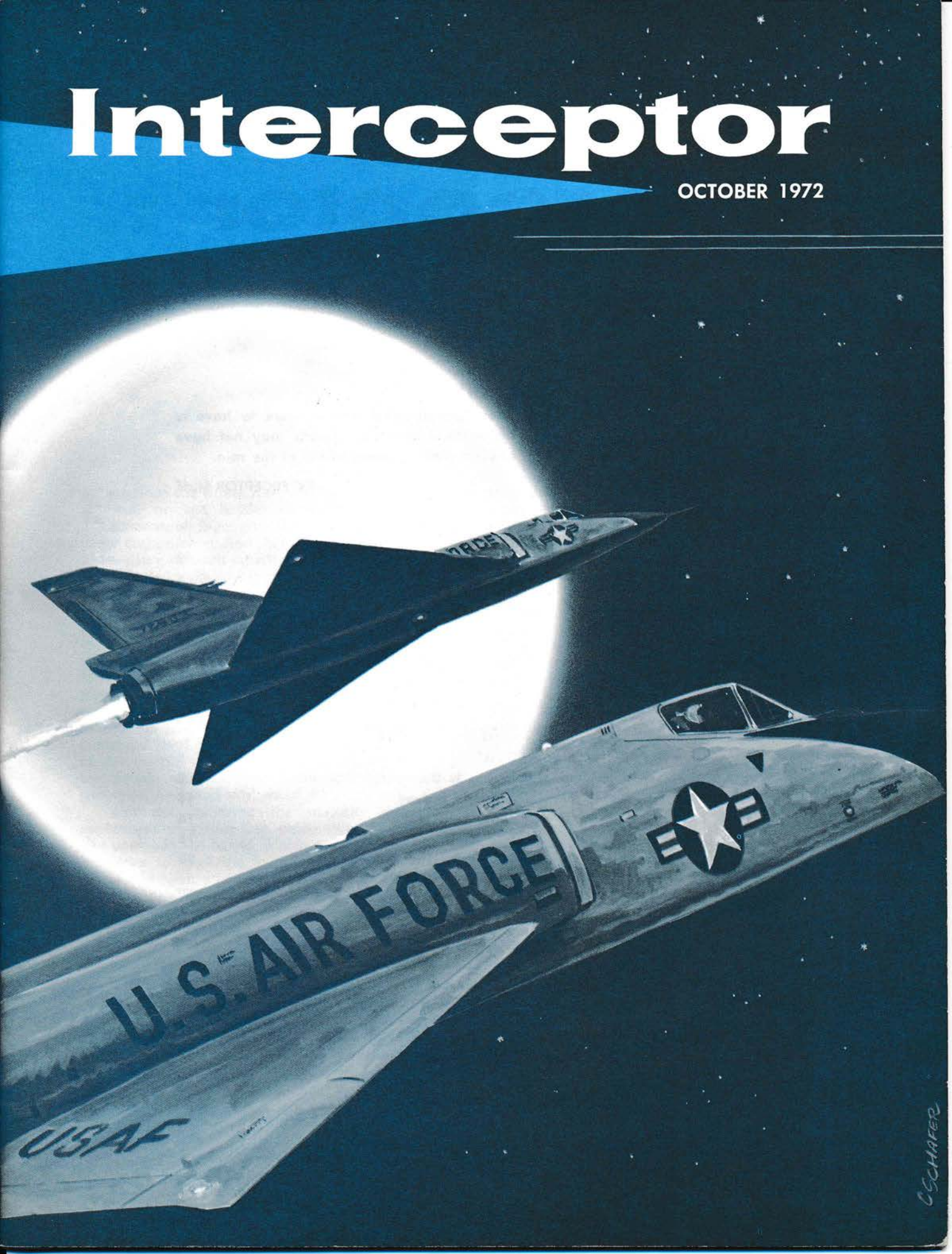
Interceptor

OCTOBER 1972



Interceptor

FOR THE MEN AND WOMEN RESPONSIBLE FOR AEROSPACE DEFENSE

VOL 14
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SPOTLIGHT

Those people who always seem to have a black cloud over their heads may not have enough sense to come in out of the rain.

INTERCEPTOR Staff

DEPARTMENTS

SPECIAL FEATURES

OUR COVER

In any weather, at any time of the day or night, ADC Alert fighters are ready to respond when our radar controllers detect unknown or enemy aircraft. Here we depict a vista experienced by very few men flying in the silvery light of a full moon and a crystal clear night.

"We don't ask our supervisors to get their hands dirty any more, but we must demand that they get involved."

Ever since the Stone Age, combat leaders have won or lost battles depending upon the amount of ingenuity they used. In nearly every encounter we find that the winner managed to resolve a difficult situation by giving the most explicit directions to his men and then applying his resources most effectively.

Time hasn't changed the philosophy of good management and one would think by now lessons we learned would be deeply ingrained in our way of operation. Yet, in traveling from one unit to another, it quickly becomes obvious that some units "do it better" than others — in some cases dramatically better. The difference between success or failure is usually found not at the command level or even at the working level, but at the middle management level. That's where the people with the experience and know-how supervise the actual workers.

I'm not knocking the majority of our supervisors who do a fine, outstanding job. But, like apples in the barrel, it only takes one or two bad ones to spoil the lot. The supervisor who doesn't perform up to his level of authority and responsibility is a potential block to his and every other function in the operation. His lack of concern, ambition, or leadership transmits itself in negative attitudes like a contagious disease. He's usually complaining or looking for an excuse. He lacks the ability to overcome the obstacles that normally occur in military life and he expects things to be handed to him on a silver platter. He fails to recognize the lead time required for people, parts, and equipment. He thinks he is the only one in the Air Force with a problem and, what's worse, he's blaming others for his failure. His typical response is, "They didn't do it," when in reality he should have made sure they did do it.

The effective supervisor, by comparison, seems to meet his requirements with ease although he has the same problems. Why? Undoubtedly he has assessed the situation from the fundamental viewpoints of: "How effectively can I use what I have today?" and "What will I need tomorrow?" and "How do I go about getting it?" He makes this assessment frequently so he knows he's always up to speed on the current situation. He knows that objective management can solve most of his problems and by documenting his requirements through channels, he will help himself achieve the more difficult and long range objectives easier. We don't ask our supervisors to get their hands dirty any more, but we must demand that they get involved. When you find one of your key supervisors "retired-on-active-duty," you'd better build a fire under him, move him out of the way, or be prepared to live with the consequences that poor supervision bring.

The old slogan "If you are not part of the solution, you may be part of the problem," fits here. So if the abort rate is climbing and your daily schedule isn't working out smoothly, take a look at your supervisors. Make sure they're part of the path to success instead of failure.

COL JOHN M. VARGO
Chief of Safety

HOT LINE

95 FIS REUNION/DEACTIVATION. A combination reunion/going away party will be held to commemorate the deactivation of the 95 FIS 11-12 November at the Dover AFB Officer's Club. For further information call 1/Lt David Ratcliffe or 1/Lt Gayland Crumley at Dover AFB, DE, extension 6442.

SPAD REUNION. The third annual Spad Reunion will be in San Antonio, Texas, October 27-29. Pilots of Spads, Sandys, Hobos, Zorros, Fireflys, as well as Downed and Rescued Crewmembers and all other interested parties are invited. William H. Sullivan, former U.S. Ambassador to Laos, will be the guest speaker this year. For information, contact Capt. Jim Seith, 103 Oak Circle, Universal City, Texas, 78148.

