with VHF, VOR, ILS, and a low frequency ADF system. The weapons delivery system and missile control system have been removed, and the front cockpit instrument control panel and consoles have been rearranged to accommodate the additional equipment.

Externally, the gun compartment is utilized to house components of a gaseous oxygen system which supplements the standard liquid oxygen system. Dummy missiles, filled with oil, are mounted on the four fuselage missile stations, to provide smoke generation by ejecting oil into the engine exhaust wake. The entire airframe has been painted with polyurethane paint, using the standard camouflage paint as a base. It is a high gloss paint, and is wearing very well.

Aerodynamically, the Thunderbird F-4E is almost identical to the stock F-4E. Wing loading is slightly higher in the show configuration with a full fuel load due to the increased gross weight of the Thunderbird aircraft, which tips the scales at about 45,850 lbs versus approximately 44,000 lbs for the stock F-4E. The rudder-feel airspeed switch has been supplemented by a two position toggle switch mounted on the main instrument panel. The "normal" position functions exactly the same as does the F-4E rudder-feel system. The "low" position acts as an override switch and provides 2.6 lbs of pedal force per degree of rudder deflection, regardless of airspeed. The stabilator control system is identical to the stock F-4E.

With equipment in hand, the solo pilot embarks on a very interesting and challenging phase of his flying career. While the diamond demonstrates the grace and beauty of precision formation flying, the solo focuses on the maximum performance, subsonic envelope of the aircraft. In solo work as in any phase of flying, the key to success, and survival, is proper training. Typically, a new solo pilot will know very little about solo flying, in contrast to the diamond trainee, who generally has a good degree of formation proficiency.

Initially, solo training consists of formation flying. The Thunderbirds are a formation outfit, and everything from walk down to hand shake is formation oriented. Much of the solo routine includes formation maneuvers with the diamond, and flying the outside left or right position in a wedge roll or loop naturally requires formation proficiency. To "formate" effectively, aircraft handling must be smooth, and this pays dividends in the solo demonstration of maximum performance. As we know from our hours spent in ACM and gunnery training, or our experiences in combat, rough handling interposes a barrier between the aircraft and maximum performance. To fly the aircraft to its design limits, it must be brought there smoothly, and thus formation practice is a sure foundation to solo proficiency.

Solo training begins with very simple maneuvers, such as the four point roll and inverted flight, practiced at altitudes well above show altitude. Each training sortie is

chased by the leader or lead solo pilot, and altitudes are lowered only after consistent performance is demonstrated at altitudes which insure survival. As technique develops and maneuvers are mastered, new maneuvers are practiced, once again at altitude. As the training season progresses, the solo routine is integrated with the diamond, and emphasis is placed on timing and consistency.

To achieve proper spacing of maneuvers during the demonstration, the solo pilot takes his timing from certain key calls made by the Thunderbird Commander. For example, in a diamond rolling maneuver, when the Thunderbird Commander calls "Standby smoke, smoke on ready now," the solo hacks his clock and plans his whifferdill to arrive at show center in 60 seconds. To assist in his planning, a survey flight is made prior to the demonstration at which time easily identifiable timing check points are selected by the solo pilot to be used as a final timing check on the approach to his maneuvers. Normally these check points are 20 seconds from show center when approaching at 425 KIAS. Similarly, in over-the-top maneuvers by the diamond, the solo takes his 60 second hack from the "float" call of the diamond, which occurs at the top of the diamond's maneuver. This insures an even flow at show center between the diamond and solo, and in dual solo work it is essential for accurate centering.

From the first training sortie to the last, and throughout the show season, focus is placed on consistent performance. Each maneuver and each mission, in so far as possible, is identical from crank-up to shutdown, and reflects the patterns of habit developed during the training season. A well performed demonstration requires absolute concentration and mental preparation. We naturally try to fly a perfect airshow everytime, but as far as I know, this is a goal not yet reached by a Thunderbird team. As Maj Tony McPeak so aptly put it in a previous TAC ATTACK article, "the solo pilot should achieve success steadily, satisfaction never."

The F-4E is an exceptional solo aircraft. Control response is excellent, though slightly more sensitive laterally and longitudinally than was the F-100. This requires more finesse in close formation, but is more than compensated for by the extraordinary power response of the aircraft. This power permits the addition to the solo routine of an Immelmann on takeoff, a maneuver which would require JATO assist in the F-100. The additional power expedites the joinups required of the solo and simplifies power control, in over-the-top formation maneuvers such as the five-card and wedge loops. Almost instant airspeed control is another of the fringe benefits of the high powered F-4E. This is particularly satisfying when performing at relatively low airspeeds in maneuvers such as the wing walk/roll and roll on takeoff. Inverted flight capability is also quite good in the F-4. Ability to maintain airspeed while inverted permits the addition of an inverted or outside slow roll during the solo sequence and an inverted push up to 30 degrees in the landing phase of the demonstration.

This, then, is the F-4E as a solo aircraft. All it requires to put it through its paces, whether it be mixing it up with a Mig 21 in SEA, or flying inverted at the "Not at Home" Drome in an aerial demonstration is the greatest precision instrument ever conceived, – the TAC Fighter Pilot. If we can represent you, the pros of the flying business, we are accomplishing the major part of our mission. We will never be satisfied until you are.

FLYING THE C-9 CANOPY

...or...

Flying the C-9 Canopy ...or...

after ejection, what's next?

Installing the C-9 parachute in F-4 cockpits will give the Phantom a steerable canopy plus a true zero-zero egress system. The Dash One's current requirement of 50-knots forward airspeed will be changed to read something like "0-knot minumum on the runway."

The skysail, the F-4's current parachute, has always provided a soft opening with stability and a slow rate of descent. But because of its slow opening quality, the 50-knot minimum was required. This problem is eliminated by modifying the standard C-9 with an anti-squid line which holds the canopy apex near its normal post-opening position. On zero-zero ejection, this "forced" opening gives an aircrewman a full chute up to a second sooner and at a hundred feet higher than the skysail, depending on the pilot's weight.

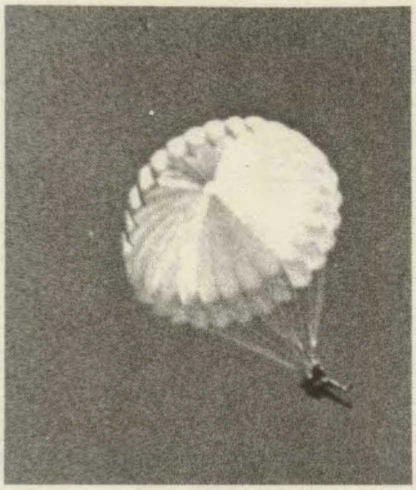
Add to these improvements the "lanyard four-line jettison system" and you have a stable hard canopy with directional control. PLF with the C-9 is the same as skysail techniques, on land, in trees, or water. But with directional control, the parachutist has some control to pick his landing spot and attitude of touchdown. This technique is described, step by step, on the following pages. However, the lanyards should be used only if the canopy is normal, not torn or partially inverted, a condition sometimes caused by erratic airflow during chute opening.

