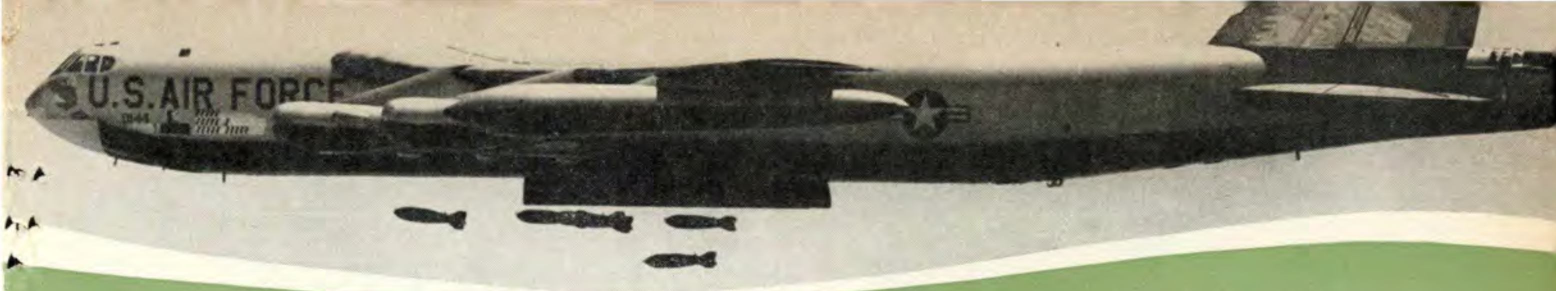
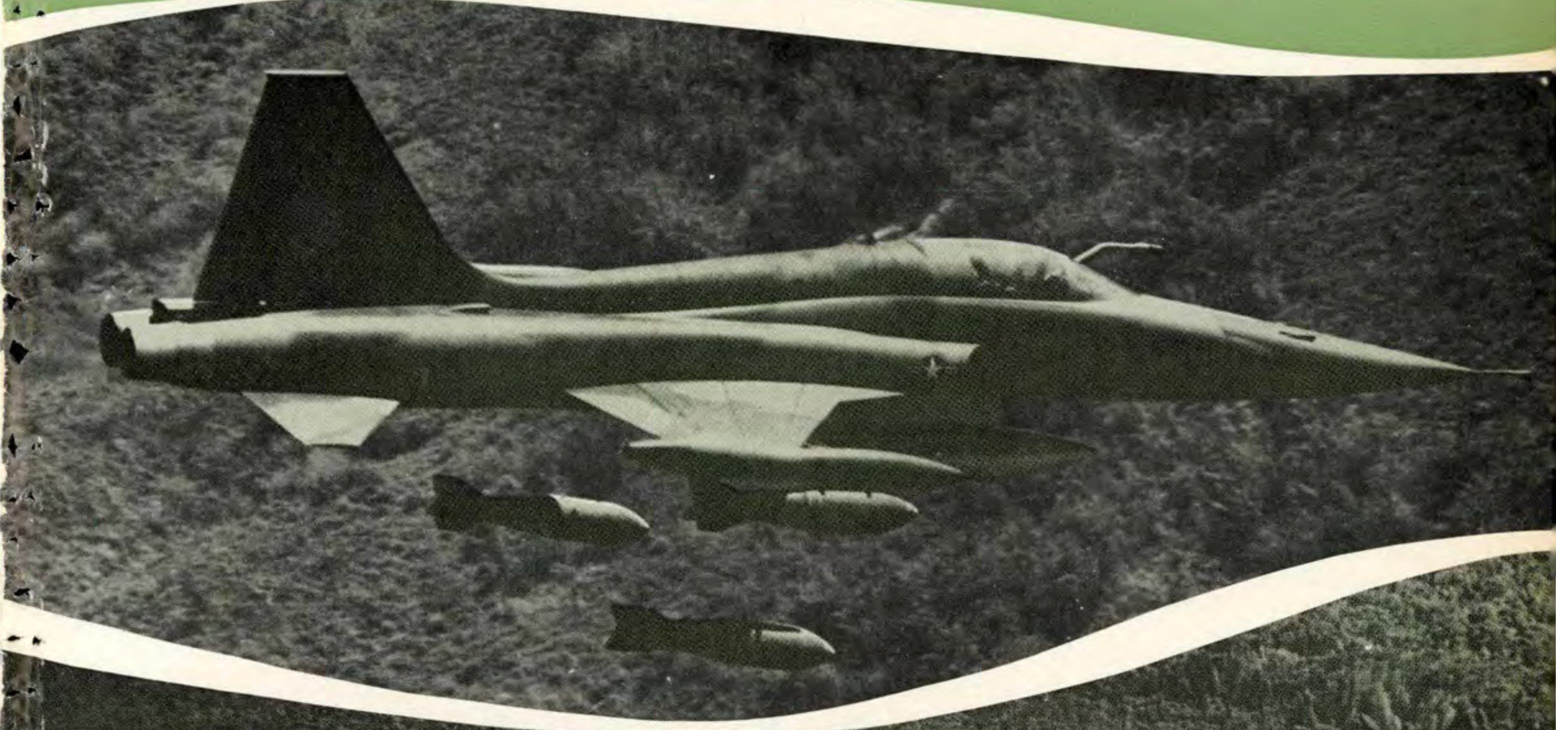


AEROSPACE

SAFETY

UNITED STATES AIR FORCE

JUNE 1966



AEROSPACE SAFETY

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FALLOUT

FLIGHT TESTING — 1966

While reading the article, "Flight Testing — 1966," in the March 1966 issue of *Aerospace Safety*, I noticed a ground safety discrepancy in the picture above the story.

Although the picture was taken to show the flight testing crew entering the cockpit area, the aircraft wheels are "not chocked." Also there is no indication of the aircraft being statically grounded to the designed or appropriately marked grounding point on the ramp.

Is the straight object hanging down between the nose wheels (landing gear) the aircraft's own static ground wire to dissipate static electrically after landing and taxiing?

In this picture which depicts the flight testing crew entering the cockpit area for flight, engine air intake plugs are installed. The pitot tube cover and streamer are still installed on the pitot boom, too. Maybe the air intake plugs are installed for classified reasons of the air intake area. The YF-104A aircraft pictures in 1954 had specially made intake cones in front of the main part of the air intakes to break up design pattern. Remember?

The cockpit entrance stand might also be held in a steady condition by the civilian employee at the base of the stand. The stand's individual wheel locks cannot be seen due to photo engraving halftone used.

In my opinion, I believe the YF-12A deserves the same sound safety treatment as other USAF aircraft receive. But, this aircraft probably is still in Lockheed control while undergoing USAF flight test certification and service evaluation. This I don't know.

This picture should illustrate a preflight condition for intent of flight prior to entering the cockpits. "A picture is worth a thousand words."

Thank you.

SSgt Theodore L. Willey
525 FIS Quality Control Sec
APO New York 09132

Sharp eyes. This was a stock photo not intended to convey a message of any sort.

WESTERN HOSPITALITY

The picture above the article titled "Western Hospitality" is of a YF-12A and not an SR-71. Note the ventral fin on the fuselage and the shape of the radome.

Let me take this opportunity to say that I enjoyed the article and am happy to hear that there are still a few citizens left who treat military folks doing their job with something more than cool formality.

Capt Richard A. Milburn
F-12 Project Officer, DSC/Materiel
Hq ADC, Ent AFB, Colorado

The story's the thing.

USAF AERO CLUBS

Your article "How Are The Little Guys Doing?" presented a summary of Aero Club accidents/incidents in the most informed light yet seen in a widely distributed publication.

I am one of the thousands of enlisted people who learned to fly and am licensed only because of the USAF Aero Club program.

(Continued on page 28)

1966...A Record Year For Accidents?

1966 is well on its way to becoming a year of catastrophe. If the trend continues we may end up with the worst Air Force aircraft accident record in recent years. While the statisticians tell us that such increases are the result of chance and are to be expected, this is small consolation to the men who are killed or to the commanders who must execute their missions with reduced numbers of men and aircraft.

Review of the accidents which have occurred indicates all too many are the direct result of irresponsible acts which can be prevented, if responsible agencies are alerted to the need for increased alertness in time.

Equipment can fail, maintenance people can make errors, weather can create hazards, airfields can be inadequate, designers can create poor equipment. These are acknowledged problems that cause accidents, and many people are working each and every day to correct such deficiencies. Pilots and their supervisors also are acknowledged problems and they are being worked on almost constantly to eliminate the accident potential. But, unfortunately, we cannot always ferret out and get rid of the people who will intentionally and knowingly show off or to try to prove that they know more than the guys who wrote the book. Neither can we afford the lenient, soft-hearted or irresponsible supervisor who won't take action against such individuals.

Rather than preach a sermon, let us examine excerpts from some recent accident reports; you can draw your own conclusions as to the amount of rational thinking, the sense of responsibility, the reliability and the integrity of the people involved in these accidents.

• A transport crashed on the runway and was destroyed while making a "spectacular" takeoff. The crewmembers were all killed. Fortunately, the load of passengers and cargo had just been off-loaded. Weather conditions were 600 feet scattered, 1200 feet overcast (ragged) with five miles visibility in haze. The aircraft became airborne somewhat beyond the computed takeoff distance, rotated rapidly to an estimated 70 degree nose-high pitch attitude and climbed into the overcast. It reappeared seconds later in an estimated 60-degree, nose-down pitch attitude and impacted 5,336 feet from the start takeoff point. The cause factor of this accident was pilot error. One salient point from the accident investigation report will be quoted for your consideration: "The pilot frequently used poor judgment and was inclined toward 'showmanship'. He enjoyed demonstrating maximum performance climbs, even with cargo and passengers aboard. Evidence indicates that at least five such maneuvers were performed in the month previous to the accident." The medical member's report included some personal information which revealed a definite inclination to the spectacular.

• A trainer collided with a radio antenna tower in a restricted area. The pilot was not authorized to be in the restricted area and was "burning off fuel to reduce weight." After the collision, the pilot climbed to altitude and bailed out. The cause factor of this accident was pilot error.

• Two bombers collided in mid-air and crashed. The four crewmembers ejected successfully. The aircraft were returning from a combat mission and the leader signaled for trail formation. Both aircraft completed a roll while in trail. The lead aircraft then began pull-up for a loop with the wing-man following. At the top of the loop, both aircraft reached low airspeeds and the pilots began vertical recovery maneuvers. The aircraft collided during the vertical recovery phase. There can be little question as to the cause factor, can there?

The examples cited are but three of far too many. The past year includes such beauties as a T-38 taking off with one engine inoperative; an F-101 flown by two pilots suffering from the after-effects of partying and a champagne breakfast; two bombers colliding while "combat maneuvering" through an instrument practice mission; two A1Es colliding when they "bounced" a pair of F-100s; and several cases of buzzing. All of these accidents were avoidable.

June is now staring us in the face. Last June was the worst month for accidents during 1965. During that month we managed to rack up 42 major and 8 minor accidents with 133 fatalities and 39 destroyed aircraft. This year's record to date has not been good. We cannot afford another June of that kind. This "end of the fiscal year panic" can be recognized and compensated for. To prevent avoidable and inexcusable accidents (and that's most of them) each must think rationally, exercise his assigned responsibility, demonstrate reliability and integrity in every facet of flight operation, whether it be maintaining, scheduling, supporting or flying the mission. The limited and decreasing number of men and aircraft available to the United States Air Force are critical resources which must be preserved. ★

PRECIOUS SECONDS

Capt Robert A. Anderson, 174 Tac Ftr Sq, Iowa ANG, Des Moines, Iowa

It's a beautiful July day at Podunk AFB. The weatherman reports a pressure altitude of 1280 feet and 90°F temperature. Galen 20 Tow completes his takeoff data card and local clearance form. Galen 20 Lead gives the briefing and details of the air to air gunnery mission. Following the briefing the usual bets are made by the ace members of the flight.

With the walk around completed, the J57 started, and all pre-taxi checks completed, Galen 20 Tow is ready to taxi. Taxi checks are completed and Podunk Tower transmits: "Galen 20 Tow cleared for takeoff, runway 31, winds calm, altimeter 29.97." Military power checks indicate "go" and brakes are released. Throttle outboard, afterburner lights and gages check O.K. There's 150 knots and nose wheel liftoff. The F-100 lifts off the runway and accelerates to 180 knots. Gear handle up, now watch airspeed so that you don't exceed 190 knots which is max speed when the dart target is still under the wing.

In the next five seconds Galen 20 Tow lives a life time. The J57 flames out and drops from 15,000

The Answers

The questions posed by the author are valid, and the record suggests that the dynamics of ejection still need a lot of explaining.

Since the takeoff situation is fresh in mind, let's discuss this one first.

Captain Anderson is right in presuming that immediate ejection would, or, more properly, should be successful. This stems from the fact that the rocket escape system does have a proven on-the-runway ejection capability at 120 knots or higher. It is true, therefore, that immediate ejection should be successful.

Let's first understand clearly why we say such an ejection *should* be successful instead of *will* be successful. The answer lies in the fact that the present rocket seat provides about six seconds of time in trajectory in an on-the-runway ejection—and the parachute lbs of thrust to 5000 lbs of thrust in three seconds. The F-100 is 10 degrees nose-high, airspeed decreasing and a 33,000-lb aircraft approaching Newton's Law. Galen 20 Tow ejects immediately. The aircraft is still nose high, gaining altitude, has good flight stability and the wings remain level. The ejection is a complete success, thanks to the proper and precise action of the pilot.