3/4 INCH DISCREPANCY. While pre-flighting the Deuce at a stop-over base on his way home, the pilot noticed that two of the afterburner nozzle segments were open about three-quarters of an inch. He decided to press on home and really watch the engine instruments, especially on takeoff. Everything looked okay until he pulled out the burner at 10 thousand feet. The low E.P.R. and a lack of thrust indicated to him that the nozzle was still open. The same thing happened when he leveled at FL 240 and again at FL 310. Although he had abnormally high fuel consumption, he got home safely. When he shut down he confirmed visually that the nozzle really was stuck open. Further maintenance investigation revealed that the afterburner had been very hot. The outer duct was streaked and the forward end had buckled. The heat had melted the solder on the actuator cylinder lines that closed the nozzle and they had disconnected. Part of the solder had melted on the cylinder lines that open the nozzle. Maintenance pressure checked the spray bars, pig tails and manifolds and found four pig tails leaking where they were soldered into the spray bar. The nozzle fairing weldment showed signs of extreme heat and the afterburner shroud was burned blue meaning that there may have been a fire between the afterburner and the shroud. When is a discrepancy a small one?

ANTI-FOULING FOUL-UP. After getting an excessive Mag drop on No. 1 during his pre-takeoff run-up checks, the T-29 pilot decided to "clear the engine." He put the mixture lever in AUTO-RICH, ran the throttle up to 35 inches Hg., then pulled the mixture to AUTO-LEAN. He closed the augmentor vanes and the nacelle flaps and let the CHT (that's Cylinder Head Temperature for you turbine powered types) heat up to clean the spark plugs. As the CHT reached 180°C, the No. 1 fire warning light flashed, then came on steady. Then, as if to support the fire warning light, the No. 1 nacelle belched great clouds of smoke. The crew shut down the engines and evacuated the aircraft *posthaste*. The subsequent investigation revealed no evidence of fire or overheat damage to the engine. By closing the nacelle flaps *and* the augmentor vanes, the pilot blocked most of the air across the cylinders and caused a rapid heat rise which triggered the fire warning system. This rapid temperature increase heated the cylinders, push rods, and rocker boxes and caused residual oil on the crank case to smoke as though there was a real fire. The investigators said "Pilot Factor." By closing the augmentor vanes along with the nacelle flaps (the augmentor vanes are normally closed only during flight — like to maintain CHT in a descent) the pilot induced an excessively rapid temperature increase. This, in conjunction with the fact that he let his CHT get to 180°C, caused the resultant "fire" indications. It's okay to let the CHT get up to 180°C but only after you've held it at 160° (the Dash-One says you control the CHT with the nacelle flaps) and determined that 160°C won't clear the plugs. Sometimes just the slightest deviation can cause a great deal of excitement and often substantial damage.

Duck!

There is nothing more beautiful and graceful than a bird in flight, and it's always a pleasure to watch them glide and soar effortlessly on the wind. But when one of these feathered friends glides into the intake of our jet engine when we're on takeoff roll, or soars through our windscreen when we're traveling at 400 knots, the situation is anything but beautiful. Each year the US Air Force spends millions of dollars to repair or replace aircraft that have collided with birds.

In 1971, we recorded 383 aircraft damaged by bird strikes. That was 23 more than we had in 1970, and a total greater than any previous year. Included in this total are two major accidents, two aircrew fatalities, and two aircraft that landed with windscreen failures. It is obvious that birds bear watching, not because they are beautiful, but because they are a serious hazard to manned flight.

ADC aircraft collided with birds 15 times in 1971. The most disastrous of these incidents was when an F-101B ingested a bird during takeoff. The crew died during an unsuccessful abort. So far this year we have recorded only two incidents in the command. At first glance, this appears to be a substantial improvement, until we realize that the most dangerous season is now upon us — the fall migration period. Most of us agree that birds are a problem, but there isn't too much a pilot can do if a flock of starlings decides to cross the runway just as he

These seagulls change a routine takeoff into an exciting experience.

lifts the gear on takeoff. However, the Air Force can and is doing something to alleviate the bird strike problem.

We now have a group of bird experts working on a program called Bird-Aircraft Strike Hazard, or, appropriately, BASH. These people operate out of the Ecosystems Technology Section of the Air Force Weapons Laboratory (AFWL) at Kirkland AFB, NM. Staffed with experienced biologists, zoologists, and ornithologists, this section is working on methods of reporting and forcasting bird movements, equipment for diverting birds away from aircraft, and procedures for keeping birds away from airfields. If your flight operations has a particular problem with birds, these are the people who can help you. Since the bird-aircraft collision problem differs at various installations, this section of the AFWL sends an Environics team to make an ecological survey of the airdrome having the bird strike hazard. They determine what aspects of the local area attract birds and what can be done to encourage the birds to move elsewhere.

Birds come to an area to feed, drink, nest, roost or just loaf. One of the biggest problems the teams have found is that, although the Air Force recognizes the bird hazard, we turn around and make our airfields attractive to birds. We approve sanitary land fills that provide food, we maintain small ponds and streams, and we cultivate grass and other vegetation that provides nesting areas. If we removed all of these attractions we would still have a few migrant birds, but our main problem concerns large resident bird populations around the airdrome. These are the birds that we must deal with.

Here are some of the ecological actions that the Environics teams have suggested at individual airports:

- Cover sanitary land fills so that they will not provide a food source.
- Eliminate water sources by leveling the ground to avoid occasional ponds and by using drainage pipes rather than open ditches.
- Eliminate ground cover such as wild berry bushes or other plants that provide food for the birds.
- Maintain the grassy areas around runways and taxiways at no more than eight to twelve inches in height. (This makes the grass too long to be suitable for starlings and meadowlarks, but too short for nesting birds.)
- Use pesticides to control insects that attract birds.

These practices, tailored to your particular area and problem, will make your base less attractive to birds. But how do you get rid of them while you're waiting for the ponds to dry up? The experts have a few answers in this department too.

One method that has been successful in temporarily dispersing loafing sea gulls from seaside runways, is the bioacoustics system. This system uses an amplifier/stereo cartridge tape player that plugs into the cigarette lighter of a patrol vehicle and transmits the recordings of the alarm cries of a sea gull. The other gulls hear the cries and depart the area. The only problem is that the birds eventually get used to the sound, and the system loses its effectiveness. To counter this, the patrol varies the sound pattern by occasionally shooting off a few firecrackers. If, after this, there are still some die-hard individuals that refuse to respond to the combination of sounds, a few live shotgun shells add realism and make the combination of methods quite effective.

An effective method for dispersing starlings and other small birds, is the use of bait treated with a chemical called Avitrol. When birds come in contact with this chemical, they become disoriented and cry out in anguish. This action alarms the remainder of the birds and they

leave. Since Avitrol is a poison, base personnel must coordinate with state and local conservation officials before its use.

We are now making progress. The Civil Engineers can change the natural and psysical characteristics of the base for a permanent solution and the base operations bird-patrols can temporarily chase away these unwelcome visitors. But what about all those ducks and geese that fly through the GCA pattern and our low level training areas? The Weapons Lab is sponsoring tests in this area also. They have people now working on techniques and procedures for detecting these migratory flocks with ATC radar. If the tests work out, controllers will be able to divert our aircraft around the birds or discontinue the approach. Radar controllers will also be able to help compile better information on migration corridors and aid in short range migration predictions (feather forecasts).