A partial inversion makes the canopy skirt form a figure eight, when viewed from beneath. To correct, pull down on the suspension lines attached to the smaller loop of the figure eight.

The C-9 canopy is being installed in Phantoms now coming off production lines. Retrofits are expected to begin at unit level sometime in August. As seats are fitted with new chutes the decal located on the drogue chute housing will be changed to read "Zero Knot Minimum on Runway."

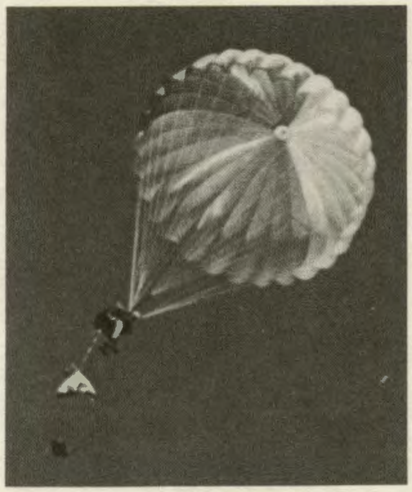
after ejection, what's next??

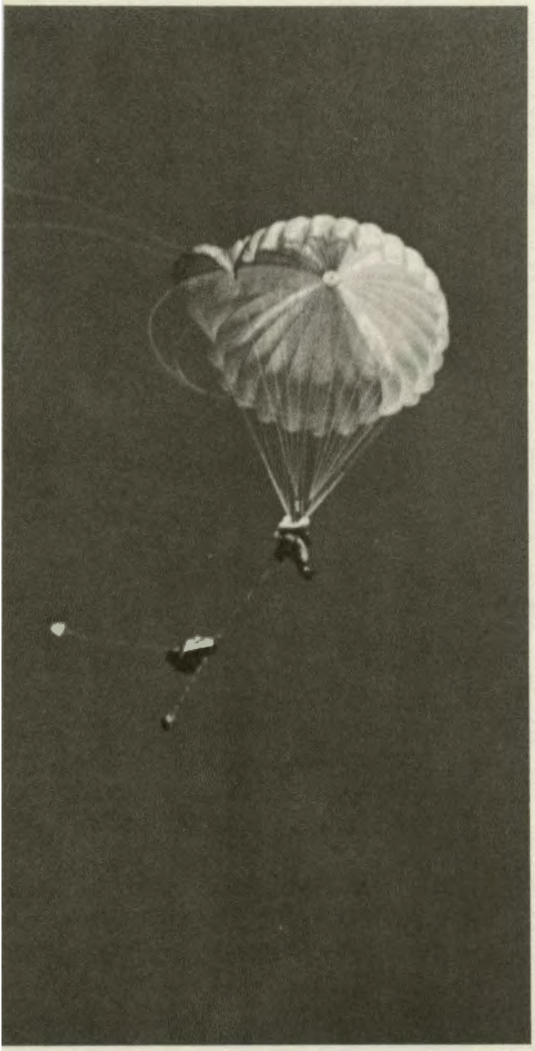
what's next??



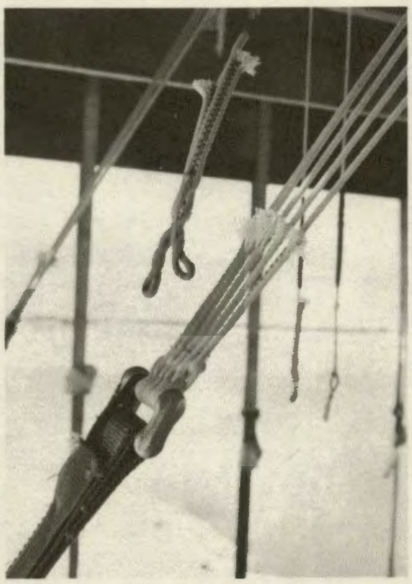
STEP ONE: After parachute canopy opens, check for torn panels and canopy inversion. Correct inversion (page 15), raise visor, and remove oxygen mask.

STEP TWO: Deploy survival kit, visually check for release. If over water, inflate both sides of LPU, check that valves are closed, attach both units with velcro strap.

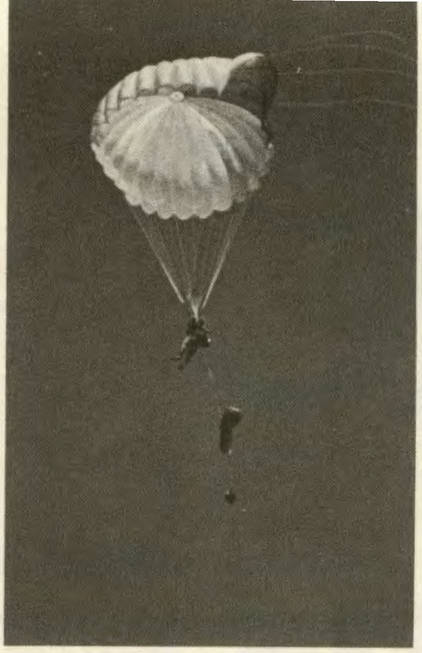




STEP THREE: Lanyard four-line jettison mod eliminates use of line cutting knife, reduces oscillation and provides limited steerability. If canopy is in good condition, jettison four lines by grasping both red loops on inside of each rear riser (right). A quick jerk releases two lines (below) from each rear riser connector link. As four lines are released, a large lobe or scallop forms (left) at rear center of canopy.



STEP FIVE, SIX, SEVEN: All chute
feet. At this altitude the parachutist
drift angle for ground contact is 30
direction. For water landing, drift
landing, F-4 jocks should operate bot
riser from harness. Other C-9 use
reaching 200 foot level, remove sa
points by grasping riser (above) or ho
cover, then slowly release to assure
other riser, then grasp both risers
right). When body contacts ground o
a firm tug (right) on each release loop


STEP FOUR: With lines jettisoned, rate of descent remains constant, with lateral forward movement up to 350 fpm (no wind). Do not use four-line jettison feature if darkness prevents good check of canopy condition. To steer, rotate canopy by pulling left or right rear risers. Amount of down pull determines rotation rate (30 degrees per/sec max). Over or under shoot ground obstacles by steering with or against the wind.




manipulation should cease at 200 must be ready for PLF. Optimum -45 degrees left or right of wind facing wind. Immediately after th quick release connectors freeing rs will do the following. Before fety covers from canopy release ok arm through riser "Y," remove latch remains locked. Repeat on with palms over releases (above, r water, operate both releases with

TAC TIPS

...interest items, mishaps

Tac Tips

NEW "OLD HAZARD"

Props on airplanes have taken their toll through the years. That's why the ground rule: Never walk thru a prop arc . . . spinning or still. Give them the respect they deserve or they'll bite you.