Would the outcome have been different if the pilot had stayed with the aircraft a little longer? The aircraft would gain a little altitude as airspeed decreased, but would the pilot have made it if, as he ejected, the aircraft stalled and rolled 45 degrees to one side? Would this angle of bank cause the rocket seat to end up accelerating toward the ground instead of away from the ground in the last portion of the ballistic curve? This could have possibly placed the pilot at too low an altitude for successful parachute deployment.

Let us examine the prescribed procedures in the F-100 Dash One relating to this situation. It states that: If engine failure occurs on takeoff and the gear handle is up —EJECT. Also on the same page the procedure for low altitude ejection is zoom aircraft up and hold nose high attitude until airspeed reaches 140 knots or vertical velocity indicates zero and then eject. An examination of this procedure leads to the conclusion that if Galen 20 Tow had attempted to zoom, as stated in the Dash One, he would have stalled the aircraft during ejection. The F-100 has poor roll stability and has high sink rates when stalled. Would this angle of bank and sink rate cause the resultant of the ejection vector to end up lower than the actual ejection altitude? It certainly appears that this is true.

Then let's consider that Galen 20 Tow interpreted the first procedure to mean eject immediately. This could be considered a logical interpretation but if he had followed the second procedure the outcome might have been different.

The F-100 Dash One also states that with rocket ejection seat a successful ejection can be accomplished at ground level with 120 knots indicated airspeed. Then why are we still having low altitude ejection failures? Are we placing too much emphasis on the zoom procedure and forgetting the importance of aircraft attitude at time of ejection?

It appears that a complete study of the rocket ejection seat system is in order. This study should include the various effects on ejection of the various aircraft attitudes, i.e., bank angle, fuselage angle, sink rate, etc.

The pilot also needs more information about what the aircraft is going to do during these precious seconds: As, how long does it take the aircraft to decelerate from various speeds to stall speed under various weight conditions, configurations and temperatures? We need hard facts like these so that some of those precious seconds are not wasted on indecision.

Under certain conditions aircraft attitude at time of ejection appears to be critical. Then why can't the pilot maintain control of the aircraft with one hand and eject with the other? Would such a procedure inflict any serious injury on the pilot during ejection?

The answers to these questions could make more of these precious seconds living seconds, instead of fatal seconds. ★

opening sequence *should* take less than that. Specifically, the parachute should open and arrest the fall within three to three and one-half seconds.

But this timing has some presumptions in it. It presumes that separation is complete and immediate, for example, and that's a questionable presumption. We know that some people have managed to hold onto their seats in spite of the butt snappers—some with one hand, some with both. And the lanyard doesn't get pulled until and unless the seat moves two and one-half to three feet away from the ejectee.

So, delay in separation is a real possibility in any ejection, and when you have only six seconds available, there isn't much time to waste.

Next, the three second timing we cite presumes that the zero lanyard is connected. We think this is a fair presumption for the takeoff situation, because we believe that most people do hook it up when they strap in.

But please note this carefully: If the zero lanyard is not connected, the one-and-one system should also provide a chute in an on-the-runway ejection, because the total is only increased by one second—from about three seconds to about four seconds.

Now, who wouldn't agree that if the margin of time available for parachute opening can be increased—it should be? Well, the zoom maneuver is the means of doing this, and that is why the Flight Handbooks discuss it.

The principle of the zoom maneuver is so simple it's disarming. All it is saying is—ejection in a climb is better than ejection from level flight. Going further, ejection in a climb is the best situation possible, and ejection from a dive is the worst.

Certainly, if there are thousands of feet of air beneath, the value of the zoom maneuver is academic. It becomes important as the time to the ground becomes critical.

But let's get back to the takeoff situation and treat the questions Captain Anderson has raised.

First, he has, rightfully, identified some hazards that are implicit to the specific instructions he quoted. It is true that if 100 different pilots, with 100 different configurations, starting from a variety of airspeeds—tried to "zoom up and hold a nose high attitude until airspeed reaches 140 knots, or vertical velocity indicates zero"—there would be 100 different results. And some of them would look like spins.

Thus, it is far more important to understand what the Handbook writers *mean* than it is to memorize what they *say*.

We know what they mean. They mean, establish the best climb angle possible from the airspeed available, then eject at the peak of the trajectory. Knowing that cues are needed for identifying the peak of trajectory, they specified 140 knots or zero vertical velocity. The theory, of course, is that 140 is near the stall boundary —and they don't want the aircraft to stall. Similarly, zero vertical velocity marks the point where the climb ends and the fall begins. Obviously, this marks the highest altitude the aircraft will ever reach.

The same thing can be stated in a variety of ways; it has been. And most of them have been found to contain loopholes that lead to misunderstandings, too.

Take the statement that "the purpose of the zoom maneuver is to establish a launch vector rather than to gain altitude." Some pilots like this definition so well that they protest when anyone says "zoom for altitude."

The fact is that the zoom maneuver does everything. It establishes a climb angle, which is an upward vector. This results in a gain of altitude—at a rate which depends on the angle of climb and the airspeed.

This being true, the only question to be answered is—when is the best time, moment or instant, to eject? The answer suggested earlier was at the peak of trajectory.

So, once again, precisely where is this peak of trajectory? How is it best defined and/or recognized by pilots?

There simply is no single correct answer, because a peak climb angle (or vector), a peak altitude or a peak rate of climb can be defined, and ejection at the peak of any one of them would be successful.

There is, in our opinion, a distinct advantage in thinking in terms of peak climb angle rather than peak altitude. The reason is, simply, that peak angle can be recognized quickly and easily in a low speed zoom maneuver. It feels, and it is, exactly like a landing. When you reach the "stops" and the climb ceases to steepen—you are there. The airspeed will be approximately that for normal touchdown; the rate of climb will be at its peak value; and, if full aft stick were held, the next thing to happen would be stall, wingdrop and spin.

Since we are discussing a climbing situation, however, the airplane is not going to start falling immediately—nor must aft stick be held and a stall accepted. The airplane is through flying and should be turned loose so that it will stay upright and drift over the top of the ballistic trajectory.

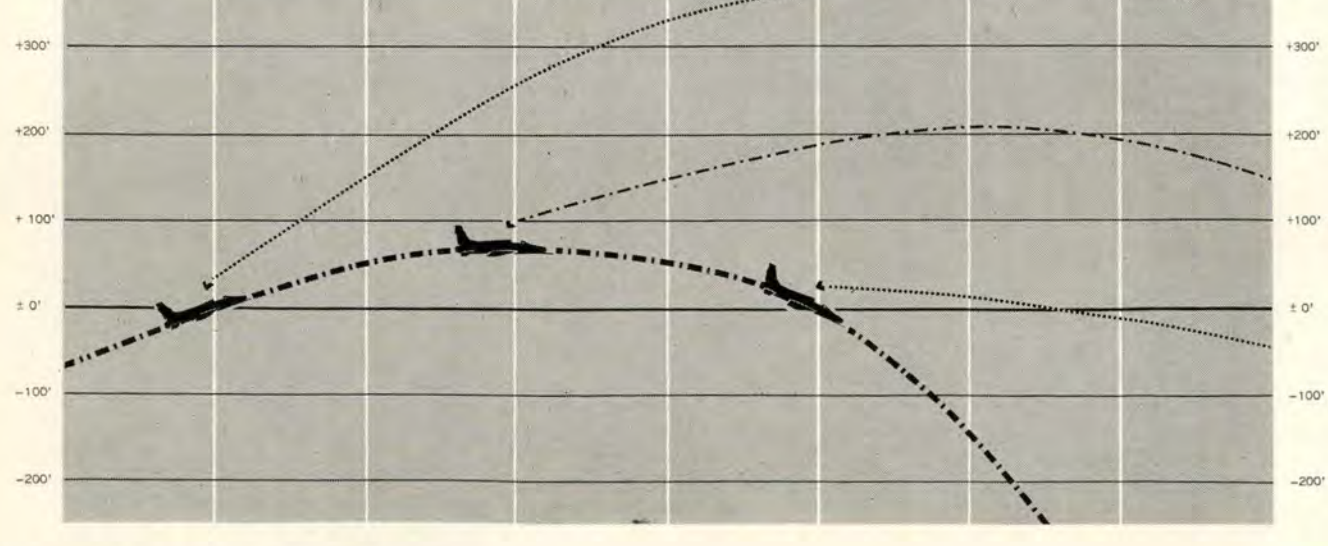
Certainly, if an airplane is going uphill at speeds like 120-140 or 180 knots, it is going to coast uphill for some moments before it tops out and starts falling. It will do this whether it stalls or not, whether it's spinning or not, and whether the pilot likes it or not. Mr Newton wrote that into law a long time ago.

If ejection is initiated at this point, the ejectee will have the same initial velocity and direction (which is upward) that the aircraft has—plus the boost effects of the seat. The geometry of such an ejection is shown in Figure 1. Note the trajectory of the man and seat on the left after ejection; it continues upward for quite a while before it curves downward.

If the pilot chooses to seek peak *altitude* before initiating ejection, he will have to be both careful and perceptive. Careful, because the airspeed will bleed off to values well below one G stall speed, which means that he must unload the wings with forward stick or trim to avoid stalling them out. And he will have to be perceptive to recognize the transition from climb to descent. True enough, it can be detected as rate of climb reaches zero.

Between instrument lag and the mechanical functions of ejection, however, if ejection is delayed until the V.V. indicator reads zero, the fall will have begun before the seat leaves the aircraft. Presuming you hit it on the nose, however, the trajectory of the seat is shown as the center illustration in Figure 1. Note that the man who ejects at the

Figure One



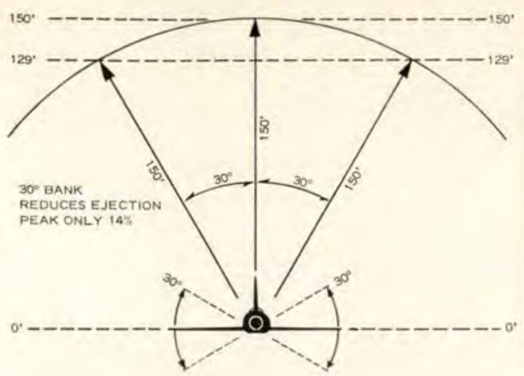


Figure Two

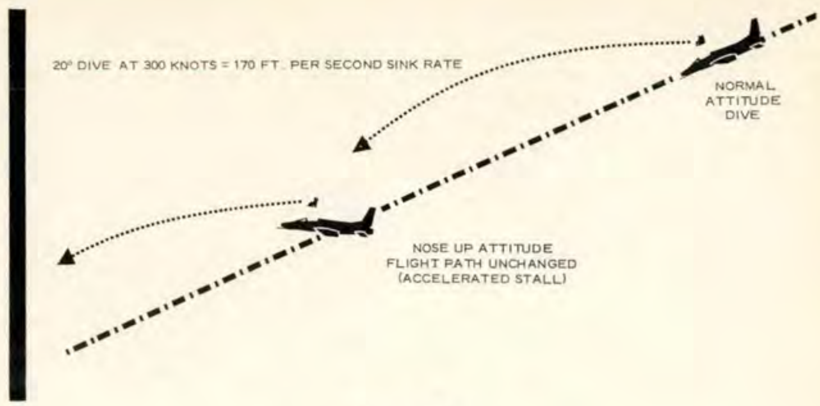


Figure Three

peak of the climb angle will actually reach a higher altitude in trajectory than the one who rides the aircraft to peak altitude—then ejects.

In order to be consistent, we have shown a third situation in Figure 1, the illustration on the right. This shows what happens if the cues that identify the peaks are missed.

The diagram is accurate, in that the nose of the aircraft points into the relative wind. If we didn't do this, meaning if we—or you—were to forcefully hold a nose up attitude in an airplane that is falling at sub stall airspeeds—the airplane would more likely be spinning than upright.

Which brings us to Captain Anderson's final question: What happens to the ejection geometry when aircraft attitude gets radical or out of control?

Having seen evidence of excessive concern over attitude, as well as some erroneous implications attributed to it, a strong comment is in order. That is, until and unless the pitch or bank exceeds 30 degrees, don't worry about it!

Figure 2 shows the effects of a 30-degree variation from vertical. The peak height is only reduced 14 per cent by a 30-degree angle. Thus, a seat that would bump a pilot 150 feet high if he were straight and level, will send him up 129 feet in a 30-degree bank.

But beware of thinking in terms of pitch attitude! There is no normal condition of flight where a 30-degree pitch attitude would not be either a steep climb or a steep dive. When ejecting from airplanes that are in 30 or 40 degree pitch attitudes—the effects of flight path on the overall ejection are almost invariably far more important than the effects of the attitude on the seat!

There is only one general situation in which the flight path of an airplane can remain essentially unchanged while the pitch attitude varies greatly, and that is in the case of true pitchup (or pitchdown). Here, and here alone can it be said that the seat vector is working against the airspeed to the extent that it affects the outcome of the ejection.

In a flying airplane—and that means an airplane that is flying within its range of flyable angles of attack—the proper frame of reference in discussing ejection is flight path, and the terms to be used are climb or dive. References to attitude should be de-emphasized, and here is a good example of why.

An F-105 pilot found himself in an overly steep rocket pass, not long ago, and he saw that he couldn't hack the pullout. Actually, he pulled the bird into the stall twice, then decided to eject.

That aircraft was in a dive, perhaps at 20 degrees or so. If it were doing 300 knots, (it was a snap-up delivery) his rate of descent was about 171 feet per second. Having read or heard that attitude was important in ejection, this pilot pulled the stick to the aft stop to achieve a "level attitude," and then ejected. Of course the airplane stalled! But, fortunately, it did not snap or spin.