While these procedures help us avoid the birds, other researchers are looking at equipment to help the birds avoid us. The AF Weapon Laboratory is monitoring tests on T-38 and T-37 aircraft equipped with strobe lights. A study by the Flight Safety Foundation in 1970 indicated that aircraft equipped with these lights had fewer bird-aircraft collisions. In addition to the trainer aircraft tests, a TAC F-111 squadron is evaluating the effectiveness of the strobe lights and the effect of mounting the lights in different locations on the aircraft. If these tests prove that birds are sensitive to light energy, we may see aircraft in the future equipped with laser-bird-deflectors. "Flash Gordon where are you when we really need you?"

Of all the techniques we've tried, habitat manipulation is generally accepted as the most effective means of bird control; however, the complexity of a bird control problem may require expertise outside your base and command resources. If your base has a bird hazard, you can get help by contacting the Assistant for Natural Resources, Office of the Director for Civil Engineering, HQ USAF, Washington, D. C. 20330.

While our base supervisory personnel are working on a permanent solution to the bird strike problem, there are still some things we flying types can do:

a. When you must fly at low altitudes, reduce your airspeed. The damage a bird does to your flying machine is a function of his weight and your airspeed.

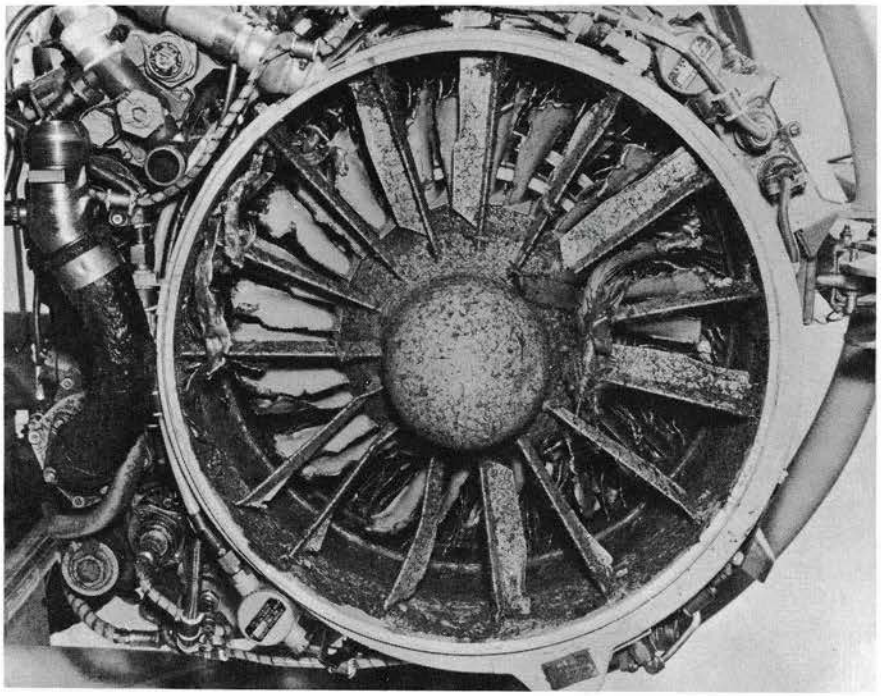
b. If your helmet is equipped with a dual visor, use it. If you don't have the dual visor, request one from your life support specialists. The visors are available.

c. Since most bird strikes occur at low altitude, spend as little time there as possible. Increase your rates of climb and descent when departing or approaching the airfield.

d. Schedule your night flying at other times than peak migration periods. Unlike fighter pilots, migrating birds like to fly at night.

e. Report all bird strikes or near misses regardless of whether they damage your airplane or just scare you as they zoom past. Your report will help identify the greatest hazard areas.

After presenting this article we still like to watch a graceful bird in flight, but we'll never again leave bread crumbs on the lawn behind the BOQ. ★



What could a little birdie do to my awesome jet engine?

Seeing is Deceiving

When you're on that long, flat final, that "in the groove" feeling you get from what you see may put you anywhere but where you want to be. This article explains some factors that confuse the eye and mind. In some cases the eyes don't have it.

EXCERPT OF COMMANDER'S REPORT OF AIRCRAFT ACCIDENT.

". . . (the pilot) evidently did not recognize that his glide path would land the aircraft short of the runway threshold. Various known visual perception problems exist on the approach end of (the) runway . . ."

a. The final approach is over water.

b. The overrun is (XX) feet above the runway and slopes toward the runway.

c. The approach lights are on stanchions (XX) feet above the runway elevation.

d. The runway is unusually wide . . . and only (X),000 in length.

e. GCA touchdown (point) is nonstandard (X00) feet from the end of the runway.

"Any or all of these visual perception problems could have contributed to (the pilot's) failure to recognize a dangerous situation and initate a go-around. (The pilot) was confident that he was over the overrun and in position to land in the first 1,000 feet of the runway, while actually he was positioned over the approach lights. There is an obvious misinterpretation or misjudgment of the visual cues available to the pilot during the transition from instruments to visual references."

Spatial disorientation caused by faulty visual references continues to be a major cause of accidents in the Air Force. Several years ago a major flying command overseas estimated that 14% of all its accidents were caused by spatial disorientation. Investigators isolated one of the visual factors when they stated that the primary cause of undershooting and overshooting non-emergency accidents was faulty distance rate-of-closure on the part of the pilot. The United States Air Force is not alone in accidents caused by illusory phenomena. The Royal Air Force credited disorientation as the most common probable cause of their fatal accidents. These factors are not limited to military flyers alone. Landing approach accidents are a major problem in all phases of aviation. The more the experts examine the problem,

the more they are convinced that vertical guidance in some form is a must for jet operations whether it be VASI, ILSs, GCAs or some sort of an airborne computed glideslope. Pilots generally understand and agree that during the landing phase they are busier than at any other time in the flight. But at the same time, they are usually more attentive to the required procedures for landing. Despite the fact that knowledge of visual illusions has been with us for many years, experienced pilots still land short or overshoot because of these illusions.

Twenty years ago Captain Coquyt with Sabena Airlines won the coveted Flight Safety Foundation/Aviation Week Distinguished Service Award for work in this field. Therefore, what we have to say is not really new but is worth repeating.

The best approach angle for jets and turboprops is 3°. ILS glide slopes and VASIs are in the 2 3/4 to 3° range and we are accustomed to the 3° view of the runway. However that 3° angle is measured from the true horizontal and either sloping terrain or sloping runways play havoc with our visual assessment of the correct approach path.

Some time ago what was then the Military Transport Service, and is now Military Airlift Command, formed a basis for the following checklist.

ANTI-ILLUSION CHECKLIST

Any one or a combination of the following conditions can create these illusions:

1. Sloping threshold terrain.
2. Runway lighting. Lack of approach zone lighting, intensity of approach lights as compared to surrounding terrain.
3. Visibility restrictions. Haze, precipitation, smoke, glare, moisture or precipitation on the windshield.
4. Runway characteristics. Width compared to "normal." Length in contrast to width. Humps or dips in the runway.
5. Runway contrast. Color compared to surrounding terrain. Precipitation on runway. Visibility restrictions.