The neatly slashed forearm belongs to a TAC troop who forgot this sage advice. Fortunately, it was a flying model's propeller he tangled with and not a bigger bird's. He attempted to catch another enthusiast's runaway flying model that was ground looping into his expensive radio-controlled toy.

P. S. You might've guessed it. He's a flight safety officer.

TRIGGER LOCK

On his first gun pass, the AT-33 pilot pulled the trigger and got a no-fire. Thinking the trigger was not depressed far enough, he set up for a second pass. His guns fired this time – but didn't stop! He safed all switches and went home. The bird was impounded for a shakedown.

Investigators found a phenolic chip lodged between the gun firing contacts and housing in the stick grip, this caused a no-fire on the first pass. When the pilot squeezed the trigger on the second pass the phenolic material was crushed, and splinters lodged farther down in the gun fire contacts, jamming them closed. Four phenolic fragments sized from 1/8 inch to 1/4 by 1/2 inch were found in the stick grip assembly. The fragment surfaces showed recent breaks, and together matched a chip missing from the trigger near the safety pin hole. The surface where the chip had broken off the trigger was oxidized and smooth indicating an old break. There was no way to tell how long this piece had been floating around in the stick grip.

The chip was believed to be caused by improper insertion of the trigger safety pin some time in the past. This type incident is not new. Last year a fighter in another command hosed off over two hundred rounds with the same malfunction – but not the same cause. Their problem was using the wrong trigger safety pin; it was oversize and had to be forced. Eventually the phenolic trigger began chipping and resulted in the same malfunction. Good preflight item before gunnery!

TELL YO'R BUDDY

While taxiing in after completing a local flight, the brakes failed on this fighter due to a failure in the right brake system. Both the takeoff and landing were normal in every respect, the brakes were not abused. After the throttle was stopcocked, the aircraft rolled 300 feet on the taxiway and off into the grass where it sank in and stopped with no damage. Another pilot following noted intermittent smoking from his predecessor's right wheel for about 1500 feet prior to brake failure.

with morals, for the TAC aircrewman

LOOK!!!!

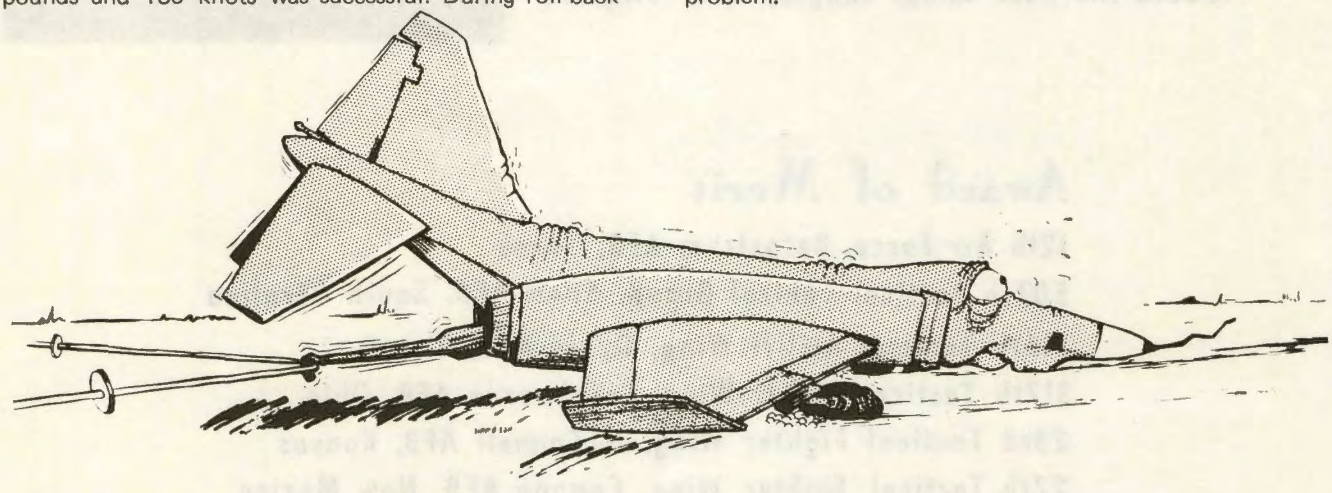
Through the years we pilots have all looked at the Control Tower as a sort of big brother. He sees our mistakes every day, and doesn't tell; he's the guiding hand that got a lot of us to the end of the runway, and to our parking spot at a strange field; he did us favors, for which we were grateful; he was all things to us, and we appreciated it.

One morning while in the landing pattern we witnessed the end of another era. A pilot, after failing to make contact with the local base ops and command post, requested the control tower to relay an innocous request to base ops. After a short hesitation the curt answer came back, "Negative, non-ATC function." So, unless you know what ATC functions are – lookout, you may be dropped too.

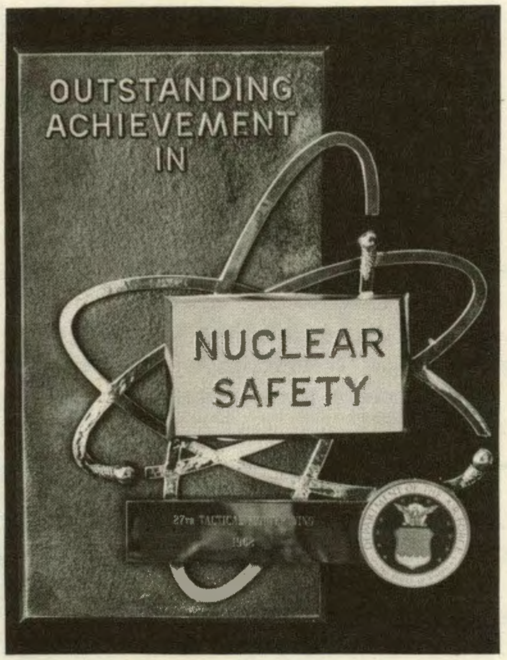
SLINGSHOT

When the emergency generator failed to come on the line following a double generator failure, the RF-4 pilot decided to call it a day. He returned to his home patch in another command and flew a no-radio pattern, followed by two VFR patterns to check the tank jettison area. Then the outboards were released, but the centerline did not jettison. The gear and flaps were blown down due to an intermediate indication on all indicators, and the aircraft was flown by the tower with tail hook lowered to tell all concerned of the impending approach-end engagement. The subsequent BAK-9 arrestment at 45,000 pounds and 150 knots was successful. During roll-back after the stop the nose gear cocked and the aircraft could not be stopped before the right main gear left the runway.