As it happened, he made it. And he probably believed that the change in pitch attitude saved him. The fact is, however, that the time it took him to make this move cost him far more altitude than it gained him—no matter whether it took him half of one second to do it, or more than one second.

That airplane was approaching the ground at 170'/sec.—and changing the attitude to "level" in a deep stall condition didn't reduce that descent by any noticeable amount.

He did change the seat vector all right, from 20 degrees nose-down to level. Since the 'Chief still has the M-3 catapult, he actually changed the vertical component of the seat from about 61'/sec. to 65'/sec.

Surely, if he had realized that he was losing 170'/sec.—while he was performing a risky maneuver that could only reduce his descent by 4'/sec.—he would have ejected instead of pulling back on the stick.

Those are the facts about pitch attitude. Figure 3 shows the geometry of this particular situation. Think it over, and talk it over; the difference between the effects of flight path and pitch attitude is really important.

In order to eliminate loopholes in this discussion, here is a question: Should this '105 pilot have used the zoom maneuver in this situation?

We hope the answer is intuitive. If the aircraft can't be pulled out of the dive, how in heck can it be zoomed?

The one remaining unanswered question posed in the opener is: If the rocket seat has a zero level capability, why are we still having low altitude ejection failures? ★

DAMN THE

PILOT LOSES PASSENGERS— THREE LEAP IN FOG . . . .

This headline appeared in the papers 31 years ago. There have been a lot of changes since then, but pilots today are learning the same lessons this pilot learned so long ago.

TORPEDOES...!

Vernet Poupitch, Directorate of Aerospace Safety

The winter was severe with numbing cold and unusually heavy snowfall. Life hadn't come to a complete stop, but nobody was out and about if he could help it. The only flying being done was that considered to be absolutely necessary.

Then, at the Army Air Corps depot at Olmstead Field, Middletown, Pa., we received a message saying that a fighter was grounded at Elmira, N. Y., for lack of an engine. "Would we fly an engine and maintenance crew to Elmira to make the installation?"

The aircraft and facilities in 1935 were somewhat primitive by today's standards, but there was a real "can do" attitude so a pilot and three mechanics were found to make the trip. While the pilot was making preparations, the depot truck backed up to the Bellanca transport and the crew loaded the aircraft with a spare engine, tool boxes and field A frames. Three mechs and an army hitchhiker completed the cargo. The pilot was cleared and the aircraft took off at about 10 o'clock in the morning headed north.

Elmira weather at the time was reported to be overcast with a 2600-foot ceiling, 10 miles visibility, temperature $-10°F$, with ice in the clouds.

At Sunbury, Pa., approximately 90 miles north of Middletown, the ceiling dropped to about 800 feet. Just north of Sunbury was the Eagles Mere Ridge, a small range varying in elevation from 1900 to 2100 feet, lying directly across the flight path. The ceiling dropped to zero over the Susquehanna River and all the passes. Just beyond Eagles Mere, the ceiling rose to 1600 and finally increased to 2600 over Elmira. As a last resort it would be easy to follow the iron compass into Elmira. There was no radio station at Sunbury, so the pilot could not learn of the lower ceiling until he got near enough to observe it. Now the decision had to be made whether to turn back and wait it out or poke into the weather.

The Bellanca had no wing de-icing equipment, but exposure to ice would last only a few minutes. Abort or complete the mission? The pilot quickly cranked the world's first computer—his brain. Does the answer he got seem familiar? It was, "Damn the torpedoes, the mission must go!" So he continued, climbing to 2500 feet into the soup and noting the time. He had verified his track and identified the last landmark. In six minutes, he would have crossed the mountain range and would let down until in the clear.

The Bellanca transport was a single engine, high wing, fabric-covered transport with fixed gear. One of the most efficient load carrying transport aircraft in the air, it could lift practically anything. Every external member, including the landing gear struts, wing struts and the fuselage, was a lifting surface, except the wheels and they were faired. The fuselage was shaped like a thick air foil section. In addition to the external structure that supported the large wing, there were streamline wires running from the bottom of the fuselage to the spars at about two-thirds of the span. A heavy, coarse, wire mesh separated the cockpit from the cabin. The temperature in the cabin was always ambient because it had no heat.

Just before going on instruments, the pilot checked the cabin with a quick glance and saw the hitchhiker huddled aft near the cabin door with the three mechanics, Sgt. Berry, Corp. Heimbauch, and Pvt. Smith, nonchalantly sitting along the side of the cabin. Berry, from Arkansas, was a medium size young man, wiry, high strung, a natural comedian, and a darn good crew chief. Heimbauch was shorter and younger, a little on the stout side, and a newcomer to the outfit. He had enlisted at Middletown. Smith was of medium height, slender, on the slow side, a good mixer, a tag-along type of an individual, and always broke. By the middle of the month, he was jawboned to the hilt. In order to satisfy his drinking urge, he would drink barracks shaving lotion not locked in the foot lockers.

The pilot, satisfying himself that the cargo and passengers were in satisfactory condition, proceeded through the clouds on instruments, noting from time to time the clock on the instrument panel while he held his course and altitude. The windshield frosted, then iced. That was expected, but not so soon. The side windows were still clear and he quickly observed his wing leading edge to be clean, so he was not worried—yet. Then there was a peculiar hum—he could hardly hear it at first—that developed into a deep howl. The wings were still clean, but that noise—it was different from anything he had ever heard before. This was no time to lose the engine. He concentrated on the instruments. Everything looked good. There was no vibration, but that howl was getting louder and louder. One more minute to go, then he would let down. Now, the side windows began getting translucent—but just hang on! That awful noise! What was it?

Finally, the six minutes were up and the pilot nosed down. At 800 feet, he was in the clear and *saw* the noise (the streamline flying wires had iced into what appeared to be one inch rope vibrating like strings on a bass fiddle). He took a deep breath of relief and turned his head to reassure his passengers. The hitchhiker and the engine were all he saw. Fearful of what may have happened, he quickly found an auxiliary field, landed, and proceeded to ask questions.

DAMN THE TORPEDOES!

The hitchhiker related the events as they occurred in the cabin.

Shortly after the pilot had checked the cabin with his sweeping glance and then went on instruments, Sgt. Berry was complaining of being cold, so he placed himself between Heimbauch and Smith. Heimbauch was sitting farthest aft. When the flying wires iced and began vibrating, the noise in the fuselage, amplified many times, scared Berry, and when he stood up and looked through the wire grate forward and saw the windshield iced and heard the howl rising in pitch, he panicked, shouting, "We're in a spin—get out!" and raced aft for the cabin door.

But round little Heimbauch was not asleep. He reached the cabin door first, crowded by Berry, Smith and the hitchhiker, pushing to get out! The doorknob had to be turned before the door could be forced against the slipstream, but somehow Heimbauch managed the manipulation. Out he went, but in the crowding, his parachute harness hooked around the inside doorknob! Poor Heimie, outside in the clouds, hooked like a quarter beef in a deep freeze, but very much alive, shouted and kicked to no avail. Berry, Smith, and the hitchhiker were clamoring to get out, each trying to outmaneuver the other. But, push as hard as they could, they could barely crack the door open. They had to free Heimie before they could open the door, so they kicked the doorknob hard with their heels and broke off the knob, saw the harness pull out, and proceeded to push each other out.

When asked why he didn't jump, the cold, frightened hitchhiker replied simply that there was no one left to push him out.

The pilot's concern now was the safety of his stampeding, jumping crew. He knew that over the mountains the clearance had been only 400 feet, and if any one of the three had delayed in opening his chute, he would buy the farm. The pilot immediately proceeded to the nearest telephone and reported to the Pennsylvania Highway Patrol, giving the route of his flight. After a short wait a patrolman phoned to say that two of the parachutes had been recovered. Heimbauch was alive but bruised, and Berry had only a sprained ankle. A little later Smith, about whom the pilot had the greatest concern, was reported to be okay. The pilot telephoned his home base, reported the incident and was told to return as soon as weather permitted while the crew returned via Pennsylvania Highway Patrol, after hospital treatment.

Now, from the serious side, what can we learn from the story? The pilot was good and had a lot of weather experience. He had been an airline pilot, flew depot flight tests in all type aircraft, had ample cross country time and was familiar with the terrain out of Olmsted Field. He was at home on instruments, and respectful of the radio range and their multiples, as well as of the eastern high tension lines strung across valleys, like clothesline.

If the crew had not stampeded, the flight would have been routine and there would have been no story to tell. From the flight safety aspect and good judgment, the pilot should have turned back to Olmsted when he saw the weather barrier. The success of the flight was not worth the odds of icing the wings and/or the carburetor. A delay of one or two days awaiting the weather would have made the flight routine.

This pilot was capable and would have been able to cope with any situation on this flight except wing icing. That, he did not encounter, but he did run into the unpredictable. And *he left no margin for error.*

Over the years pilots have learned many lessons. It's too bad that so many of their successors have to relearn those same lessons the hard way.

The pilot in this story learned a lesson that was engraved on his mind for all time: Crank in *all* the odds in your favor and allow yourself room to spare. ★

LEGAL OR SAFE?

Maj Francis A. Dellorto
928 Troop Carrier Group
Chicago-O'Hare Intl Aprt, Ill

I was riding with a pilot friend of mine the other day in his beautiful new Pontiac GTO. He was understandably proud, calling forth the eager horses to zoom down the highway. As we approached an intersection another auto made a half-hearted attempt at stopping, then proceeded onto the highway directly in front of our galloping steed. This didn't bother my friend at all. Blasting his new trumpets, he continued at the same speed. The other car stopped halfway across the road and our splendid vehicle careened around and sped on merrily. My friend was very perturbed about this intrusion and when I asked him why he hadn't slowed down or stopped, his retort was, "I had the right of way, I was *legal*."

This brought to mind many such incidents that happen while we are in command of many more horses than the GTO possesses. I mean the *flying machine*. How many times has ground control cleared us across a runway and we galloped across without checking to see if the approach end was clear? How often has the tower cleared us to take the active and hold, and again without checking the approach, we whipped out onto the runway eager to roll? How often have we been cleared to land while one and a half miles out, and, although we saw another aircraft holding on the runway, our approach was continued because after all *we were* cleared to land. We were *legal*.

All of these incidents reveal an inert tendency in us humans to perhaps want to go outside the realm of the law, but also to want everyone else to think that we are *legal*. We feel that since the controller has cleared *us* it is then up to the other fellow to watch out.

Let's look closer at the word *legal*. It is a word meaning lawful, legitimate, basically implying strict conformity to the law. Definition of the word *legal*, although broad and lengthy in the dictionary, does not say anything about *safety*. It follows then that making an instrument approach at minimums is *legal* but it is not necessarily *safe*. Many things should be taken into consideration.

Is the weather up or down? Does it go from 200½ to 100¼? If so, you might have a tendency to go lower than you should and inadvertently break minimums while concentrating on the approach.

Is the air smooth or rough? Two hundred and a half in smooth air can be more or less routine, but in turbulent air extremely difficult. It's legal! But, is it safe?

Is there heavy precipitation? Two hundred and a half in heavy rain or snow is legal. Is it safe? You have to rely on wipers and clean windshields to allow you to even see half a mile.

Is there adequate approach lighting? This can make a big difference if you are cracking minimums.

How long is the runway? Two hundred and one half in heavy rain, landing on a 5500-foot runway might be legal but—!!

Is there a stiff crosswind? It's legal to land with a 40-degree crosswind of 15K and 200 and a half, but it would take a proficient instrument pilot, who is also a crosswind expert, to handle this situation. Many other items enter the picture, such as runway conditions, approach zone obstructions, icing conditions. When you are in doubt or when safety dictates, exercise your prerogative and divert to a *safe* alternate.

I know that from now on whenever I hear this word *legal* used in flying or driving that I personally will not use it as a synonym for *safety*.

° °

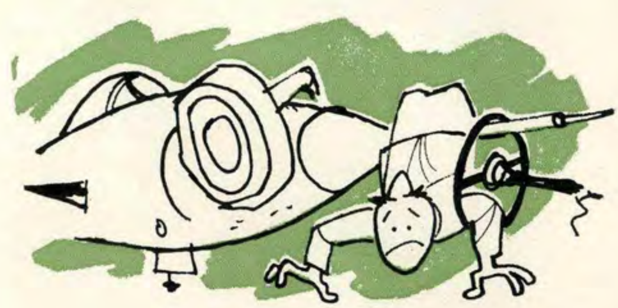
Although a driver (either aircraft or automobile) "has the right of way," he is not legal if he is involved in an accident which he could have prevented. The Courts call it "the last clear chance" or "subsequent negligence" rule. What is really meant is that if another driver has placed himself in a position of peril through his negligence, every other driver has the responsibility to avoid collision with him if possible and reasonable to do so. If such action is not taken by the legal driver, he has not taken advantage of the last clear chance to avoid the accident and could be charged with subsequent negligence. ★

Rex Riley CROSS COUNTRY NOTES

CLOSE CALL—The B-52 was on the low level portion of the mission when the crew spotted a light aircraft ahead on their course. Pull-up was begun immediately and the bomber missed the bugsmasher, but only by about 100 feet.

The above was taken from an OHR with the recommendation that general aircraft pilots be made aware of low level routes through various means. The fact of the matter is that information relative to these areas is available to civilian pilots, but there still remain some who wouldn't know an oil burner from a smudge pot. This means that it is up to Air Force crews to constantly monitor the surrounding area during these low level flights. Our aircraft aren't built quite like tanks and a little job can take one of our bombers out of the air very quickly. Incidentally, while you are keeping your eyes open to save your own life, you might save his.