MATS made this checklist to alert pilots to the visual illusions they may encounter while under various environmental and runway conditions. Many times the pilot won't realize he is experiencing an illusion, particularly if he isn't aware of the possibilities of existing illusory conditions. Also, all pilots don't experience the same illusion under given conditions.

So that we may become more aware of some of the factors which cause these illusions, and some of the steps that we can take to become aware of them, let's go back and review this anti-illusion checklist in more detail.

SLOPING THRESHOLD TERRAIN

When there is an upslope in either the runway or the approach zone, expect an "above the glidepath" illusion. You will be lower that you appear to be.

When there is a downslope, expect a "below glidepath" illusion. You will be higher than you appear to be.

In the first case, correcting for the illusion on the apparently high approach, will result in your landing short of the runway. In the second, it will result in an overshoot unless you maintain power and air speed control. In the latter case, merely "pulling the nose up" could result in flight on the backside of the power curve and a premature touchdown.

Normally, when a pilot makes a visual approach, he subconsciously judges his approach path from a combination of his apparent dis-

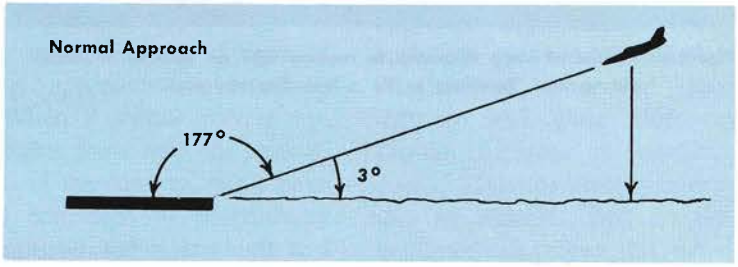


Figure 1. Normal approach glide path.

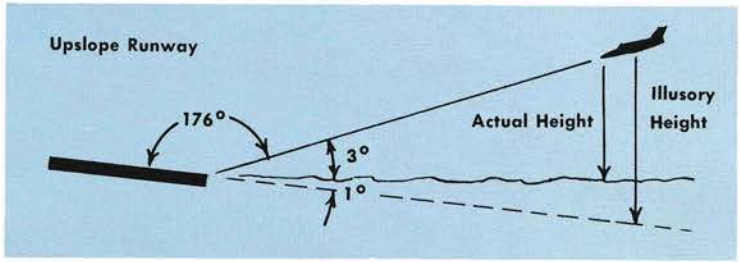


Figure 2. Illusion of steep approach to runway with a one-degree upslope. Tendency to fly a low, flat approach.

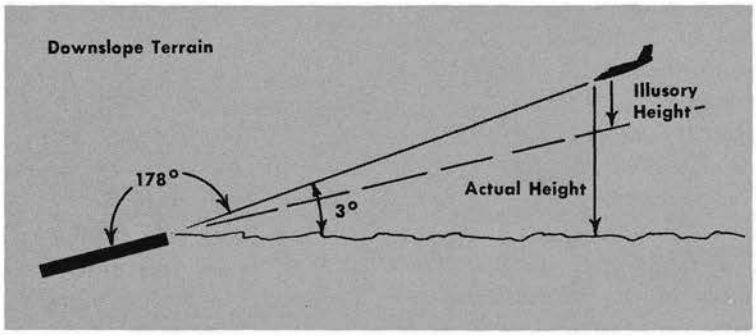


Figure 3. Illusion of flat approach to runway with a one-degree downslope. Tendency to fly a steep approach.

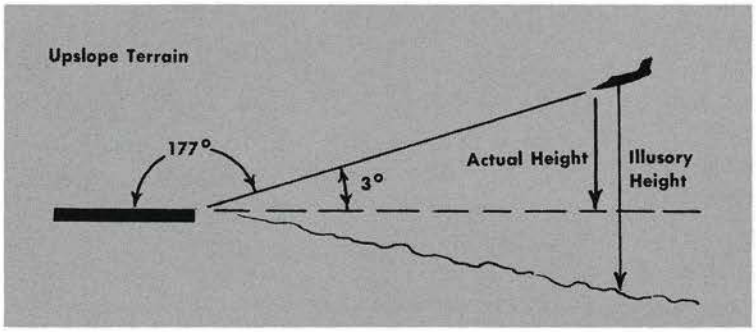


Figure 4. Illusion of steep approach to runway with an upslope in threshold terrain. Tendency to fly a low, flat approach.

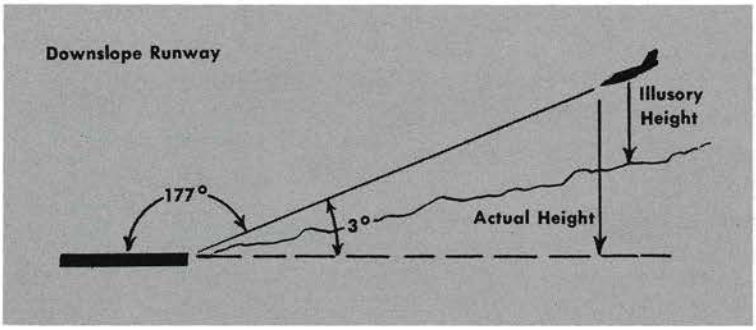


Figure 5. Illusion of flat approach to runway with a downslope in threshold terrain. Tendency to fly a steep approach.

tance from the runway and his apparent height above the terrain. Through continuous exposure to precision glidepaths, and now VASI, the pilot becomes "tuned" to a 2½ to 3° glidepath. Or, to put it another way, to see a 177° relationship between the runway and himself. This is shown in Figure 1. The angular relationships shown in this and subsequent figures are exaggerated for clarity.

When there is an upslope, as shown in Figure 2, the normal glidepath appears to be too steep and there is a tendency to fly a low flat approach.

When there is a downslope, as shown in Figure 3, the normal glidepath appears to be too low and there is a tendency to fly a steep approach.

When the approach zone terrain slopes upward, as shown in Figure 4, it appears to us that we are higher than we actually are. This effect can be more or less than the sloping runway effect, depending on the pilot. Conversely, if the approach zone terrain slopes down toward the threshold, the normal glidepath will seem too flat, as in Figure 5.

Combinations of slopes may amplify or nullify the illusion. Also, the length of the runway, or hazardous terrain at the far end of the runway, may add psychological effects. Our over-concentration on touching down near the approach end could possibly increase our hazard.

In order to negate the effects of these varying terrains on the runway approach, we should check the approach plates to determine the published runway slope. Then we should follow the precision glidepath to touchdown or evaluate the approach zone while on downwind or base if we are making a visual traffic pattern. Whenever in doubt, ask the tower.

VISIBILITY RESTRICTIONS

Under conditions of haze, smoke, dust, glare, or darkness, expect to appear higher than you actually are.

Shadows are one of the key factors in depth perception. If the shadows are not present, due to visibility restrictions, it will unknowingly confuse us as we approach the runway. Since we are unable to discern the shadows that we normally see at a given height, we interpret our altitude as being higher than we actually are. We also encounter this effect during dark night landings.

Another serious case is when we encounter smoke or dust lying low across the threshold. The effect varies with individuals and is modified by the intensity and clarity of runway lighting. This is best exemplified, when on a precision approach, by our tendency to reduce power and drop below the glidepath as soon as we see the runway.