In April, a TAC unit had an "almost" similar to the above arrestment. The engagement following a utility system failure was not particularly smooth, the aircraft was yawing ten degrees either side of centerline. It stopped in the center of the runway, heading twenty degrees left. As the aircraft rolled back emergency brakes were actuated to keep from running off the runway backwards. This area becomes an important consideration in your operation if you only have one runway. A main gear in mud up to the axle will tie you up for some time – and jeopardize arrivals, especially when fuel is a problem.

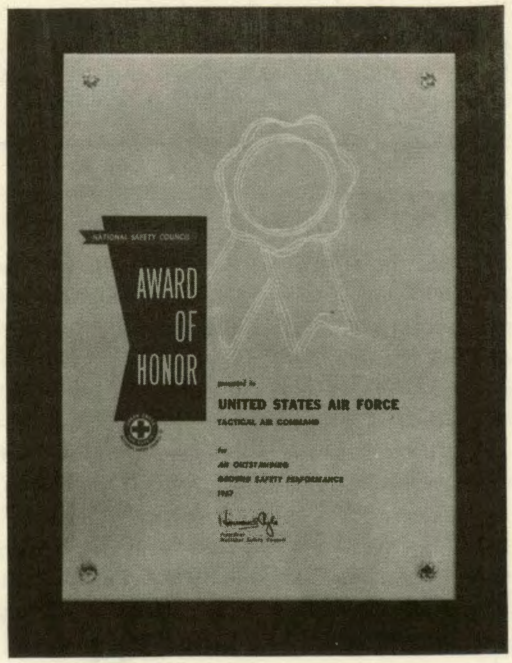


1968 SAFETY AWARDS



Nuclear Safety Award

27th Tactical Fighter Wing, Cannon AFB, New Mexico



Award of Honor

Tactical Air Command, Langley AFB, Virginia
9th Air Force, Shaw AFB, South Carolina
4500th Air Base Wing, Langley AFB, Virginia

Award of Merit

12th Air Force, Bergstrom AFB, Texas
507th Tactical Control Group, Shaw AFB, South Carolina
516th Tactical Airlift Wing, Dyess AFB, Texas
317th Tactical Airlift Wing, Lockbourne AFB, Ohio
23rd Tactical Fighter Wing, McConnell AFB, Kansas
27th Tactical Fighter Wing, Cannon AFB, New Mexico

CREW CHIEF OF THE MONTH

TSgt Wilson

Technical Sergeant James D. Wilson, 524 Tactical Fighter Squadron, Cannon Air Force Base, New Mexico, has been selected to receive the TAC Crew Chief Safety Award. Sergeant Wilson will receive a letter of appreciation from the Commander of Tactical Air Command and an engraved award.

MAINTENANCE MAN OF THE MONTH

TSgt Valentino

Technical Sergeant Robert L. Valentino, 4538 Fighter Weapons Squadron, Nellis Air Force Base, Nevada, has been selected to receive the TAC Maintenance Man Safety Award. Sergeant Valentino will receive a letter of appreciation from the Commander of Tactical Air Command and an engraved award.

CHOCK TALK ...*incidents and incidentals*

A CLOSE ONE !

The C-123 lifted off and the control column locked in a near-neutral position. Aileron and rudder control were normal, but the elevators resisted movement. The Provider rotated to a nose-high attitude and the alert pilot regained pitch control with elevator trim tabs. He climbed to a safe altitude, then checked the flight control lock disengaged and pulled the reverse lock handle. No help.

Using tabs and power for pitch control, he headed for a longer runway. In his no-flap, straight-in approach he used power and trim on glidepath, flare, and touchdown.

Maintenance inspectors found a bolt wedged between the elevator spring-tab bell crank and the elevator tab torque tab. The offending bolt was an undersized substitute for the original spring tab stop bolt.

They couldn't identify the "nut" who had risked an airplane and crew by using a wrong bolt in a vital flight control.

A NEW SOURCE

While recovering from a proficiency maneuver at 12,000 feet, an F-4E aircrew heard a muffled banging; both throttles were immediately retarded to idle. The aircraft commander readvanced each throttle individually to check the engines. Number two accelerated normally to 80 percent where it hung up. Simultaneously the EGT began to rise so the throttle was retarded to idle. Number one engine was OK and a single engine landing was accomplished.

The number two engine ingested the nose compartment jury strut which broke off in flight after unlocking. This was the second incident experienced by the unit in which the jury strut was released from its stowed position in flight. The first one did not break off. New preflight item?

JARRED JUGGLER

Maybe he saw it in a war movie on the late-late show. Or was impressed by a juggling act on the "really big show." Whatever the reason, one member of a munitions assembly crew made a one-hand pickup of a BDU-33 practice bomb . . . with a signal cartridge installed.

He swung it with a firm fin hold, Indian Club style, to deposit it on the assembly table. Underestimating the bomb-nose arc, he snagged the table's edge. The BDU-33 jarred loose from his grip, hitting the concrete floor nose first.

The signal cartridge detonated, ejecting the cartridge case thru the bomb's center. The casing hit the "swinger" on its course to the ceiling, digging a small hole before ricocheting. The initial explosion also gouged a small hole in the concrete floor.

Fortunately, the munitions handler suffered only minor lacerations to his right eye and right hand. To avoid more injuries resulting from missed one-hand flips, unit munitions operating instructions now direct all practice bomb handling be done with two hands. It's no place for juggling acts.

FLYING SCREWDRIVER

During a loop and at 21,000 feet inverted, the left engine of an F-4E compressor stalled and flamed out. The aircraft was rolled upright and air started. Everything was normal except RPM could not be advanced beyond 78 percent without compressor stalls. The engine was left in idle during recovery.

An apex screwdriver and bit holder had entered the engine causing extensive compressor blade damage. No maintenance history could be connected with this incident. All tools used in minor maintenance had been accounted for.