IF THERE IS any one place where a driver should be extra careful, it is on the flight line. I've seen my share of tug races and other such nonsense on the ramp, but in general, the driving on the flight line is rather circumspect. Why, then, do we continue to have accidents in this area involving aircraft and other vehicles? Granted there is sometimes a great deal of activity, lighting is often poor and weather might be a factor, Rex believes that two factors are primarily responsible for these accidents. They are lack of knowledge and care. Let's examine a couple of recent examples:



• An F-101 was being towed from the trim pad back to the parking area, and a pickup truck with two men in it was on the way to the trim pad where another runup was about to take place. The driver of the pickup was driving down the center of the taxiway, which had been cleared of snow, when he met the vehicle pulling the aircraft. For just a moment he looked down at the light beam indicator on the instrument panel to see if his headlights were on high beam. When he looked up he saw that the approaching vehicle was a tug pulling an aircraft. By then it was too late. The pickup driver tried to avoid the aircraft, but the truck went under the left wing and a megaphone and rotating beacon on top of the truck cab scraped along the underside of the wing.

• A C-135 was being backed into the parking spot by a towing vehicle when the towing team chief noticed that the aircraft was getting close to a guy wire pole at the flight line perimeter fence. He signalled a stop and the aircraft was stopped with the nosewheel on a yellow taxiway clearance line. The vehicle driver told the wing walker on the left side that the nose of the aircraft had to be behind the yellow line. The left wing walker then cleared the operator to continue backing. Meanwhile the team chief was on his way forward to tell the driver to pull the aircraft forward. He signalled the driver to stop, but it was too late. The tail hit the pole resulting in a tear in the right elevator trailing edge. The cause factors (and investigators found several) center around personnel error, but certainly contributing was the fact that the hardstand on which the aircraft was being parked was not big enough for large aircraft because of the proximity to the fence and pole. The pole has since been removed, which is like closing the barn door after the horse escaped.

Rex relates some of these occurrences each month not to embarrass anyone nor because he thinks we have a lot of idiots around the flight line. But the facts are inescapable: we continue to have a lot of these type mishaps due not only to the actions of people, but to the location of equipment and facilities that makes an accident almost inevitable. Every day there are a lot of close ones that do not result in accidents because some sharp-eyed gent sees the hazard in time. This is where Rex thinks the flight line troops can make the Air Force a lot of money. When you see one of these obstructions, how about telling your flying safety officer about it? At least YOU will know that he has been made aware of it and you can bet that he will do whatever is in his power to have the threat removed.

PETE PIGEON was desperate. Unless he could get a message through, a lot of his buddies were going to wind up as entrees for a bunch of hawks. Pete was fast, and he was leading the pack in the big homing pigeon race. But about 50 miles from the starting point, with a five-mile lead, he had been attacked by the hawks and barely escaped with his life.

The hawks had orbited high in the sun and dived on Pete as he flew along, his mind intent on navigating precisely to his home coop. Fortunately, he had seen the lead hawk in time and dived into a nearby cloud. The weather was very cold and the cloud pretty wet and Pete had iced severely, making it difficult for him to remain aloft. With his wings heavily iced, and his vision fading from a coat of ice, he had fluttered out of the bottom of the cloud determined to get off a message on guard channel to the nearest radio to warn the rest of the pack behind him.

But Pete was out of luck. Guard channel was cluttered with conversation between the station and a pelican yakking about fishing conditions in Lake Erie. The warning never got through and the hawks had a feast that day.

The OHR filed by a fighter pilot read thusly: "(The other aircraft) broadcast on 243.0 mc UHF emergency frequency for approximately 20 to 30 minutes to .... control tower with constant chatter concerning a weather report, telephone numbers, etc. . . . This appears to be a completely unnecessary use of guard frequency. Availability of other facilities, frequencies and equipment made this unnecessary. .... Flight service station serves .... tower and has adequate UHF frequencies. . . . I wonder why .... tower did not suggest a different procedure."

Rex wonders too. If you are one of those who is contributing to guard channel becoming garbage channel, we hope you don't wind up as the pigeon.

PRIMARY CAUSE—Supervisory Factor. The instructor pilot failed to insure the gear was down and locked prior to landing. A contributing cause was operator factor in that the pilot failed to lower the landing gear.

This appears to be one of those heads up and locked situations but let's not ridicule these pilots. It could happen to you. In this incident the pilot had not flown for six months and was being requalified. Six successful touch and go landings had been made without incident but on the seventh it finally happened: they forgot the rollers. There aren't any lessons here that countless numbers of pilots haven't already learned, but Rex feels obliged to preach a little.

There is plenty of evidence in the records that when numerous touch and go landings are being made, the probability of forgetting the gear gets real good. IPs especially should make it a habit to check and recheck in these situations to prevent that most embarrassing of moments to a pilot.

THE F-4 AND A
Wet Runway

Capt Jerauld R. Gentry, Edwards AFB, Calif.

The abnormally high accident/incident rate of the F/RF-4C type aircraft on wet runways added impetus to a test program accomplished at Edwards AFB during the last five months of 1965. We were directed to determine the aircraft performance on a wet runway and define the optimum techniques which would result in the shortest stopping distance. I use the term "stopping distance" in preference to landing roll as we were especially concerned with aborted or refused takeoffs at high speed.

Our test vehicle was RF-4C serial number 63-7743 which was especially instrumented for the tests. Wheel rpm, brake pressure, and anti-skid signal were recorded on an oscillograph, and a centerline camera pod photographed each of the three gear during the runs. Two photo theodolite cameras tracked and recorded each run to give us instantaneous velocity and deceleration.

Prior to each test our fire department would lay a test strip 50′ wide and 8000′ long with a mixture of 200 parts water and one part foam. This resulted in a maximum depth of .05 inch and an average RCR of 17. As soon as the fire department completed the strip, the tests would start.

The refused takeoffs consisted of accelerating the aircraft at various gross weights (43,000–52,000 pounds) to arrive at the desired abort speed just as the wetted section of the runway was reached. The landing tests were similar, in that the aircraft was landed just as close as possible to the beginning of the wetted section.

The initial tests brought out the importance of tire design. On one of the first runs, which was a no drag chute, refused takeoff at 42,000 pounds gross weight, I aborted at 140 knots and used maximum aerodynamic and wheel braking. Eight thousand feet later I was still whistling along at 100 knots. Our computed stopping distance was 12,000 feet. The stopping distance under similar conditions using a drag chute was 7700 feet; and remember, these distances did not include the 2000+ feet required to accelerate to abort speed! Naturally we were quite concerned with these results. The tests were repeated with similar findings. A McDonnell team tried it in their airplane and wound up with a slightly longer distance.

We then learned that we had not been using the optimum tires. We had been testing three-groove tires, which were to be replaced with the four-groove General tires. In addition to the extra groove, the General tire had wider grooves thus allowing a greater volume of water to escape from under the tire. The tests were resumed with the new tires and approximately a 40 per cent reduction in stopping distance was attained. I hope the directive to use the wider grooved tires wherever wet runways may be encountered is being followed.

(There is no special federal stock number to differentiate between the three groove and the four groove tire. The three groove tires will be used stateside until the supply is exhausted. All overseas supply requests will be filled with the four groove tire.)

The results shown in the chart are corrected to 2300 feet pressure altitude, 10.4 degrees Centigrade and an RCR of approximately 17. In addition, the refused takeoff distances are from 140 knots and do not include the distance required to accelerate to that speed. These data represent over 60 test runs and correlation with the Dash One is not too good. The Flight Manual landing roll data appears 70 per cent optimistic with a drag chute and 29 per cent optimistic without a drag chute. Our final report, soon to be published, will be used to correct the landing charts, and give additional information in the takeoff section. It is evident from the data below that takeoff planning for a wet runway is more critical than is presently indicated in the Flight Manual.

It is interesting that only a small increase in stopping distance results from a 10,000-pound increase in gross weight. Also it appears that a barrier engagement is inevitable on most runways if drag chute failure follows a high speed abort. Fortunately McDonnell has given us a reliable drag chute system.

The techniques that resulted in the shortest stopping distance were basically those outlined in the Flight Manual. Both throttles were chopped to idle at touchdown or when abort was initiated; the drag chute, if used, was deployed; the stick was pulled to the full aft position; the speed brakes were extended, and maximum anti-skid braking was used until the aircraft stopped. The flaps were left extended as this not only increased drag, but reduced idle thrust due to boundary layer control operation. The importance of flying the Flight Manual recommended "on speed" approach to touchdown cannot be over-emphasized. Several landings were made with a "flared" touchdown and this resulted in an increase in ground roll of 400 feet due primarily to a delay in wheel speed-up immediately after touchdown.

Because of many system malfunctions, there has been considerable reluctance to use nosegear steering. This feeling is certainly justified; however, on a wet runway with a crosswind, nosegear steering may be the only thing that will keep the aircraft on the runway. When I did not use nosegear steering, I experienced difficulty keeping the aircraft in the 50 ft wide test. Using rudder for directional control above 100 knots proved effective; however, in the speed range of 70-90 knots the F-4 has a tendency to fishtail with maximum braking on a wet runway even without a crosswind. This fishtailing is disconcerting to a pilot and cannot be adequately controlled using rudder or differential braking. Differential aileron/spoiler action only aggravated the fishtailing tendency, and of course, differential braking lengthened the rollout. Consequently, we recommend engaging nosegear steering just prior to brake application. Proper maintenance and TCTO 608 to improve the reliability of the system should remove the hesitation to use nosegear steering.

Hydroplaning was mentioned many times during the test period. There are at least two types of hydroplaning: dynamic (hydrodynamic theory) which is primarily a function of water depth, tire pressure, and velocity, and viscous (lubrication theory) which is primarily dependent upon the runway surface texture and fluid viscosity.

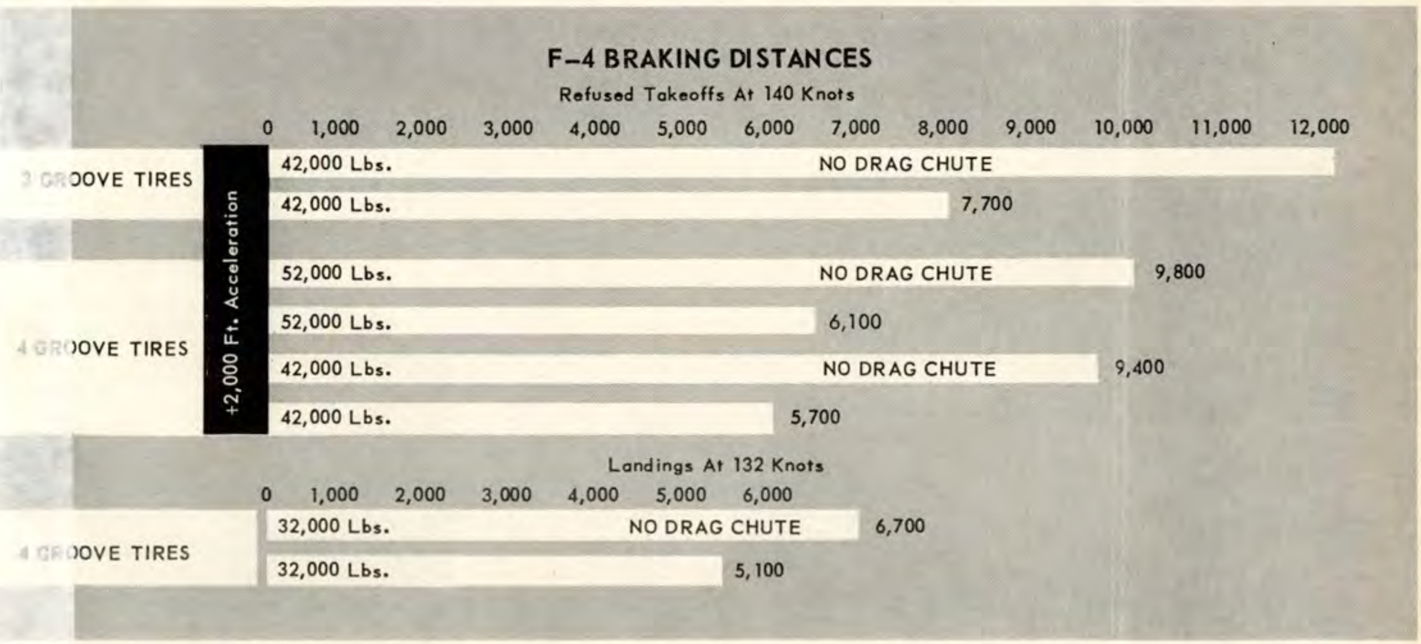
Initially we believed that we might be experiencing the more common total dynamic hydroplaning. Tire pressures were significantly varied as a check, but no improvement was noted. Our data indicated that we never encountered total dynamic hydroplaning. Viscous hydroplaning, to some extent, is probably always present on a wetted surface.

Brake effectiveness at high speeds on a wet surface is very low. The coefficient of friction doubles as the aircraft decelerates from 140 to 100 knots, and doubles again decelerating to 50 knots. There was little or no apparent deceleration that I could feel when applying maximum braking at high speeds. In fact, the airplane seemed to accelerate when maximum braking was applied without using the drag chute. This sensation can readily be interpreted as an anti-skid or brake failure, and the temptation to turn the anti-skid off and revert to manual braking may be strong. This action should be delayed, if possible, until the aircraft has decelerated to 60-70 knots. Anti-skid cycling was always apparent below 75 knots and was sensed as high as 100 knots with the heavier gross weights.