Moisture on the windshield often interferes with visibility and may cause any type of "off glidepath" illusion. Light rays will refract or bend as they pass through the layer of moisture on the windshield. Depending on the particular aircraft and pattern of ripples across the windshield, we can appear to be above or below the glidepath or left or right of centerline. This can be as much as a 200 foot error at one mile from the runway which, when combined with the effects we've already mentioned above, could result in touching down 3,000 to 5,000 feet short of the runway. To prevent this, maintain a precision glidepath rate of descent from minimums to touchdown during conditions of rain, haze, or darkness. Avoid straight-in VFR approaches under these conditions. If you are VFR, make a close in VFR pattern. Cross-check altimeters with the ILS outer and middle marker or the controller's report on minimums to make certain your approach is not too low.

RUNWAY LIGHTING

1. Expect to appear higher than actual, and further from the runway, when the runway lights are dim.

2. On a straight-in clear night approach, we will be farther from the runway than it appears to us.

If you turn a light up bright, it'll appear to be closer. Dim it and it will seem farther away. Or, more simply, bold colors advance, dull colors recede. An approach to a brightly lighted runway on a dark clear night, often has resulted in a touchdown far short of the runway. The effect is greatly increased in clear cold air or when approaching over an unlighted desert or water surface. An approach over an area where there are houses or other surface lights will decrease the contrast of the high intensity runway lights. The absence of approach zone lighting greatly increases the hazard.

There is always the danger of confusing approach and runway lights. When a double row of approach lights joins with the boundary lights of the runway, pilots have reported confusion in determining where approach lights terminate and runway lights begin. The beginning of the runway must stand out clearly. We can have this by installing radically different runway and approach lights or special lights separating the approach from the runway.

Approach lighting systems should not give illusory or false information. Under certain conditions approach lights can make the aircraft seem higher when it is in a bank than when its wings are level.

The intensity of the approach and runway lighting system is important. For example, pilots have the impression that they are in a bank when they are actually flying level if one row of runway lights is brighter than the other. Here is another rather unique illusion. If there is a single row of lights along the left side of the approach path, most pilots misinterpret the perspective and "correct" their glide path to the right. Thus, the touchdown point would be far to the right of the runway as the aircraft crosses the runway threshold.

The experts have undertaken the approach and runway lighting problem with extensive research in recent years to minimize these illusions. As they test these improvements, they incorporate valid improvements into present systems. It is important to note that the services haven't yet adopted a standardized approach lighting system; therefore, one of the major hazards in approach and glide slope systems is that different airfields use different systems, and, consequently, complicate the pilot's task of making height and distance judgments on approach and landing. Instrument approach systems combined with a standardized improved approach lighting and glide slope system should eliminate or drastically reduce the false or illusory information that we receive. But, for the time being we can reduce this visual confusion due to runway lighting by, again, checking the approach plate, so that we know what type of threshold lighting to expect. Then we should follow the published instrument or visual approach procedures and the precision glidepath whenever it's available.

RUNWAY CHARACTERISTICS

When approaching a wide runway, expect to be higher than you appear to be. Expect to be closer if you are approaching a short narrow runway. (See Figure

6) Most pilots base part of our judgment on a mental comparison of the runway in front of us with the "normal" view of the runway to which we are accustomed. If we are used to landing on a runway that's 12,000 feet long and 300 feet wide, we may touch down well short of a 4,800 foot by 120 foot strip which has the same relative proportions. Out on the final of such an approach we'd probably judge ourselves further out and therefore higher above the ground than we really are.

Irregularities in runway surfaces also cause a runway to appear much shorter when we lose sight of the end when touching down, due to a hump between the aircraft and the far end. This sudden "shortening" of the runway often results in blown tires, which then end in a problem of keeping the aircraft on the runway. To avoid this trap, it's smart to check the runway dimensions on the approach plate. Look down the runway, rather than just to the side, to judge the height for touchdown. Crosscheck the runway slope, this will give you a clue as to dips or humps. Then, if we know where the touchdown point is, we'll know if we have sufficient runway remaining to complete our landing roll. Check the runway-remaining numbers so you won't have a momentary feeling of panic.

RUNWAY CONTRAST

Be alert for problems in depth perception when the runway color approximates that of surrounding terrain.

A snow covered runway, or a night landing on a dimly lit runway are extreme examples. Even lesser conditions present severe problems in depth perception resulting in overshoots and undershoots. The concrete runway on a sand surface in bright sunlight or the blacktop strip surrounded by dark foliage will give similar difficulties. Water on the runway in either of the latter two examples will heighten the effect. Haze and other visibility restrictions will also serve to further reduce runway terrain color contrast.

Be exceptionally cautious under these conditions. Again, follow the precision approach, if available, to touchdown and be prepared to make a go-around. We can avoid these illusions and their effects, or at least minimize them, if we are aware of the factors which produce them. We should think about these things before each flight and during each approach. You flight leaders should know all about the visual conditions at your destination. Then make sure you carefully brief your flight on what to expect when they pitch out and see something other than your wing light. We should also apply this "illusion evaluation" as a part of our personal procedure and a part of this illusion checklist as we execute the approach. If it doesn't look right, take it around. One command recommends that their pilots "drag" (fly over) the runway before they land at a strange field for the first time. ★

EDITOR'S NOTE: This article is adapted from data compiled from "Visual Illusions" by Lt Col Donald G. Pitts, USAF, BSC (Ret), which appeared in the December 1970 INTERCEPTOR and the Flight Safety Foundation's "Business Pilots Safety Bulletin 72-203" published in April 1972. Although this article discusses VFR approaches, it is not intended to suggest that pilots should use a VFR pattern when precision instrument approaches are available. In fact, ADC supplement 1, paragraph 8, 1b(6), to AFR 60-16 specifies that night VFR approaches may be practiced only after a precision low approach (PAR or ILS) has been made to that field.