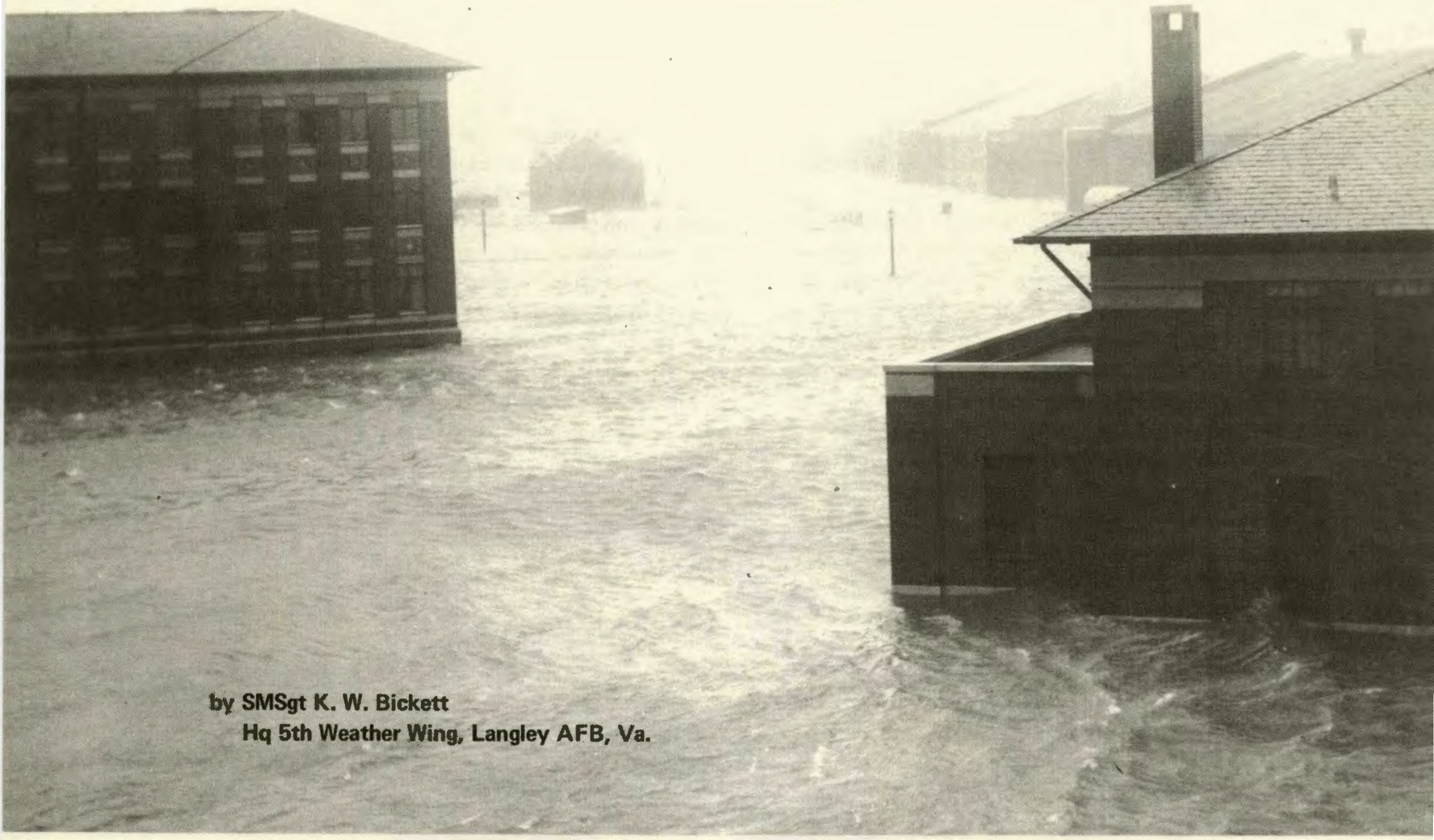
with a maintenance slant.

LET'EM EAT RICE ?

Shortly after level-off, a SEA based 0-1 began to run rough, then quit. The pilot turned toward the nearest base and went through his emergency procedures but the engine would not start. He kept trying and after a while it began to run, but reluctantly. By nursing it the pilot was able to get 1300 RPM which enabled him to make the field. On base leg the engine stopped again and an uneventful (?) dead stick landing was made.

You wouldn't think that things could get so fouled up, and to top it all off – as the aircraft coasted to a stop THE ENGINE STARTED BY ITSELF. The pilot had no control over his errant engine so he shut off the fuel selector valve to kill it. Very little investigation showed the maintenance error responsible for this fiasco. The finger screen surrounding the carburetor poppet valve was pushed in on one side binding the poppet valve spring, this time in the near full-open position. With the valve in this position, engine controls had no effect on fuel flow, even at idle-cutoff. The last maintenance in this area had been performed one month earlier. An unforgivable reason to be eating rice?

HURRICANE



by SMSgt K. W. Bickett
Hq 5th Weather Wing, Langley AFB, Va.

A fully developed hurricane is a threat to life and property. It may cover an area of more than 30,000 square miles, inhabited by more than 30,000,000 people. Each year hurricanes devastate widespread areas and have accounted for damage amounting to nearly a billon dollars, as was the case of Diane in September 1955. Since 1900, over 12,000 persons have lost their lives in hurricanes in the United States alone, and as late as 1963 a single hurricane was responsible for the death of over 7,000 people and over $500,000,000 in property damage.

A meteorologist defines a hurricane as a large revolving storm originating over tropical or subtropical waters with highest sustained surface wind speeds of 64 knots (75 mph) or more. The definition is somewhat simplified because, not only do hurricanes possess extremely strong winds, but they are also accompanied by torrential rains and extraordinary high tides and waves.

The word "hurricane" comes from the Carib-Indian word, huracan, which means "evil spirit." In other dialects it is translated "devil," or "storm god." Regardless which definition is used, the hurricane is appropriately named, for it is nature's most destructive storm, even if it is not nature's most intense storm. Tornadoes are far more intense, but their lives are short, and the damage they cause is confined to relatively small areas.

Storms of hurricane intensity are common to all tropical and subtropical waters, except the south Atlantic and eastern south Pacific, but their name differs. Through the western Pacific they are known as typhoons; cyclones in the Indian Ocean; and willy-willys in Australian waters.

Various stages of storm intensity are identified primarily by the strength of the highest sustained wind speed contained with their circulation. The criteria established for identifying these various intensity stages are as follows:

1. Tropical disturbance: Completely void of strong winds.

2. Tropical depression: Highest sustained surface wind speed less than 34 knots.

3. Tropical storm: Highest sustained surface winds 34-63 knots.

4. Hurricane: Highest sustained surface winds greater than 63 knots.

All hurricanes possess the same basic characteristics, but they vary considerably from storm to storm. High surface winds are probably the most significant hurricane characteristic for not only are they responsible for widespread destruction, they are also the major factor in the production of abnormally high tides that inundate coastal sections.

Few measurements of hurricane winds have been attained by ground stations since most wind measuring equipment becomes part of the flying debris before maximum wind speeds arrive. It has been calculated that wind speeds of 200-250 knots are necessary to account for damage caused to particular structures. An "average" hurricane does not contain winds of this magnitude; they are usually in the 90-100 knot range. The area of hurricane force winds (greater than 64 knots) associated with an average hurricane is approximately 7850 square miles, but they have been observed affecting areas over 200 miles (125,664 square miles) from the storm's center. Gale force winds (34-63 knots) have affected areas 600 miles (282,744 square miles) in diameter, but usually their effects are felt in areas 350-400 miles in diameter. The maximum surface winds are normally found in the hurricane's right front quadrant as it moves along its destructive path.

Most hurricanes have a life span of about 9 days, but this varies with the month of occurrence. August and September hurricanes have the longest life span averaging 12 days, while July and November storms average only 8 days.