To recap our recommendations for stopping the F/RF-4C on a wet runway:

- Fly an "on speed" approach and touchdown as close to the end of the runway as practicable.
- Immediately after touchdown deploy drag chute, engage nosegear steering for directional control and apply wheel brakes.
- Use maximum anti-skid braking until stopping is assured.
- Configure the aircraft with as much aerodynamic drag as possible.

CAUTION: During strong crosswind conditions, if the drag chute is causing directional control problems, jettison the chute when it no longer gives effective deceleration. ★



Jet jocks sometimes have to be briefed on the mixture control, tailwheel, and other peculiarities of the old fashioned recips. But it's all part of learning to . . .

Hunt With A Bird Dog

Maj Karl K. Dittmer, USAF

"That crosswind was a little rough. Even with full rudder the bird almost got away from me. I made another takeoff and started to bug out of the pattern to go do some airwork, but changed my mind. I wasn't about to let that little airplane get the best of me."

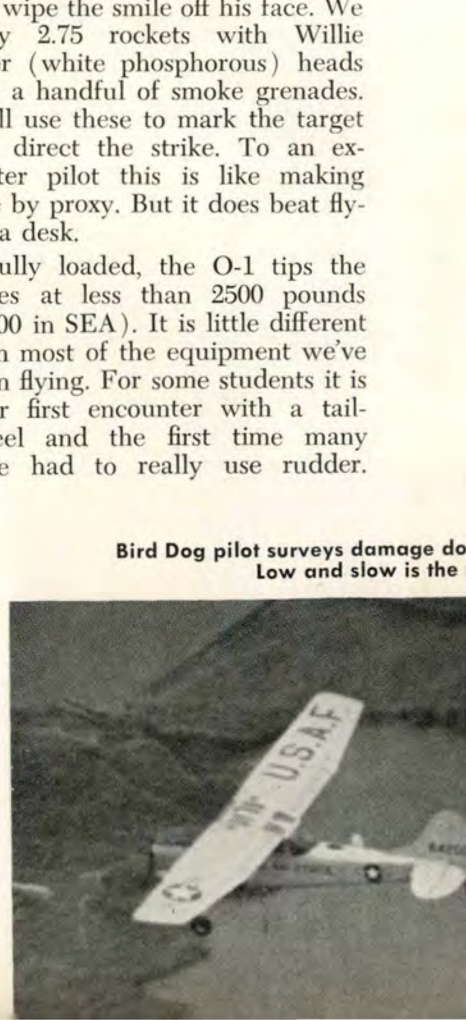
The speaker, a Major, was talking about one of the lesser known Air Force aircraft—the Cessna O-1 *Bird Dog*. Until recently, the *Bird Dog* belonged to the Army and the Major to a TAC F-100 squadron as its operations officer. At present, the Major is one of my classmates here at Hurlburt Field, Florida, where we are going through the 4410 Combat Crew Training Wing's O-1 Aircrew Training Program (ALO/FAC). The backgrounds of the pilots going through this program are as varied as there are missions in the Air Force. We have two combat ready F-105 pilots, two more F-100 types, B-52 pilots, training command instructors, you name it.

Three weeks from now we'll be putt-putting over the jungles and rice paddies of Southeast Asia looking for the Viet Cong—"Charlie," they call him. The idea, as I get it, is to form a blanket of O-1s over the area so Charlie can't wiggle without being spotted by one of us. Once we spot him, it will be up to someone else to try and wipe the smile off his face. We carry 2.75 rockets with Willie Peter (white phosphorous) heads plus a handful of smoke grenades. We'll use these to mark the target and direct the strike. To an ex-fighter pilot this is like making love by proxy. But it does beat flying a desk.

Fully loaded, the O-1 tips the scales at less than 2500 pounds (2800 in SEA). It is little different from most of the equipment we've been flying. For some students it is their first encounter with a tailwheel and the first time many have had to really use rudder.

Spotter plane, O-1 Bird Dog, flies low over jungle to spot enemy. Keeping target in sight while staying out of fighter's way is just part of the day's work.

Bird Dog pilot surveys damage do
Low and slow is the



Ground handling is similar to the old T-6, except you can see over the nose. In the air it handles like no other bird, except the L-19. It is short-coupled and the "ball" seems to detest the center. I found it necessary to feed rudder in ahead of aileron both rolling into and out of turns. In the turn itself, I usually need a little rudder with the turn. The amount varies with angle of bank, direction of turn, power setting and the time of day. In some respects, the O-1 is like a Gooney Bird—easy to fly without bashing, but difficult to fly with smooth precision. Landings are best made tail wheel first and truly smooth ones are worth crowing about. About the time someone thinks he has it tamed, it produces some bounces that would make a mustang envious.

Our instructors are returnees from SEA tours in the *Bird Dog*. They hand out a lot of good, solid first-hand information in addition to showing us how to mark targets, navigate with one finger on the map and handle the machine without popping any rivets. Some are full time instructors while the rest are here on a four month TDY tour. Our maintenance people are mostly TDY troops also. This creates its own peculiar brand of problems, and the operation runs reasonably smoothly in spite of the problems.

Our training program was well planned. They gave us two weeks of ground school on air to ground operations, counterinsurgency, and other subjects slanted at the operation over there. We spent one afternoon on the aircraft itself, understandable, since all systems are about as complex as the spring steel landing gear. Of note: someone asked what a magneto did and someone else wanted a rundown on the mixture control. Neither man had ever flown behind a prop!

ne to bridge by fighter bombers.
name of the game.

White phosphorus grenades fired from O-1's spot targets for fighter bombers. Sighting system is primitive.

The flying training program started with two-hour transition missions. Most of us got three flights in one day and "soloed" on the second ride. Soloing isn't always that easy. My instructor told of one student who had never flown an aircraft where he needed to use the rudder pedals for anything except for the wheel brakes when taxiing. They actually had to teach him basic flying fundamentals before they could turn him loose. As a matter of fact, they made us go through a few stall series, slow flight, and had us try lazy 8s and other coordination exercises before we started shooting stop-and-go landings. Stop-and-gos we shot by the gross. In fact, we needed a minimum of 130 landings to graduate. When traffic is light you can get 20 in an hour. Transition was followed by a low-level cross-country with emphasis on navigating by grid coordinates. A night transition ride and checkout was followed by a proficiency check.

Next came tactical training—marking targets and controlling fighter strikes. This means trying to hit the ground with our 2.75 inch rockets and smoke grenades.

"Ah, Hot Flash Lead, do you have my mark?"

"I have your mark, Pigeon."

"Rog, well, ah, the target is 200 meters southeast of my mark."

"Nice shooting, boy."

The *Bird Dog* has no sighting system other than some homemade chewing gum-and-grease pencil device they installed here at Hurlburt. However, we manage to get tolerable accuracy, more-or-less, shooting from the hip.

During our tactical training one thing became evident. This machine doesn't unroll anyone's socks during the pull up from a rocket pass, and it is a terrific zoom indeed that gains back 500 feet of altitude. It ain't no fighter, despite that big 213 horsepower mill.

While directing strikes, one of the more pressing problems we had was keeping the target in sight while at the same time keeping out of the fighters' way. We had to use a different technique for each type fighter and for each kind of ordnance. One can't standardize it—there are too many variables. The best we could do was to stay loose and play it by ear. In fact, that seems to be the name of the game over there. Throughout the training program our instructors kept on us to stay flexible and to THINK. They stressed that we'll be on our own in SEA and will have to make our own decisions, often weighing the importance of a target against weather and other factors which affect the relative risk.

The people here in the O-1 program are doing a good job of providing a practical training environment. Further, they have managed to do it safely. I notice that they didn't beat us over the head with safety, but did keep things under reasonably tight control—you know, constantly monitoring the wind, weather and us dumb students. As usual, it has paid off. There have been a few ground loops and other close calls, but, to date, no one has broken any of the little airplanes. ★

Pilots just being introduced to the O-1 and A-1 aircraft might do well to read the article on torque on page 22, especially if your experience has been limited to jets—Ed.

Save $12,000,000 in 1966

Lt Col Harold E. Brandon, Directorate of Aerospace Safety

No, there's nothing wrong with the title of this story. We mean twelve *million* dollars. Now if you are one of those fellows thinking that you can't save 12 dollars, much less all those millions, you are the guy I want to talk to. You and I and a lot of other people can save the Air Force twelve million dollars during the remainder of this year, and it won't even be very difficult.

I can see that you are a skeptic and that I'm going to have to **show** you. Fair enough. But to digress just a moment. No doubt you are familiar with the tremendous efforts to prevent aircraft and automobile accidents. Commanders constantly stress flying safety and the Air Force is really going all out to decrease the number of lives lost in automobile mishaps. These efforts have paid off as evidenced by the steady decline in our aircraft accident rate during the past 20 years.

Now, let us examine another area, one that is costing the Air Force millions each year, plus an unnecessary loss of lives. During the two-year period, 1964-65, there were 141 aircraft accidents *on the ground*. Some were classified non-flight, while others fell into the flight category because there was intention to fly. (This article covers only those mishaps classified as aircraft accidents. In 1964 alone, 128 aircraft were damaged in *ground* accidents—which is another accident category.) Because of the extent of damage, 61 of these were considered to be major accidents. And these alone cost more than forty-eight million dollars. We didn't compute the cost of the 80 minor accidents.

This is where we get the $12,000,000 figure: These on-the-ramp accidents are costing about four million dollars a month. Multiply the monthly figure times the second six months of this year and you can see that our $12 million figure is pretty realistic.

By now you've figured out that all we have to do is prevent about 15 or 16 accidents during the remainder of this calendar year. But who do we mean by we? An analysis of cause factors reveals that most of the accidents of the type we're talking about are caused by Maintenance and other personnel error. Maintenance people were involved in the majority of the personnel error accidents, while drivers of support and other equipment accounted for the remainder in this category. In fact, errors on the part of maintenance and other personnel, pilots and supervisors accounted for 74 accidents, or more than half the total.

Only a moment's inattention is required to produce a scene such as this. Damage from mishaps on the flightline cost USAF millions.

The accompanying table provides a complete breakout.

To give you some idea of how you and I can prevent these accidents, here are some briefs of mishaps that have occurred but shouldn't have. You will see that carelessness, ignorance and indifference were the main culprits.

- A T-33 was being serviced with oxygen. Unqualified personnel attempted to fill the low pressure system from a high pressure oxygen cart. Result: fire and explosion, causing major damage.
- A crew chief was running up engines on a C-130 when the aircraft jumped the chocks and collided with another C-130. Both aircraft were destroyed. The crew chief failed to properly set up the hydraulic panel and turn on the auxiliary hydraulic pump.
- An unqualified airman lost control of an F-101 while taxiing to the trim pad. The aircraft left the taxiway and hit a mud bank. Cause factor was maintenance supervisory personnel.
- During a Coco alert, a B-58 skidded off an icy runway. The result was fire and destruction of the aircraft. The cause factor was supervisory personnel who failed to consider all existing runway conditions during a Coco alert.
- A T-29 collided with a ground power unit causing explosion and fire resulting in major damage. The cause factor was pilot error, in that he failed to properly clear the area prior to taxiing.
- A C-131 was struck by a refueling truck. The driver of the refueling truck fell asleep and allowed the truck to collide with the parked aircraft.
- A B-52 crew was taxiing in preparation for takeoff when brakes and steering were lost. The pilot turned off anti-skid and pumped brakes; however, the brakes were ineffective and the aircraft traveled 438 feet farther and collided with a parked KC-135. Cause was maintenance

Photo is dramatic; loss was tragic when C130 burned. During a two-year period there were 141 aircraft accidents on the ground.

supervisory error, in that the jumper wires were not removed from Nrs 1, 2, and 4 hydraulic pack turbine control relays. The wires were placed on the packs during prior maintenance.

• The operator of a de-icer vehicle with the boom raised to a 45-degree angle drove under the wing of a C-119. The boom struck the wing. Cause, maintenance error.

• A B-52 was returning from a routine night training mission when it struck an unlighted, unattended fire truck that was parked on an active taxiway in violation of current Air Force directives. Cause factor was listed as pilot error; however, unit supervisors were negligent in approving parking of the vehicle in the path of taxiing aircraft. Controlling agencies, including the crew, that could have prevented the accident were not notified of the parked vehicle.

• A C-124 was being refueled when fire broke out and destroyed the aircraft. Primary cause factor was attributed to maintenance error, in that the quick disconnect of the F-6 refueler was not secured properly.

In order to reduce these costly accidents during 1966 it is essential that commanders and supervisors of maintenance and operations activities insure that published directives concerning ground operation of aircraft, vehicles and equipment on the flight line, are complied with at all times.

To further reduce this staggering cost in dollars and loss of equipment and lives, each individual associated with aircraft and supporting equipment has the personal responsibility to re-examine his qualifications, habits, procedures, and methods of performance in an effort to eliminate safety malpractices and potential hazards.

Now do you believe that you can help the Air Force save twelve million dollars during 1966?★

BREAKDOWN OF ACCIDENTS BY CAUSE FACTOR

	Pilot Factor	Maint. and Other Personnel Factors	Weather	Supervisory	Materiel	Other
MAJOR	7	20	5	8	15	6
MINOR	6	29	5	4	26	10
	13	49	10	12	41	16
				TOTAL		141

If you are an aficionado of the water sports, learn . . .

THE THREE Rs OF WATER SAFETY

Robert L. Savage, Hq ASD, AFSC, Wright-Patterson AFB

The frantic upsurge in water sports during recent years has brought a correspondingly steep curve in water accident statistics. The drowned and the maimed add up to a grim total of largely preventable accidents. Preventable, that is, had the participants taken the time to learn something about the lethal environment and equipment they coveted in haste.