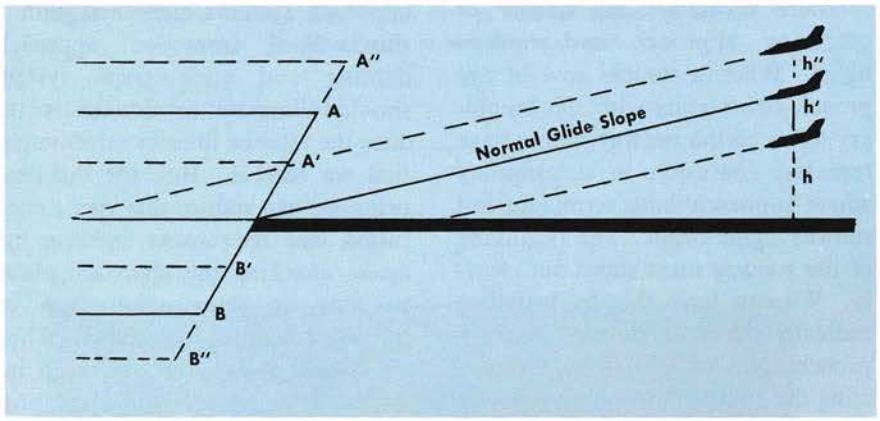
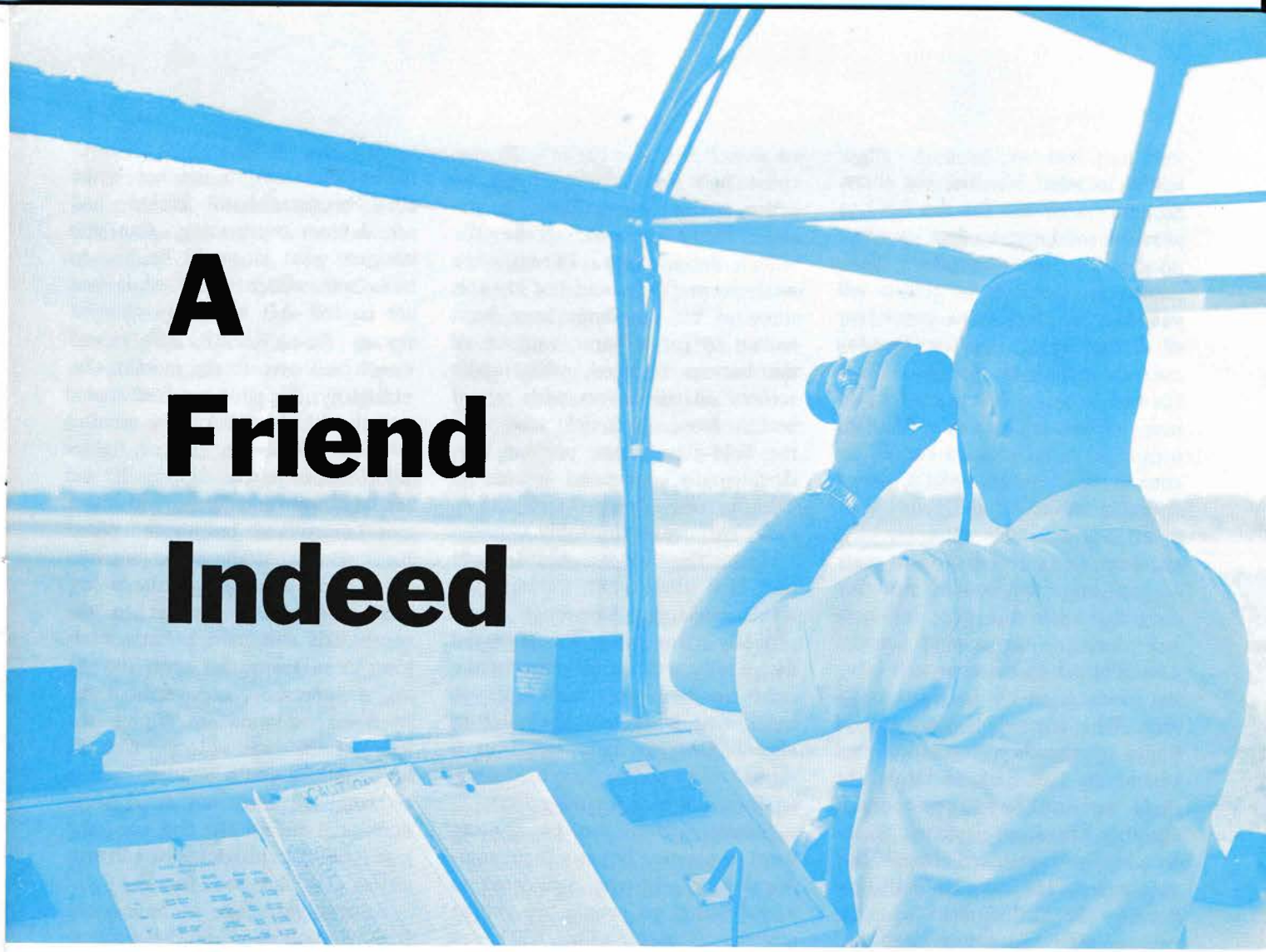


Figure 6. The effect of a wider or narrower runway versus a normal width runway landing an aircraft: AB is the width of a normal runway; A'B' is the width of a narrow runway; h' is the height for a narrow runway; h+h' is the height for a normal runway. At the same point in the approach the pilot feels as though h' is equal to h+h'. A normal glide slope at height h' results in the tendency to undershoot or land short of the runway. A wider than normal runway (A"B") makes the pilot feel that a normal glide slope is too low. He will go high on the glide slope (h") and overshoot.



A Friend Indeed

Most pilots have an aversion to remote assignments and being the Runway Supervisor Officer falls in that category. After all, who wants to traipse out into the boonies on a cold, dreary day, fumble a frozen lock open, crank up a cantankerous APU and shiver in the cold damp for fifteen minutes waiting for the whistling outhouse to warm up. Yet despite the discomfort and inconvenience, the unsung hero in the Runway Supervisory Unit can provide a valuable service. So let's begin this article with an open mind.

We know that there is a lot of controversy about Runway Supervisory Units. Some people think we don't need them because all the guy is supposed to do is watch for gear up approaches and we don't have those any more. Besides, it's the pilot's responsibility to put the gear down. Other people think that we ought to have enlisted wheel watchers like the Navy because the job isn't challenging enough for a pilot/officer. Then there's some who think that we need an RSU all the time because they think every approach is a potential gear up landing — they don't trust anyone. Even the regulation (AFR 55-16) lends itself to controversy. For instance, why do we require an RSU for a pilot on a local training flight and then not require one when the pilot changes hats to do a functional test flight? Or why do we need a "mobile" for a pilot flying local but not require one when he goes cross-country? Anyway, we have a regulation for RSUs, so it appears they are here to stay.

This article is not going to talk about gear-up approaches except for a short blurb at the very end. So please stay with us if you're not too biased already, and we'll try to point out some other uses for the RSUs that may help your operation stay accident-free.

For starters, Colonel Neyland in his article, "Bad News for Pilots" (INTERCEPTOR, June '72) told us that the Air Weather Service was caught up in the dollar squeeze. As a result we won't have a qualified observer near the runways

telling us what it's like out there. So here's a chance for the RSO to provide solid, up-to-date weather information from the pilot's viewpoint. He's going to be able to tell you (the pilot) and the supervisor of flying about the fog forming over the marsh at the end of the runway or when the rain starts to turn to freezing drizzle. This information could make a big difference in whether you make a missed approach, slide off the runway, or divert to a suitable alternate. As an example, one of our birds took a trip into the toolies not too long ago when the pilot lost control during a crosswind landing. The pilot set up his approach using the winds given by the tower operator. The crosswinds were out of limits by squadron regulation, but still in the ball park as far as the flight manual was concerned. Another squadron airplane, piloted by a highly experienced aircrew, had just landed. He had a difficult time keeping the bird straight with the hydroplaning and a crosswind that caused the nose to yaw 25° off center. But he made it. However, the RSU wasn't manned so nobody saw how bad it really was out there. Shortly thereafter the other airplane landed and started sliding down the runway in a horrendous crab. He didn't make it because he slid off the runway and wiped the legs off the bird. Maybe an RSO could have prevented this accident.

Then there was the time when a pilot checking out in an F-102 attempted to beat a thunderstorm to the home drome and landed with a twenty-knot tailwind on a fairly short runway. This, while the RSO watched in mute testimony. During the accident investigation, he still had a tough time finding words.

Actually the RSO is the final extension of the whole operation because he's right there where the action is from the beginning to the end of the mission. Take the launch, for instance. Even though we have preflights and last chance, some of our airplanes have been known to get airborne without all the buttons fastened, with intake screens installed, or with speed brakes down. A quick scan with the field-glasses can prevent this. (Incidentally, command interest is focusing on dropped objects — look 'em over thoroughly.)

Along this line, we heard about a T-bird that went through the whole prelaunch inspection route properly. But, when the pilot did the runup check on the runway, the right tip tank cap blew off. A quick-eyed RSO told the pilot to abort. This not only saved us a set of tanks but also prevented some anxious moments for the pilot.