Hurricanes can be expected to develop anywhere over the water area extending from the Cape Verde Islands westward to the Gulf of Mexico. There are five major development zones in this area; in the order of most frequent storm development these zones are:

1. The Atlantic Ocean in the vicinity of the Lesser Antilles (mainly east of the Islands).

2. The western Caribbean.

3. The Gulf of Mexico.

4. The Bahamas region.

5. The vicinity of the Cape Verde Islands.

Figures 1 through 4 give the location of primary development areas and prevailing paths taken by hurricanes and tropical storms from these areas for the months of July through October.

June storms tend to develop more frequently over the Gulf of Mexico and the western Caribbean Sea than any other zone. The Gulf storms usually take a northwestward path, striking the Texas coast more often than any other. Caribbean storms often take a northward track through the Yucatan channel into the Gulf of Mexico, and then

Figure 1 **JULY HURRICANE AREA**

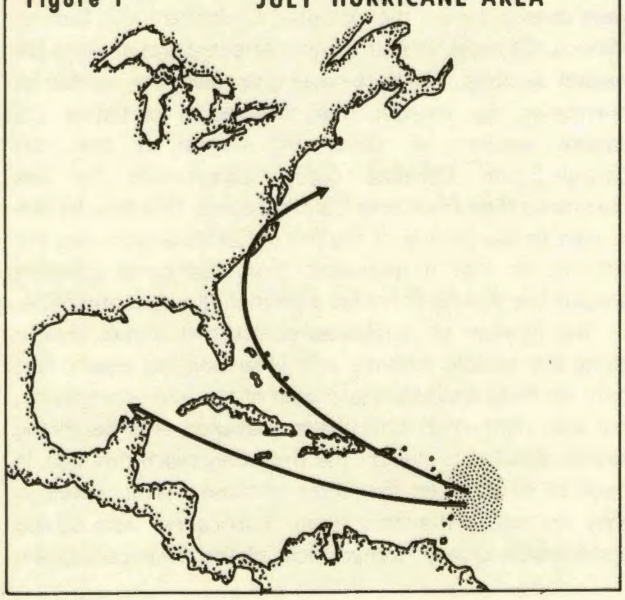


Figure 2 **AUGUST HURRICANE AREA**

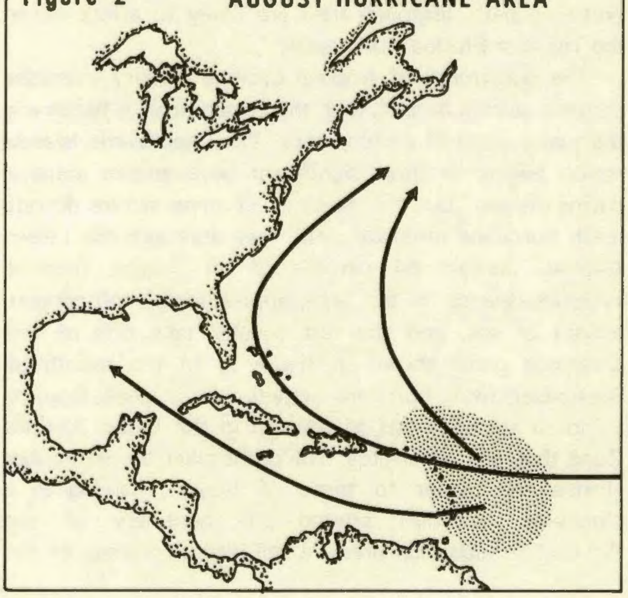


Figure 3 SEPTEMBER HURRICANE AREA

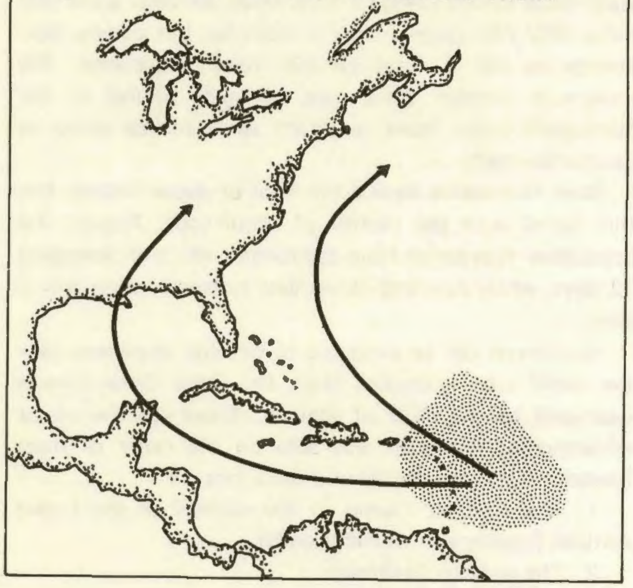
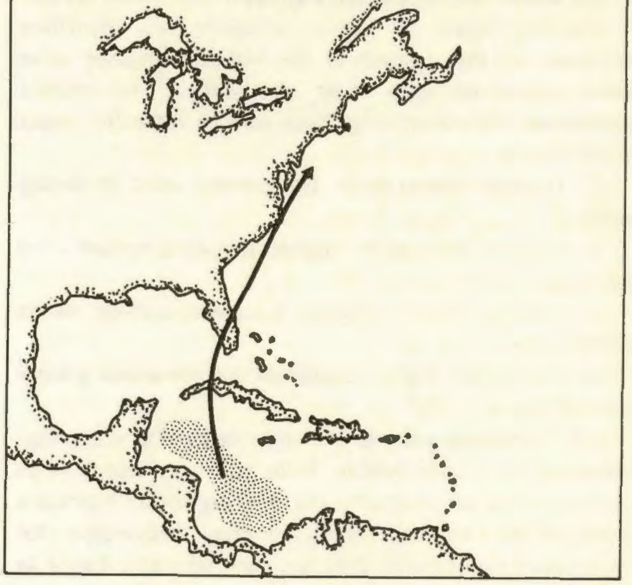


Figure 4 OCTOBER HURRICANE AREA



usually recurve to penetrate the Florida coast north of Tampa.

The area of maximum occurrence shifts eastward to the vicinity of the Lesser Antilles by July (figure 1). The incidence of development remains significant through the Gulf of Mexico and the Bahamas region, but very few storms develop over the Caribbean. Figure 1 shows the prevailing paths taken by July storms originating in the vicinity of the Lesser Antilles. Hurricanes which take the path north of Cuba usually lose energy rapidly after passing Florida, becoming extratropical cyclones by the time they intersect the North Carolina coast. Hurricanes which take a path south of Cuba move into the Gulf of Mexico via the Yucatan channel, and then take no preferred path, although they are likely to affect either the Texas or Florida Gulf coasts.