The outboard engine, a lightweight "kicker" used mostly by fishermen until a few years ago, has grown into a monstrous, roaring, smelly juggernaut. Driven at full throttle by landlubberly children, paramours, alcoholics, and grandmothers, all without an hour's training, it has changed the waterbug's way of life, forced new laws to be written, and driven a wedge of misunderstanding and distrust between those who have one and those who don't. In its wake comes the water skier—a virtual unknown fifteen years ago; and deep below him, the SCUBA diver pokes silently into the mysterious (and lethal) depths.

If you are already involved, or are about to take up one of these sports, you owe it to yourself, you owe it to your progeny and you owe it to your fellow water lovers to learn something about the handling of boats, and water safety.

Learn the "Three R's." In this case, they are RULES, REGULATIONS and REQUIREMENTS. And if at all possible, attend one of the free courses in boat handling offered by the United States Coast Guard Auxiliary or the United States Power Squadron in your area. If you don't know how to contact them, write to the Chief Director of Auxiliary, U.S. Coast Guard, Washington, D.C.

Everyone who operates a boat must realize his responsibilities; there are basic rules which must be followed. Sufficient freeboard (the height of the boat hull sides above the water line) and a safe hull design in seaworthy condition are the prime requirements for a safe boat. Each operator must be familiar with the handling characteristics, capacity and safe speed for his boat. Some manufactured boats have a small metal plate near the transom which states the maximum load and engine horsepower for safe operation of the craft. Follow the Rules! One must also consider the size of the boat for the body of water on which it will be used. A small boat that is safe on a river may not be safe for a large lake or coastal area.

Author checks lifesaving device for pet of Freda Lazenby, daughter of Owen Lazenby of Wright-Patterson Safety Office. Mr. Savage, training officer for 2d Coast Guard District Auxiliary, recently received State of Ohio award for contributions to boat safety.

State and federal laws require certain safety equipment to be on board your boat when it is used on the waterways. Most important is an approved life saving device in serviceable condition for each person on board. This may be a life jacket, life vest or a buoyant cushion approved by the Coast Guard. Buoyant cushions are not approved for children, and some states require that children under 12 years of age wear a life jacket at all times while on board a boat. It is good practice for a boat operator to insist that non-swimmers wear life jackets. For all others, life saving devices must be located so they are quickly available in an emergency.

FUEL HANDLING

One of the major causes of boating accidents is careless handling of fuel. All permanently installed fuel tanks must be vented so that the vent line terminates at the exterior of the hull. Filler pipes must be mounted flush with the deck and positioned so that spilled fuel can easily be washed overboard. Gasoline fumes are heavier than air, of course, and all closed compartments must be vented with two cowl ventilators.

If you are operating a boat with closed compartments, you are urged to contact the Officer in Charge of Marine Inspection, in the Coast Guard District in your area, or a member of the Coast Guard Auxiliary for specific ventilation requirements for your boat.

If your boat is equipped with an inboard engine, there is a cardinal rule that must be followed: *Before you start your engine, open all motor hatches or covers.* If it is equipped with an exhaust blower, allow it to operate for a sufficient length of time to remove any accumulated fumes from the bilge. And please don't install your own make-shift electric wiring; there is always the danger of gasoline fumes aboard. All electrical circuits must be fused, and open type switches are out. Even the battery should be covered with a non-conductive material, since a carelessly handled tool or metal object might touch the battery terminals and cause an electrical spark.

Outboard motors with portable gasoline tanks are so designed that the tank can be removed from the boat to be filled. These portable tanks should never be filled in the boat; if ignited during refueling operations the fumes and spilled fuel could create a terrific explosion. Remember—gasoline is more dangerous than dynamite! So take the time to be careful.

FREE BOAT INSPECTION

The U.S. Coast Guard Auxiliary offers another free service to all boat owners who request it—a Courtesy Motorboat Examination. This examination determines whether the boat owner is complying with the law and the requirements of the Auxiliary for certain additional equipment which will entitle him to the Auxiliary Courtesy Examination Decal.

The additional requirements for this decal are to have on board an adequate pump or bailer, a paddle or oar on Class A boats, a distress flare, an anchor and line of suitable length for the locality, approved running lights in operating condition. The boat, of course, must be in ship-shape and seaworthy condition. During this examination the Coast Guard Auxiliarist will point out all of the items necessary for making your boat safe for operation in the local waters. Since this examination is conducted only at the request of the boat owner, discrepancies in the examination are not reported. They are noted on the examination form which is given to the boat owner and he may correct them and receive the decal.

Having a boat in seaworthy condition and equipped with the required safety equipment is just the beginning. Boat owners also must realize they are completely responsible for the safety of their passengers. If you are operating on a large body of water, it is common sense to let someone know the time that you expect to return. In addition, give them a description of your boat and its registration number. This information will be helpful to the Coast Guard or other rescue organizations in the event your craft becomes disabled and fails to return on time.

THE THREE Rs OF WATER SAFETY

WEATHER CHECK

Before starting a cruise on open waters, check the local weather forecast. If the weather looks unfavorable, postpone your voyage until another day. In the event you are caught on the water during a storm, here is how to ride it out. First, keep calm; make sure each person is wearing his life jacket. Seat all passengers in the bottom of the boat to keep the center of gravity low, secure all loose gear, and head into the waves at a slight angle. Proceed at a speed which enables you to maintain a straight course, and prevents waves from washing into the stern of your boat. If your motor should fail, use a sea anchor made of a bundle of clothing, extra life jackets, or any other items that can be tied to a bow line, and throw it overboard. The sea anchor will float off the bow and create enough resistance to keep your boat headed into the waves.

The greatest danger in riding out a storm is to allow your boat to become trapped in the troughs of the waves. When this happens, the breaking waves fall over the side of the boat, filling it with water. When the boat is headed into the waves, this danger is lessened.

Whether you operate a boat on federal, state or international water, there are certain rules of the road which must be followed to prevent collisions. As an operator of a boat you are responsible to learn these rules and yield the right of way to other vessels when they are privileged.

When another vessel approaches in your danger zone, which is described as the area dead ahead to two points abaft your starboard beam, you must yield the right of way. When you are overtaking another boat, you must realize that the boat you are overtaking is a privileged vessel. You should insure that the wake or maneuvering of your boat will not cause any accident or result in the other boat being disabled. Your wake or waves are your responsibility, and you are liable for any accident or damage they cause.

NAVIGATION AIDS

There are various aids to navigation that will warn you of danger areas and guide you through safe channels. These aids are in the form of floating buoys, shore lights, wooden structures, and other colored markers.

Buoys are identified by shape and color; each has a meaning. Red buoys mark the right side of the channel, and should always be passed leaving them on your right side when entering from the seaward toward the head of navigation. Red buoys are cone shaped, and are called num buoys. If you can remember the three R's (Red, Right, Returning) you will have no difficulty in knowing on which side of the buoy to pass. Black buoys mark the left side of the channel, are called can buoys, and are shaped like a can. Buoys are numbered with even numbers on the red buoys and odd numbers on the black, and are identified on navigation charts by type and number.

Along the coastal areas there is a system of interconnecting canals, rivers, and bays known as the Intercoastal Waterway. The systems of buoyage and markings are the same with one exception—some portion of the buoys or markers are painted yellow. The western rivers of the United States (Mississippi and its tributaries) use a similar system of buoyage except that the uppermost portion of the buoy is painted white for ease of identification after dark. They contain no numbers or other markings. Wood structures are located on the riverbanks to guide the navigator through the safe channels. Each structure contains a number which designates the number of miles from a stated point of origin.

In order to maintain a sufficient depth of water for navigation, the western rivers have numerous dams. In order to pass from one pool to another, as they are called, it is necessary to pass through a lock. When locking through, the boat operator must be familiar with procedures.

First, when approaching a dam from the up-river side, the operator must maneuver his vessel toward the lock wall along the river bank. A river chart will specify where the dam is located and the location of the lock wall. A vessel approaching the lock must signal the lock master to be admitted into the lock. An adequate length of good line is necessary to hold your boat against the lock wall when the water level in the lock changes. The line should never be made fast to any part of the boat or the bits on the lock wall, but should be held by the occupants in the boat. As the water level changes the line is shortened or lengthened to keep the boat against the lock wall.

All occupants of the boat must wear life jackets during locking operations. The water within the lock becomes very turbulent as the level raises or lowers, and all safety procedures must be observed.

When boating near a dam, either on the up-river or down-river side, it is necessary to keep a safe distance away from the dam. If you are boating on the up-river side, always have your anchor ready in the event that your motor should fail. The current in the river will carry your boat into the dam if you have no means of controlling its operation. When boating on the down-river side of the dam, keep a safe distance from the dam since the current and turbulent water can draw your boat into the water which is spilling over the dam. Exercise extreme caution at all times when boating in the area of a dam.

WATER SKIING

Boating is a sport in which all members of the family can participate, and another water sport that has increased greatly—water skiing. This is a fun sport and also a dangerous sport if basic safety procedures are not followed. First, of course, the skier must wear a life saving device, preferably a life vest that will enable the skier to float with his head out of the water even though injured or unconscious. When towing a water skier, there must be a second person on board the boat to act as an observer. The boat operator cannot safely operate the boat and watch the skier at the same time. Hand signals should be used by the skier to communicate with the occupants of the boat, and all persons should be familiar with these signals.

Another water sport which has increased in popularity is SCUBA diving. Each boat operator should be familiar with the skin diver's flag, a square, red flag with a white diagonal stripe. When you see this flag displayed on a boat which is not underway, or attached to a float, it means there are skin divers in the water. Refrain from boating in that area, but if you must, do so at slow rates of speed. Be on the lookout for air bubbles coming to the surface of the water. These are emitted from the diver's breathing apparatus and signify that he is below. Exercise extreme caution; your propeller is a lethal weapon and can fatally injure a diver.

If you are a sailor who relies on Mother Nature instead of "horses" which drink gasoline, you will need specific instructions on sailing techniques. To become proficient in handling a sail boat requires experience, until you are familiar with its operation.

In summary, all the rules of water safety boil down to a simple maxim—"For more fun in a boat, use common sense afloat." ★

TORQUE: THE OTHER FORCE IN FLIGHT

Mention torque and the "P factor"—their cause and effect and how to live with them—and you've got the makings of a lively discussion.

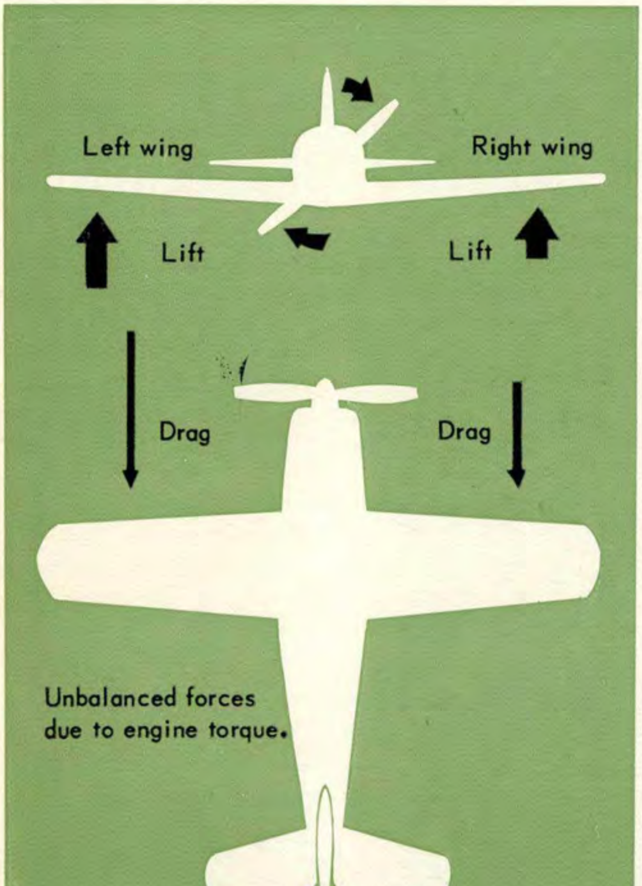
In flight training in *low performance* aircraft it is generally taught that torque and "P factor" are of prime concern. In high performance aircraft which feature wing sweep, advanced design engine mounting and high lift devices, to name some characteristics, torque and "P factor" are of varying concern depending on specific design.

Why do most American manufactured planes have a tendency to turn left on takeoff and climbout? This wayward inclination is sometimes laid to the "P factor" and sometimes to torque, the force which tends to produce a rotating or twisting motion. Both contribute to this aerodynamic phenomenon.