Standardization can be a nasty word sometimes, but as a flight commander or ops type, you want to know that your people are getting started off right. The RSO can spot those tigers who taxi a bit too fast and don't get it altogether before the burner(s) lights off. You know what we're talking about — the rotating beacons, canopy, gear pins, etc. How many of us have gotten airborne at night without flicking the nav lights on unless the RSO warned us about our oversight beforehand.

Here's one that will make your eyes water. A Deuce unit was going through the air battle phase of an ORI and the jocks were recycling the airplanes with the speed of light. One over-eager type found that his nose wheel steering wouldn't work. But he pressed to the takeoff position. By the time he got there, both brakes were smoking like a Cape Cod clambake. Mobile stopped him before he rolled. Then he couldn't taxi to the hot brake area because both brakes had seized from overheating. Can you imagine what it would be like to have both wheels freeze while you are in full AB and fully charged up to the kill, kill, kill mode? Credit one save to the mobile. (Incidentally, the pilot involved traded places with the RSO for a month.)

Even the world's greatest fighter pilot makes a bad approach and landing now and then, and these can be excused on an individual basis. But what about the guy who lands consistently long from a low flat approach or swoops to the perch like a homesick barn swallow? You know that some day he might undershoot or overshoot the overrun and wind up wiping the legs off the bird. Mobile Control logs can give you a trend indication on someone who may need some additional help. The log can also give you a trend on personal attitudes. Try this case for size.

Several years ago at an eastern base, a small cadre of F-106 pilots were competing to see who could make the shortest pattern. Their technique consisted of roaring into the overhead at about 450 knots, pulling the throttle to idle, dropping the gear in a 90° high G bank, and crowding the base leg in so close that the wings barely got level over the threshold. One day one of the competitors got so competitive that he inadvertently chopped the throttle into off. After things got suspiciously quiet in the cockpit, he realized what he had done. Fortunately he got the bird started again before he hit the ground, but the truth came out after the fact. Had the RSOs been documenting what was going on in the landing pattern, the Ops Officer could have squelched this contest much earlier.

When it comes to emergencies, a

properly equipped RSU and a sharp RSO can be the difference between life or death. For example, take the RSO who not only monitors the tower on one radio, but also departure, GCI, and GCA on another. He's going to be able to tell the fire fighters and rescue people about an impending critical situation when the pilot is too busy describing his emergency to declare one. As Johnny-on-the-spot with all the checklists and manuals, he can help you when yours is on the cockpit floor and he can get things squared away at home plate while you devote your attention to yourself and the airplane.

Need a navaid? Think about using the RSU to make an emergency penetration when your fuel gets low and the TACAN and radar go off the air. Just set up a discrete frequency in one of the RSU radios and have the pilot select the same on his data link. Switch to DL/ADF (F-106s) or UHF/ADF (101s) and voila — another way to get home. Not precision, of course, but enough to get you down if the weather is not too unreasonable, say a thousand and three. Had we thought of this one, we might have saved an airplane several years ago. In this case, the pilot was out over Long Island Sound making a WSEM pass. The missile bays stuck open and he lost everything but his UHF (including his transponder). As misfortune would have it, he was flying over an overcast and neither the Center nor SAGE could paint him. Forty five frustrating minutes elapsed as the fuel went lower. Then the engine flamed out and the pilot was forced to eject. ED NOTE: If you decide to try this one, check the UHF transmitter limitation in the RSU so you don't burn the set up. Some sets have specific transmitting and cooling times.

Isn't it nice to have someone watching to tell you that flames are spurting out the side of the fuselage just after liftoff and before you've seen a fire warning light in the cockpit? That happened to one of our Six drivers a few years back so he calmly pulled up on a downwind and ejected, saving his life. There was another time when this happened and the jock was able to abort in time. The airplane burned, but he got out unscathed. However, in another case, there was no RSU and the airplane burned up eight minutes after takeoff. The pilot's first warning was a "pop" followed shortly by a fire warning light. We might have saved this one. (We must admit no mobile was required on this one since it was an active air, but it would have been a "nice-to-have" item at the time.)

By now you must think that we're pro RSU. Well, it's a debatable subject because there are a lot of pros and cons that influence our thinking, too. But the fact is that RSUs are going to be with us for a long, long time, and while they're here, we should make certain that they benefit our operation. Along this line, we ought to make certain that they are positioned and configured in accordance with ADCR 55-16 and that we make an honest attempt at maintaining them properly.

We all know that ADC isn't like ATC where mobile runs airfield traffic and keeps a close watch on fledgling birdmen. But then we also have some new people joining our ranks and they might be able to use our help once in a while. We have at least a moral obligation if not an operational requirement to be available when they need us.

So far we haven't given one example of gear up landings hoping that you would read this article in hungry anticipation. We saved the best for last. Gear up landings have really declined in the past few years; nevertheless, ADC has had two in the last 12 months. Both of these were in the local traffic pattern where the pilots were shooting GCAs. Apparently their habit patterns were interrupted and both aircraft skin and aircrew pride were severely chafed. These two incidents cost the same amount of money and manhours that would be required to provide an RSU 24 hours a day, in eight hour shifts, for at least a year (based on a Major's pay with over fourteen years service. Just think how long you could man one with Lieutenants!). Anyway, it's a large tradeoff for a couple of hours that the RSU wasn't in operation.

So there's the story. If it sounds like a lecture, it's because we just couldn't come up with a nice way to tell people that they ought to pay attention when they're out there as the "eyes and ears" of the whole operation. Just because the regulation says that you're supposed to maintain radio silence except when safety of flight is involved, doesn't mean that you're redundant. In fact, you're performing a very important service as we tried to point out above. The key is to pay attention and be prepared for the time when you're really needed. Like flying, RSU duty can be filled with hours and hours of boredom interrupted by a few moments of stark terror. And like flying, you can't afford to relax your attention for an instant. This is even more important at joint use airfields where civil towers are controlling a vast assortment of dissimilar air traffic and the controllers are extremely busy doing so. So if you're required to have an RSU at certain times, use it, and make sure the RSO pays attention to what's going on outside. Keep it in tiptop shape; you might need it for an alternate communication post some day. ★

SUPER-SEARCH

INTERCEPTOR's look into the R&D field

After we received word that a whole squadron of F-106 jocks were testing long underwear during the summer, and that many of our fellow pilots had developed odd shaped heads (cranioddomy) that required custom-fitted helmets; INTERCEPTOR decided to look into the life support area of Research and Development. While some of the ideas we looked at may never reach production, and others may be long in coming, we found it quite refreshing to learn that someone is thinking about our warm bodies and is working to devise ways to keep them that way.

First and foremost in the minds of all pilots who occasionally don the anti-exposure (poopie) suit, is the new "Ventile" suit. (This suit is "new" to us because we don't have it yet; RAF pilots have had them for some time now.) The Ventile fabric, made of tightly woven cotton fibers, permits the passage of air when the suit is dry, but quickly seals itself to keep out water when it gets wet. A pilot wearing a suit of this fabric can spend his hours and hours of boredom in relative comfort and still have needed protection if his aircraft turns into a submarine. Unfortunately we don't, at present, have a domestic supplier for the Ventile fabric, and the United Kingdom supplier has not been able to deliver the fabric in the quality and quantity we need for production. The support system manager hopes to clear up this supply problem soon so that, by this fall, we, too, can have a suit that keeps us dry when it gets wet.