The occurrence of tropical cyclone activity increases abruptly during August, with the Lesser Antilles becoming the major zone of development. The Cape Verde Islands region begins to show significant development activity during August, but the majority of these storms do not reach hurricane intensity until they approach the Lesser Antilles. Almost 64 percent of all August tropical cyclones develop in this area, approximately 40 percent remain at sea, and the rest usually take one of the prevailing paths shown in figure 2. In the month of September, when hurricane activity is at its peak, tropical cyclones are more apt to develop in the Lesser Antilles Zone than any other area. The paths taken by September storms are similar to those of August, moving in a clockwise direction around the periphery of the Azores-Bermuda high pressure cell into land areas, or the colder water of the north Atlantic as shown in figure 3.

The major zone of hurricane development (figure 4) shifts back to the western Caribbean by October. These storms move northward, crossing the Florida peninsula in the vicinity of Tampa, then move approximately parallel the southeast coast.

It should be noted that the indicated prevailing paths are those where large numbers of hurricanes or tropical storms have traveled and are only broadly representative of hurricane travel in their vicinity. Hurricane paths are by no means as smooth as those shown, and individual tracks may describe loops, double loops, straight lines, and many other meandering curves.

During the past 89 years (1879-1968) 413 hurricanes were detected over the Atlantic, Caribbean, and Gulf of Mexico. Of these, 218 ultimately affected one or more US coastal sections. The back cover chart gives the number of hurricanes, by month, that affected a particular US coastal section. A point of interest is that the Georgia-South Carolina coasts experienced 10 less hurricanes than the North Carolina coast. This may be due in part to the jutting of the North Carolina coast into the Atlantic so that it intercepts more hurricanes traveling around the Azores-Bermuda high than it would otherwise.

The number of hurricanes observed decreases greatly along the middle Atlantic and New England coasts. Not only do these coasts lie northwest of the main storm path, but also many hurricanes have weakened after becoming extratropical cyclones by the time they reach this area. It must be emphasized that some of these storms, although they are not in the strict sense "húrricanes" have caused considerable destruction and loss of life. Hurricane Diane of August 1955 for instance approached the coast as an extratropical cyclone, but flooding still caused a billon dollars in damage and 200 deaths.

Three primary forces are responsible for the destruction caused by hurricanes: the storm surge, flooding, and high surface winds. As a hurricane crosses a coastline it is accompanied by a storm surge, which is a rapid rise in water level above that of normal tide. In weak storms this storm surge may be no more than several feet, but in more intense storms the tide may rise more than 15 feet above normal. A gradual rise in the tide level often begins more than 24 hours before the hurricane makes its nearest approach to land. This gradual rise is known as the "forerunner tide" and it may affect several hundred miles of coastline. However, it usually causes a rise in water level of a few feet. A rapid rise occurs when gale force winds (34-63 knots) arrive, with the peak storm surge occurring about an hour or two after the hurricane makes its nearest approach to land. The combination of the forerunner tide and storm surge can produce tides 15-20 feet above normal, and this rise in water level added to the peak astronomical tide can be overwhelming. Fortunately, conditions are such that the forerunner, storm surge, and astronomical tide rarely act together, and the total tide seldom exceeds 15 feet. The storm surge has been responsible for more loss of life and destruction than any other destructive force. During recent years, however, the loss of life caused by the storm surge has declined, primarily through the mass evacuation of threatened areas prior to the arrival of the surge.

Wind generated waves have tremendous erosive power, and they can alter the shape of a coastline in a matter of hours. They usually do not penetrate inland to a great extent, unless the tide is unusually high. In this event, these waves move inland and are able to demolish even the best constructed buildings in short order. This is easy to explain when we consider that a cubic yard of water weighs approximately 1500 pounds and waves may be moving shoreward at a rate of 50-60 mph.

Flooding ranks second to sea action as the cause of death and destruction in hurricanes. Since hurricanes are always accompanied by torrential rains, it is easily seen how widespread flooding often is an aftermath.

Winds rank third as the primary cause of damage and death, but winds are capable of causing widespread destruction. The majority of deaths attributed to hurricane winds are caused by flying debris and collapsing buildings. Buildings that suffer the most damage are generally of inadequate design or poorly constructed. Mobile objects only partially secured stand an excellent chance of being damaged or blown away. In addition to structural type and quality of construction, the extent of damage depends on the strength of the maximum sustained winds, peak gust, length of time the hurricane winds prevail and degree of exposure.

To illustrate a hurricane's destructiveness, a few of the more noteworthy storms are briefly discussed. Hurricane Diane, "the billion dollar hurricane," was the most destructive storm ever to affect the New England states. The storm which took 200 lives, was first observed on 7 August 1955 far to the east of the Virgin Islands, moving on a westerly course. On the 10th the tropical cyclone took up a northwesterly course toward the North Carolina coast. The storm reached hurricane proportions on the 12th. Highest winds were estimated at about 112 knots while the storm was still at sea, but as the storm approached the North Carolina coast it lost force rapidly. The highest winds recorded during Diane's landfall on the 17th were 44 knots with gusts to 75 knots at Cape Hatteras, well below hurricane intensity. Huge tides and some flooding occurred on the Carolina coast and along the Chesapeake Bay, causing only moderate damage.

The greatest damage came because Diane followed the path hurricane Connie took a week earlier. Connie's rains had saturated the eastern seaboard, and the inability of the saturated earth to absorb Diane's 18-inch torrential rains caused heavy flooding in the New England states. Diane alone would have caused only light to moderate damage, but teamed with Connie it was a disastrous storm.

Hurricane Audrey first appeared on weather charts as a

Our photos are of the Hurricane of '33 that inundated Langley. Some of you may recognize the entrance to Building 1, wonder if the boss got to work that day. As you can see below, parking is no problem – but getting home must have been a riot.

weak tropical depression northwest of the Yucatan peninsula in July 1957. Energized by the warm, moist tropical atmosphere, the depression rapidly intensified reaching hurricane stage by the 9th, while remaining almost stationary. This hurricane, which eventually caused 550 deaths and 152 millon dollars in property damage, struck the Louisiana coast near Cameron on the 27th. Although winds of 90 knots were reported and some wind damage occurred, almost all property damage and loss of life can be traced to the storm surge that produced tides of 8-12 feet. Large areas of the Louisiana coast were forewarned that water would rise 5-8 feet, but unfortunately large numbers of people failed to take the immediate action suggested by the Weather Bureau's warnings. Waiting until the last moment to evacuate, they were caught by the storm surge soon after the storm had unpredictably accelerated.

Hurricane Carla proved to be one of the most severe, destructive, and extensive hurricanes of this century, and was first detected north of Panama as a weak disturbance on 3 September 1961. The disturbance rapidly increased in size, and reached hurricane intensity by the 6th. As Carla crossed the Texas coast on the 11th, hurricane force gusts were observed from Brownsville to Port Arthur (300 miles) and as far inland as Austin (130 miles); these landmarks indicate the storm's great size. The highest sustained windspeed recorded was 126 knots with estimated gusts to 140 knots. Torrential rains accompanied Carla into Texas, dropping 16 inches or more along the coastal sections east of the storm center. Amounts up to 13 inches fell as far inland as Austin. Carla continued to produce heavy rainfall as she moved northeast through Texas and the Mississippi Valley. The effects of wind and water on the coastal areas of Texas were devastating. One town was virtually destroyed and several suffered severe damage.