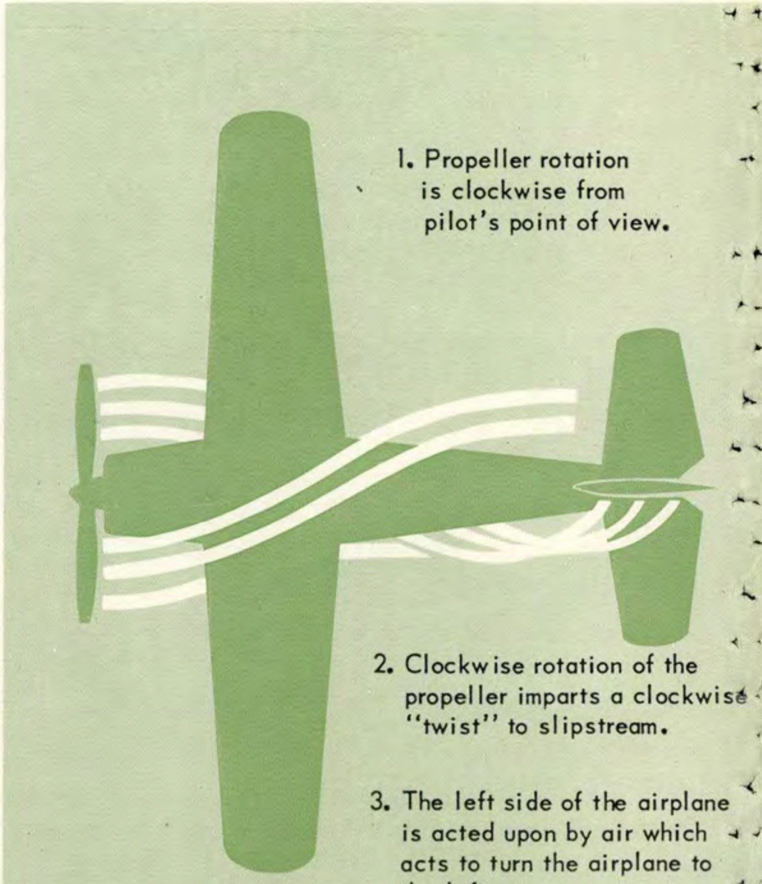
The most significant torque producing force in a propeller driven airplane is created by the rotating propeller. Viewed from the cockpit, propellers in most aircraft built in the United States turn clockwise. The propeller, swinging down to the right, exerts a torque force that tends to rotate the plane to the left.

The way to counteract torque is readily at hand. It is standard

Jet-trained pilots converting to single engine recips (0-1, A-1) have a new force to contend with — TORQUE. This article provides some basic information on this phenomenon.



Unbalanced forces due to engine torque.



1. Propeller rotation is clockwise from pilot's point of view.
2. Clockwise rotation of the propeller imparts a clockwise "twist" to slipstream.
3. The left side of the airplane is acted upon by air which acts to turn the airplane to the left.

practice for manufacturers to rig the left wing with a slightly higher angle of incidence, creating what is commonly called "wash in." In pusher aircraft and in the rare American plane equipped with a prop spinning counterclockwise, the "wash in" is built into the right wing.

"Wash in" has its limitations since it can compensate for engine generated torque only at a specific power setting and airspeed. To provide maximum benefit to the pilot, wings are rigged for cruising power and airspeed values. At other than cruise, the "washed in" left wing produces more lift, but also causes additional drag. This causes the plane to turn left unless something is done, besides constantly applying right rudder, to counteract this tendency. Setting the leading edge of the vertical stabilizer off to the left a small amount gives the same effect as applying slight right rudder, and is sufficient to cancel out the inclination to turn left at cruising speed.

An easy test for correct rigging can be made in flight at cruising speed using the trim control only. To verify the tendency of the aircraft to turn left, raise the nose with the trim control. If the plane begins to roll and turn left as it loses speed, the rigging is correct because the fixed settings of the wing and vertical fin are insufficient at less than cruising speed to counter the torque produced by the engine.

If the airplane is then nosed down with the trim control only, it will tend to roll and turn to the right as the speed increases because at higher-than-cruising airspeed the fixed settings are more than enough to overcome the engine torque.

Since the rolling effect of torque is greatest at the maximum power settings used for takeoff and climb, it is necessary to use some force on the ailerons to maintain directional control. Application of aileron control, usually to the right, adds drag to the left wing, creating a tendency for the plane to turn left during takeoff and climb.

It is routine instruction procedure to tell students they must hold right rudder on takeoff and climb to compensate for torque. This is not the whole truth—there are other factors which contribute to the left turning propensity of American planes.

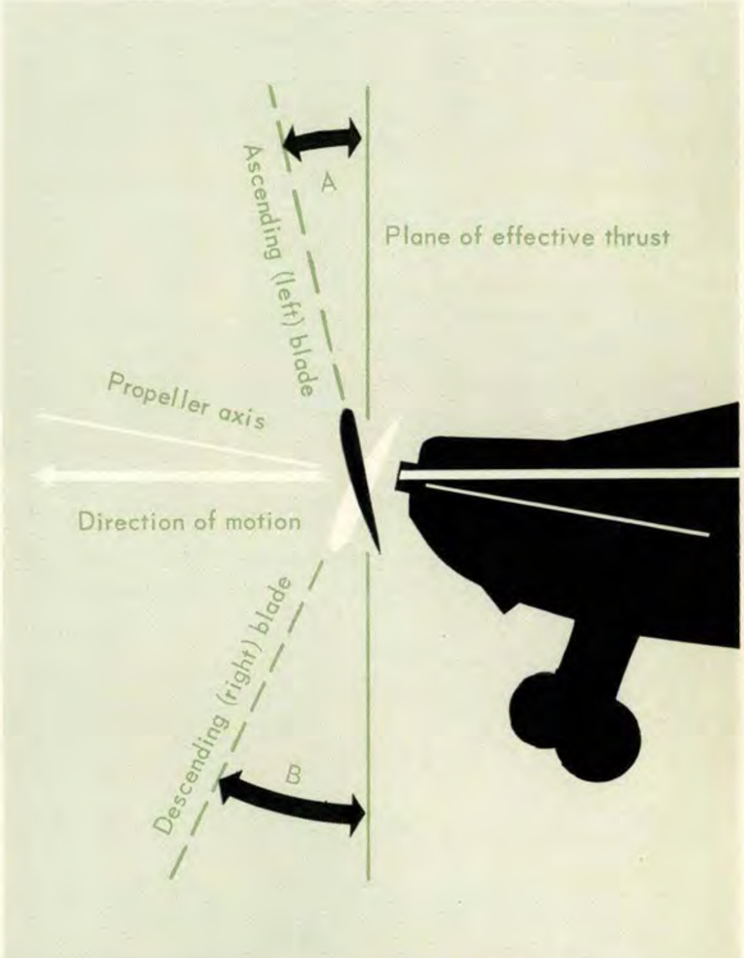
Here's where the "P factor" comes in. This is defined as the asymmetrical thrust delivered by the propeller, especially in single engine aircraft, when the flight attitude is changed. As long as the prop screws its way through the air in a direction absolutely parallel to the shaft on which it is mounted, the thrust is uniform all around its plane of rotation.

If the angle is changed, however, as in a climb or takeoff, the propeller blade as it descends on the right side of the aircraft has a much higher angle of attack than it has on the left, or ascending, side. This greater thrust will turn the plane to the left. The greater the angle of attack, the greater turning effect created by the "P factor." This is a characteristic of tailwheel craft on the takeoff roll and of all aircraft upon liftoff.

The effects of torque and asymmetrical thrust are present in both single- and multi-engine aircraft.

Torque and the "P factor" have fueled many a hangar flying session and will continue to do so as long as men fly. There are *yea* and *nay* sayers but it is the end result that counts—flying safety. Just watch your "Ps" and "Ts"—your "P factor" and your torque. ★

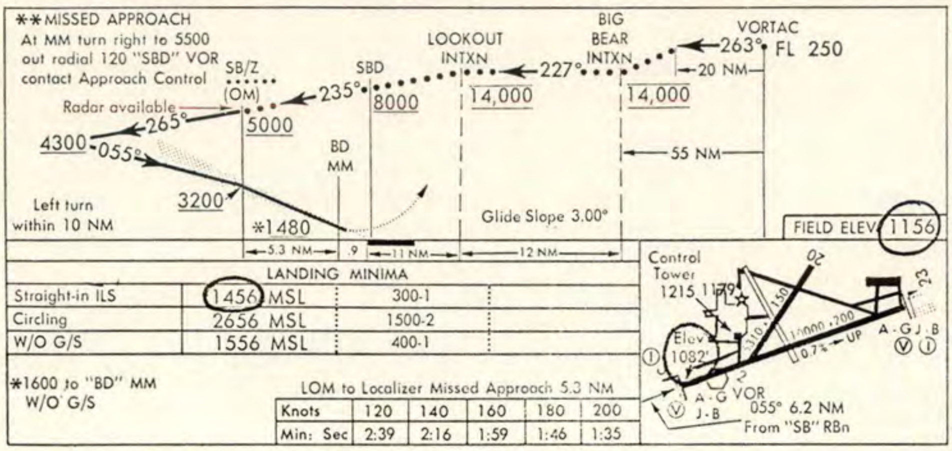
What 'P' Factor Is All About



The effect of unsymmetrical propeller thrust (P factor) on the tailwheel type airplane rolling in three point position, or on any airplane at a high angle of attack. Note that the angle of attack (A) of the left blade is much shallower than that (B) of the right blade, which causes additional thrust on the right side of the propel-

THE IPIS APPROACH

By the USAF Instrument Pilot Instructor School, (ATC)) Randolph AFB, Texas



Q. Why do some installations establish ILS minimum altitude based on field elevation and others based on threshold elevation? (See examples.)

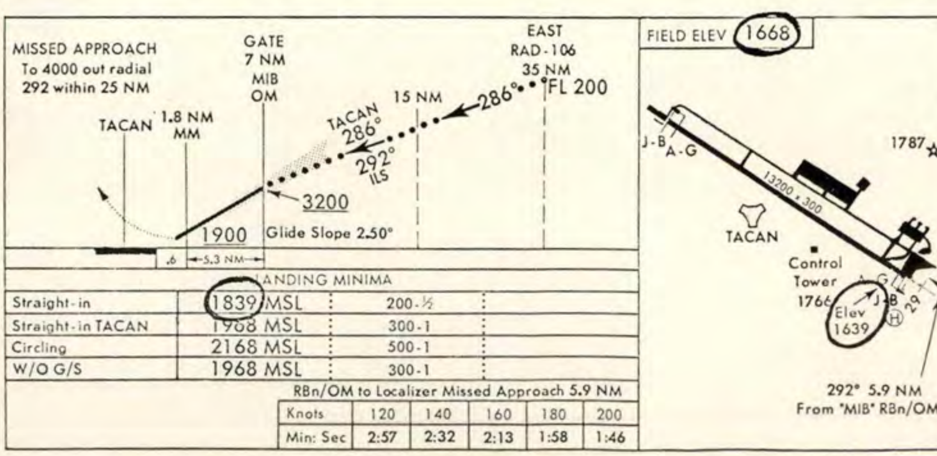
A. Existing directives (JAFM 55-9, AF Form 1368, etc.) do not provide specific guidance on how to establish ILS minimum altitudes. As a result the manner in which a minimum altitude is established varies, based on interpretation. The forthcoming TERPS (New JAFM 55-9) hopefully will solve this problem. Specific guidance is provided.

Q. Where is published field elevation measured?

A. The published field elevation is the elevation of the highest point on the landing area that is used or intended to be used for takeoff and landing.

POINT TO PONDER

Does your base have altimeter check point signs near the end of each runway? AFR 55-48 states, "If the takeoff end of any runway varies more than 10 feet off the official field elevation, a marker will be conspicuously displayed near the end of that runway indicating the exact elevation at that point." If you do not have altimeter check point signs at your base, are you sure it is because the elevation at the end of each runway is less than 10 feet from published field elevation? ★



Missilanea

HAZARDOUS INGENUITY. Safety showers, placed in many environments for the protection of personnel, particularly from the effects of chemical contact, have become a familiar sight to missile maintenance, operations, and support personnel. The reliability of these showers—a must—is verified by daily checks, usually required by tech data. The fact that the shower works, however, is not the only end result to be desired; assurance should be made that the water will not be restricted from contacting an individual under it!

In recent visits to the field, it was noticed that in the best traditions of Yankee ingenuity, plastic sleeves had been attached to the shower head, running down to the drain. Responsible personnel indicated that the sleeves had been affixed to prevent water from spraying the area during the daily check. But at one base, the sleeves presented a problem—they were taped so tightly to the shower head that they could not be readily pulled loose in the event of an emergency.

A thorough check should be made of each emergency shower in your organization. Assure that all showers function properly and that, should the need arise no individual would be impeded or even delayed from using a shower.

Lt Col K. H. Hinchman
Directorate of Aerospace Safety

BENT PROBE. An attempt to service the rear main landing gear struts of a B-52 resulted in an AGM-28 "Hound Dog" missile receiving a bent aerodynamic probe.

An airman, directed to service the struts, obtained an MC1A air compressor and started hand pulling it along the left side of a B-52 with AGM-28s on board. It was windy and the 5-foot long AGM-28 probe cover streamer was blown back and forth. On one of the streamer's swings, it became entangled in a partially open door of the air compressor and before the compressor could be halted by the airman, the probe was bent. To prevent recurrence, all probe cover streamers are being shortened to two feet.

Movement of the missile or of equipment around the missile continues to cause many of the "Hound Dog" mishaps.

Capt R. A. Boese
Directorate of Aerospace Safety

A LESSON TO REMEMBER—A certain Air Force space booster launch complex is located within a few hundred feet of an aircraft parking ramp and taxiway. During the actual propellant flow of a dual propellant loading (DPL) exercise, a transport aircraft started engines and also taxied very close to the launch pad.

An accident did not occur but safety was jeopardized and safety procedures were violated: The DPL and the aircraft flight departure were not effectively coordinated. The pilot did not meet his established takeoff time, the flight operations officer did not enforce the takeoff deadline nor request a hold on the DPL countdown, and the Missile Safety Officer did not delay the propellant flow, although both telephone contact and closed circuit television surveillance existed. Folks were duly embarrassed. You may be sure that additional emphasis was placed on the need to comply with safety procedures.

The point of this story is not that some mistakes were made, but that a valuable lesson can be gleaned from this example. There are times when control of a situation is gradually eroded, then completely lost. When individuals are in the process of working themselves into some sort of corner, there is seldom an early, overpowering warning which is sufficiently forceful to attract just anyone's attention.