In conclusion, it is a fact that hurricane damage has increased during the present century, mostly because of increased urban development and property values. Fortunately, the number of deaths have decreased in recent years because of timely and more accurate warnings. Shortly before Carla and Beulah seriously affected the Texas coast, mass evacuations were completed in severely threatened areas. An estimated 350,000 people were evacuated from the coastal lowlands before the full effects of Carla were felt, and a similar number for Beulah. These evacuations were a major factor in the comparatively low number of deaths.

So when a hurricane or tropical storm threatens you, don't consider wind intensity only. It's the storm surge tide that causes most of the deaths and property destruction. If the weatherman advises evacuation, do it. It may save your life!

TAC ATTACK TEST REPORT

Have you ever wondered how the TAC ATTACK Staff solves difficult problems ? What kind of scientific testing we employ ? Our step-by-step reasoning that provides amazing (at times brilliant) conclusions ? Here's an example of the Staff at work :

TEST # 1

PREPARATION: ***Removed the front two legs from Grasshopper and placed it on table top.***

TEST: ***Gave the verbal command: Crawl !***

RESULT: ***Grasshopper crawled.***

TEST # 2

PREPARATION: ***Removed second set of front legs from same Grasshopper and replaced it on table top.***

TEST: ***Gave the verbal command: Crawl !***

RESULT: ***Grasshopper crawled.***

TEST # 3

PREPARATION: ***Remove the back legs from same Grasshopper, leaving him no legs, and replaced him on table top.***

TEST: ***Gave the verbal command: Crawl !***

RESULT: ***Grasshopper did not crawl.***

CONCLUSION: ***It has been determined beyond all doubt by a series of tests using exacting scientific methods that a grasshopper, with all it's legs removed...can no longer hear !***

Any questions ?

Letters to the Editor

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awaiting your letters and comments....

PEANUTS

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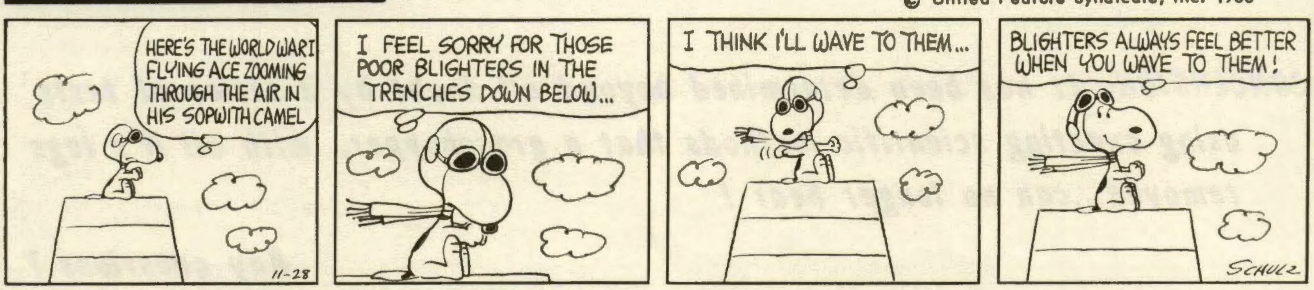

TAC TALLY

AIRCRAFT ACCIDENT RATES

MAJOR ACCIDENT RATE COMPARISON

	TAC		ANG		AFRes	
	1969	1968	1969	1968	1969	1968
JAN	6.8	5.6	28.9	0	0	0
FEB	6.2	7.3	12.8	0	0	0
MAR	6.8	7.1	12.6	0	0	0
APR	7.0	8.7	15.1	1.9	0	0
MAY	7.2	8.0	12.9	7.5	0	0
JUN*	7.0	8.5	12.9	7.4	0	0
JUL		9.3		6.3		0
AUG		9.4		8.2		2.3
SEP		9.1		7.4		2.0
OCT		9.3		6.7		1.8
NOV		8.6		6.9		1.7
DEC		8.8		7.8		3.2

UNITS

THRU JUNE	1969 *	1968	THRU JUNE	1969	1968
9 AF	3.0	7.5	12 AF	8.6	6.8
4 TFW	7.1	9.9	23 TFW	10.9	8.6
15 TFW	0	15.8	27 TFW	0	6.3
33 TFW	20.3	14.2	49 TFW	0	0
4531 TFW	0	20.0	479 TFW	11.6	13.6
			474 TFW	20.7	52.5
363 TRW	11.1	4.9	67 TRW	0	0
			75 TRW	7.2	0
64 TAW	0	0	313 TAW	0	0
316 TAW	0	0	516 TAW	0	0
317 TAW	0	0			
464 TAW	0	0			
4442 CCTW	0	0	4453 CCTW	6.9	14.2
			4510 CCTW	12.3	2.3
TAC SPECIAL UNITS					
1 SOW	11.9	6.3	4440 ADG	0	0
4409 SUP SQ	0	0	4500 ABW	7.5	0
4410 CCTW	4.9	17.2	4525 FWW	17.5	28.0
4416 TSQ	0	75.5			

* Estimated

Looking at the overall statistics for June, our accident status improved compared to May. A closer look will shake you though. All of our mishaps occurred in a nine-day span, from the 18th to the 26th. We suffered six majors with five fatalities. At this writing many of our June accidents are still under investigation and no specific pattern has emerged.

Traditionally, our losses are predominantly fighters. This month only half the total fell in that category. The other aircraft lost were a T-33, an OV-10, and a B-66. These three are still under investigation. The T-33 and OV-10 accidents accounted for our "no ejection" fatalities. They both went in from a relatively low altitude and it would appear that the crews did not have a chance to get out. The B-66 broke up and went out of control just after disconnect from a tanker on a night AAR mission.

We recorded a mid-air when two F-84s collided in the vicinity of their home patch. They were on separate VFR flights and got together on initial about five miles out. The F-4 went in on a rocket pass, the back seater made it, the A/C was too low. Our F-104 flamed out on base leg for a dive bomb pass at 8,000 feet after leaving the gunnery pattern because of radio failure. Following two attempts to restart the engine the pilot ejected.

Of our five fatalities, only one was an unsuccessful ejection. The pilot got out too low to complete the ejection sequence. In three cases no attempt was made to eject. Our fifth fatality involved a man not in an ejection seat at the time of the accident. He was thrown or exited manually from the aircraft and suffered fatal injuries when he fell to the ground from his parachute harness which remained suspended in trees. On the plus side, we had five successful ejections, one at a very low altitude.

NUMBER OF HURRICANES AFFECTING COASTAL SECTIONS 1879-1968