Colonel W. R. Sturm
Directorate of Aerospace Safety

Most people, especially those knowledgeable in their field, become concerned sufficiently early that something may be amiss. Nevertheless, an inability to "bite the bullet" sometimes persists until control is lost. Trouble, at its inception, often is not fully and clearly recognized. Uusually only a germ of an idea exists which must be developed. The lesson to remember is that, when doubt or concern first appear, safety representatives must have both the resolve and self-discipline to meet the problem with deliberate analysis. They must strive to be deliberate rather than dependent on hope to "muddle through," in thought processes needed to "stay ahead of the airplane." Control of dangerous situations can then be maintained through timely, confident, and decisive action.

Lt Col K. H. Hinchman
Directorate of Aerospace Safety

AER BITS

JUST AFTER THE T-33 leveled off, the right tiptank fell off and was observed by the pilot to land in a wooded area and burst open. He was able to control the aircraft but decided his best bet was to jettison the left tank also. This he did over water, then returned to the base of takeoff and landed. There was no damage to the aircraft.

The tiptank pin guide lock was loose and it appeared that when the locking pin was inserted, it missed the slot in the release lever forcing the lever to a partially open position. The airstream then may have forced the release lever to the open position releasing the tank.

GEAR SWITCH—During takeoff, the gear of the F-106 appeared to come up normally, then a loud "clunking" sound occurred and the gear unsafe warning appeared. This was followed by secondary hydraulic system failure. The pilot slowed down, lowered the gear by the emergency system and made a safe landing, but the right inner gear door and linkage were lost and the hydraulic line was severed.

This incident was caused the night before when the inner door uplock switch was wired closed in order for the ground crew to check out drop tank operation. The wire was not removed and was missed on both the maintenance and pilot preflights. During retraction, all three gear up switches were closed before the inner door was locked up. With the three switches closed, hydraulic pressure was relieved from the gear up side of the strut and the gear lowered by gravity.

THE VALUE OF good preflight briefing of emergency procedures for nonrated passengers was illustrated in a recent T-33 accident. The aircraft was a low level target for a stan/eval radar intercept. The rear cockpit was occupied by a maintenance officer on his first jet ride. Approximately 12 minutes after takeoff, complete engine failure occurred at approximately 7000 feet.

The pilot turned the aircraft toward an emergency field, but decided it was too far away, considering his altitude and prevailing headwinds. He informed his passenger that they would have to leave the aircraft and rebriefed him on ejection procedures.

Ejection was initiated by the pilot from the front seat. Both ejections were completely successful, the pilot and passenger landing safely with only very minor injuries.

The thorough briefing given the passenger by the pilot prior to takeoff and the opportunity to rebrief him during the emergency was a major contributing factor in his successful escape. This briefing instilled confidence in the system and enabled him to employ proper ejection and parachuting procedures.

A word to the wise is sufficient. You will never know when you may have to instruct your passenger to leave an already unfamiliar environment for a more unfamiliar and even more unfriendly one. Make certain he is afforded the best possible chance of coming through unscathed. The best way to insure this is through a thorough briefing of the escape system.

Robert H. Shannon
Safety Officer, Life Sciences Div

FOLLOWING A JEEP accident, 15 miles from base, the HH-3C crew ferried two doctors to the scene to aid the injured driver. The landing was made on the road near the overturned jeep. When the patient was ready, he was placed aboard the helicopter and takeoff was begun. During hover it became apparent to the pilot that he had insufficient power to clear the obstacles surrounding the confined area. Using good judgment, he elected to hover the aircraft as high as possible, then jettison the external tanks which were still full of fuel.

When all available power was used and the tanks were released, the aircraft climbed out of the clearing and proceeded to the base. After the tanks were released, the crew chief saw an object which looked like the cap and filler neck from the jettisoned right tank fly up toward the rotor and fall back down. No vibrations or control problems were encountered. After the helicopter landed, an inspection revealed a dent in the bottom of the tip section of one rotor blade.

As a result of this experience, a recommendation was submitted to modify the fuel dump system to allow dumping of fuel from the forward internal fuel tank. This would have eliminated the need to punch off the external tanks and also provide more margin for safety.

WHILE TAXIING to the parking area after landing, the student pilot was having trouble opening the canopy of a T-37. The IP took over taxiing and told the student to actuate the internal canopy switch and recycle the canopy locking lever. Still no results.

While the IP was parking the aircraft, the student placed the internal/external switch to the external position. The IP signaled to the crew chief, who was standing on the right side of the aircraft, that the canopy wouldn't open normally. The crew chief started around to the left side to open the canopy but the airman who had just chocked the wheels beat him to it. Noticing the open exterior jettison door, and a signal from the student that he interpreted as instruction to jettison the canopy, he did just that. Actually the signal was meant to indicate the airman should actuate the external canopy open switch.

The problem was a breakdown in communications between the student pilot and the airman, who had been working on the flight line for only two weeks. The reason for the canopy being reluctant to open was overservicing of a strut which prevented the squat switch from closing, and completing the canopy actuating electrical circuit.

FOREIGN OBJECT DAMAGE has been and will continue to be a very serious problem and one that is difficult to lick. Stones and other small objects will get on the pavement and be ingested by the engines. Efficient ramp cleaning helps mitigate this problem, along with sharp-eyed maintenance people who pick up objects they find lying on the ground. But FOD that results from carelessness cannot be tolerated.

Recently a C-124 was on final approach. As the flaps were being lowered the aircraft started to roll to the left and entered an estimated 35 to 40 degree bank. The flaps were retracted and both pilots managed to bring the aircraft to a level attitude by brute force.

After landing the aileron appeared to feel normal, but inspection of the aircraft disclosed sheet metal damage to the forward outboard corner of the right flap. Apparently the damage and the restriction on the aileron was caused by on open end wrench that was later retrieved from the right flap well about 18 inches from the right aileron. Apparently the wrench had been in the flap well for some time and somehow worked itself into contact with the right aileron. It was thought the wrench became dislodged possibly by the slip

AERO BITS

stream or light turbulence on the approach.

A similar event occurred when elevator travel of a T-37 was affected by a ⅜″ tubing storage cap which had been left in the aircraft.

There is no way of knowing how many aircraft have been lost to this cause. While many accidents have been documented, frequently the object is lost in the ensuing crash and all we have to show for it is an accident with no determined cause factor.

C-130 ACCIDENT TREND. Since the C-130 entered the USAF inventory in 1955, it has been involved in 40 major flight accidents. Prior to 1965 the maximum number of major accidents occurring in any one year was four. Four were recorded in the years 1958, 1959, 1961, 1962 and 1964. In 1965, nine major flight accidents occurred, eight of which were attributed to pilot factor, and one to facilities. From 1 January 1966 to 31 March 1966, six major accidents were recorded; however, at this time no specific overall trend except pilot factor can be identified.

Due to the C-130 mission, flying-hour increase and shortage of high time C-130 aircrews, the C-130 accident rate may well continue to increase. Statistics indicate that 38 per cent of the total C-130 flight accidents have occurred during the past 15-month period from 1 January 1965 to 31 March 1966.

Major William M. Bailey, Jr.
Directorate of Aerospace Safety

FALLOUT

Continued from inside front cover

The most striking example of enlightened thinking on the part of the author was his statement that piling on more "thou shalt nots" will not solve the problems.

One fact will have to be faced, in some areas of the country, good managers cannot be had at any price. I happen to be in one of these areas and know that the commanders responsible often have a difficult choice: (1) have second best type management, (2) put in his own GI manager (improper according to current regulations) or (3) close the facility. A close look at commands using military managers will show a much better safety and operating record.

I admit that the loss of even one manhour due to an Aero Club mishap is too much but other types of motor vehicles kill and maim far more people than do aircraft, yet few threats are heard to eliminate motorcycles, boats or cars. The National Safety Council reports more boating deaths annually than all of the light plane accidents in the United States.

I believe that the Air Force is the most likely place in the world to find people who want to fly. Therefore Aero Clubs are likely to always exist in one form or another. If they exist on the base, the commander should exercise a measure of control. If they are closed, as is sometimes threatened in order to "solve" the problems, watch for the "spontaneous" clubs to start at the local civilian airport. They will not have the assistance present USAF clubs have, thus will not operate as good equipment. Compound poor equipment with no supervision from the friendly Ops and Safety people and the loss of life and manhours due to accidents will not decline but will probably increase.

There is established in Hq USAF an office staffed with good people to oversee the program. The next step is approving military managers reporting directly to the base commanders where they are not otherwise available.

TSgt Reginald E. Holden
1513 Vallotton Drive
Valdosta, Ga. 31603

BIG "S" FOR AERO CLUB

The Hickam Aero Club enjoys the sometime reputation of being the largest in the USAF. We say "sometime" because of the unplanned losses of major segments of club membership to other than normal rotations of sponsors.

All of us who have any responsibility for the club are intimately acquainted with AFR 215-2, AFM 215-4 and instructional letters from Randolph. These are all contained in "required reading," either PIF, SOPs or otherwise. But we needed somehow to summarize our formula for a successful operation.

After a bit of tidal action in several craniums, we evolved the expression: Safety, Supervision, Solvency, Success: "Big S for Aero Clubs."

SAFETY
SUPERVISION
SOLVENCY
SUCCESS

BIG S FOR AERO CLUBS

The Hickam Club has just completed a 9500-hour annual flying program with its all-Cessna fleet. One reportable incident occurred. We have full-time management, mechanic and dispatchers who share a very attractive incentive bonus (30 per cent of net operating profit) beyond adequate salaries. Our majors and annuals are performed by an FAA approved commercial maintenance facility. Flying hour charges and instruction fees are flat rates, wet, and all fees are paid to the club. Our flight and ground schools are FAA certified and our Chief Instructor Pilot is a designated FAA Flight Examiner.

Our club is good, our equipment is good and so is our safety record. We invite transiting club members to fly with us.

Col F. N. Thompson
PACAF, Hickam AFB, Hawaii

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WELL DONE

CAPTAIN FRANKLIN A. CARAS

4758 DEFENSE SYSTEMS EVALUATION SQUADRON, BIGGS AFB, TEXAS

Captain Franklin A. Caras was flying number two position in a flight of two F-100Cs, that had departed Biggs AFB on a local instrument training mission. During the climb, it became apparent to the leader that instrument conditions would be encountered, so he signaled Captain Caras to join in close formation prior to penetrating the clouds. As Captain Caras rolled into a left turn, the rudder pedal froze in the deflected position. Captain Caras alternately applied right and left rudder in an attempt to free the pedals. Each time left rudder was applied the pedal would deflect a little more in that direction. This resulted in the rudder being deflected to almost a full left position. Squadron operations was notified of the malfunction, and due to the adverse crosswind at Biggs, both aircraft were diverted to Cannon AFB. Enroute to Cannon AFB, the pilot was occasionally able to break the rudder free, only to have it freeze in some other intermediate position. At the time of landing the rudder was frozen in approximately the neutural position, so the pilot elected to attempt a landing from a straight in approach. While the wind was more aligned with the runway at Cannon, its velocity was about 30 knots. This would require either rudder control or nose wheel steering after touchdown to keep the aircraft on the runway. Captain Caras flew a long straight-in approach and touched down with the rudder locked. When the nose wheel was placed on the runway in an attempt to acquire steering, the rudder broke free, and a normal roll out accomplished.

Investigation revealed a one-quarter inch castillated nut lying against the rudder actuator assembly. Analysis indicated it had locked the rudder. Captain Caras' cool and disciplined handling of this emergency prevented the loss of a USAF aircraft. WELL DONE!

For Meritorious Achievement in Flight Safety for the period 1 January through 31 December 1965, the units listed here have been selected to receive the Air Force Flying Safety Plaque. The stringent criteria insure that each recipient has achieved an outstanding flying safety record while maintaining mission capability.

Flight Safety Awards

AAC
- 317 Fighter Interceptor Squadron, Elmendorf AFB, Alaska
- 5017 Operations Squadron, Elmendorf AFB, Alaska

ADC
- 1 Fighter Wing, Selfridge AFB, Michigan
- 57 Fighter Interceptor Squadron, Keflavik Airport, Iceland

AFSC
- Air Proving Ground Center, Eglin AFB, Florida

ATC
- 3510 Flying Training Wing, Randolph AFB, Texas

MAC
- 63 Military Airlift Wing, Hunter AFB, Georgia
- 61 Military Airlift Wing, Hickam AFB, Hawaii

PACAF
- 416 Tactical Fighter Squadron, Tan Son Nhut AB, Vietnam
- 45 Tactical Reconnaissance Squadron, Misawa AB, Japan
- 6441 Tactical Fighter Wing, Yokota AB, Japan
- 21 Troop Carrier Squadron, Naha AB, Okinawa

SAC
- 7 Bombardment Wing, Carswell AFB, Texas
- 454 Bombardment Wing, Columbus AFB, Mississippi

TAC
- 363 Tactical Reconnaissance Wing, Shaw AFB, South Carolina
- 481 Tactical Fighter Squadron, Cannon AFB, New Mexico
- 516 Troop Carrier Wing, Dyess AFB, Texas
- 4510 Combat Crew Training Wing, Luke AFB, Arizona

USAFE
- 20 Tactical Fighter Wing, RAF Wethersfield, England
- 49 Tactical Fighter Wing, Spangdahlem AB, Germany

ANG
- 133 Military Airlift Group, Minneapolis-St. Paul Intl Airport, Minnesota
- 141 Fighter Group, Spokane Intl Airport, Washington

AFRES
- 349 Troop Carrier Wing, Hamilton AFB, California
- 434 Troop Carrier Wing, Bakalar AFB, Indiana