• We know a pilot who has custom (foamed) ski boots that fit perfectly, but he only wears them from the ski chalet bar to the "bunny" slope and back. However, this same pilot has an ill-fitting helmet that he has worn for 2,000 flying hours (a distance of approximately 20 times the circumference of the earth). But the helmet situation will soon change because ADC is planning to make custom-fitted helmets at base level. You will stick your pointed little head into a mold containing foam-producing chemicals and, in a few minutes, get a permanent, pointed little helmet liner. The Life Support specialist will then add a thin layer of sponge rubber and a leather cover. The result is a comfortable, custom-fitted helmet. The testing and evaluation period is over now, and ADC has ordered eight sets of the new molds. As soon as we can get the molds and materials, and train the local LS specialists, we can start production. But wait; before you toss your old helmet under the wheels of the nearest Coleman tug, there is another slight problem. The test units have been using new helmet shells. If you want to see your local LS specialist go into hysterics, ask him to order 25 new helmet shells. ADC hopes to clean up our old helmet shells and foam them to a perfect custom fit.

• For all of our pilots that have gotten "pure" and no longer carry cigarette packages, we may have a new use for that little pocket on the flight suit. The Avionics Laboratory is working on a two channel, voice and "beeper", radio transmitter that measures 1X2X5 inches (for comparison, a "super-king" size package of cigarettes measures 1X2X4 inches). This new radio will have the same radiated power as the old survival radio and, possibly, the capability to operate three times as long.

• The 87 FIS at K. I. Sawyer AFB, MI, is now testing the new NOMEX underwear. It was, however, rather unfortunate that the shipment arrived concurrently with summer. This new light weight, fire retardant garment can be laundered at home and offers the latest in long john fashion — a turtle neck. The 87th is evaluating two different weaves of the NOMEX fabric; and, when one of them gets ADC's approval, SAAMA will begin the procurement phase this fall. We do sympathize with the 87th pilots.

They will be wearing long underwear through the long Michigan summer, but most people can stand anything for two days.

• The Life Support SPO is also working on other flight clothes made of NOMEX. Winter and summer weight flight jackets are planned, but it will be a while before the SPO can complete the fabric tests and get the jackets into production. In the meantime, they have cancelled several types of flight gloves, made of NOMEX fabric and leather strips, in favor of other designs. Our troops testing the gloves found that the leather strips turned and ended up between the fingers instead of on the gripping area. (The leather did give them a rather decorative flair.) Air Force should receive the first of its NOMEX "G" suits this summer, but we have no firm word as to when ADC will see them. The final NOMEX item may change our whole ejection jargon. In the past aviators "hit the silk," and now we make "nylon letdowns," but in the future we will "NOMEX-it." Life support people are now testing NOMEX material for parachute canopies.

• It appears that ADC may soon have a greater supply than demand of the new dual visor kits. This item is now available on a "pilot preference" basis, and your local LS man can get and install one for you. However, few ADC pilots are ordering them. The dual visor assembly has both the standard visor and a clear (night) visor, and gives the maximum protection against bird strike accidents. According to the ADC Life Support office, many ADC pilots do not feel windscreen/canopy bird strikes are a problem in the F-101, F-102, F-106, and T-33 aircraft. Air Force will soon receive the new side-actuated version of the dual visor (the large adjustment nuts have been deleted); and they too will be available for ADC aircrews — on a preference basis.

• If your seat cushion seems to have a few more lumps in the near future, don't complain. You may need those lumps if you have to eject in those frozen northern areas that many of us fly over. Industry is now vacuum packing down-filled Arctic overcoats, socks, boots, and mittens for survival kit cushion inserts. If the configuration checks out, ADC will use these items to replace the sleeping bag in the F-101, F-102, F-106, and B-57 seat cushions. We feel this is good reasoning because, if it is tied to him, an aircrew member will always be able to find his seat. ★

How would you like to find this ensemble in your survival kit after you've bailed out over some frozen arctic wasteland? The hooded coat along with boots and mittens (that's all, men) are vacuum packed and will be put into all F-106 seat kits. Carolyn says it's warm even if you're alone in it.

T-33 ICING

With the passing of summer, we trade one set of problems for another. There won't be as many thunderbumpers to dodge, and you won't have to figure your takeoff roll and line speed so closely — but new problems do appear.

Winter means cold weather which means the ready solidification of certain liquids when temperatures are below zero or so. Neither rain nor ice present a great hazard to the average jet driver but there have been occasions when a little water and ice have been just too much for the Lockheed racer. In this discussion we'll talk about some of those occasions and about fuel systems and structural icing. Other types of ice, such as that on the runway or that which comes in a cool, tall glass mixed with toxic types of belly-burning mixtures should be discussed with your Ops officer or chaplain, depending upon the situation. (If the chaplain is in the back seat and you've landed long on an RCR of 5, you might ask him to pray a bit!)

To start off, JP-4 has an affinity for water. This means that the two will get together whenever possible. As a matter of fact, all aircraft fuels contain a certain amount of water in suspension. The concentration of the water, in relationship to fuel, is dependent upon the temperature of the fuel and the percentage of aromatics it contains. JP-4 contains a rather high percentage of aromatics, so it correspondingly can contain a rather high percentage of water. If the fuel is comparatively warm, it will retain the water in suspension. But, as the temperature drops, the fuel's ability to hold the water decreases, and the water settles to the bottom of the tanks.

The first reaction to this is that water doesn't belong in the fuel system anyway so all we have to do is eliminate the water and our troubles are over. True — but unfortunately a completely reliable system to eliminate all of the water is non-existent. We are always going to have some water, so the principal challenge is to keep it to an absolute minimum.

Probably the simplest method to get water out of the T-33 is to drain it both on preflight and postflight. There are some 30 of these oft neglected little valves located at strategic low points throughout the aircraft fuel system. We've even put new drain valves on the tip tanks to make sure we get all the water

out. You should make sure that the valves are opened before the first flight of the day and it wouldn't hurt to do it on those through-flight inspections you sign off when you stop to refuel.

When we land after a flight at high altitudes, the super-cooled metal surfaces condense water vapor from the surrounding moist air and it collects as droplets in the wheel wells, etc. You've seen it. Well it also happens in the fuel cells if the crew chief takes off the caps while he waits for the fuel truck to arrive. The same goes for caps left off during rainy or snowy weather.

Water can also condense in the tanks when an aircraft which has been hangared in a nice warm hangar is then towed out into the cold. Here again, the sumps should be drained when the fuel cools down.

Years ago we used to have a fuel de-icing system that pumped alcohol into the system upstream of the low pressure fuel filter. But that system was deactivated in favor of adding an ice inhibitor to the fuel which forms a burnable solution with entrained water, and won't freeze. That was supposed to solve the fuel filter icing problem and it apparently did, since we don't hear much about iced-up T-bird fuel filters anymore. (Free water in the fuel tanks still causes problems.)

Nevertheless, since 1964 when the anti-ice additive was introduced to the fuel, we've had nearly 80 T-birds flame-out from ice of some nature. The concensus of the experts who conducted a study in 1970 was that main fuel control internal icing was the cause. As a result of this study, new drains were designed for the tip tanks so that the water condensation therein could be drained out. This TCTO, IT-33A-550, must be completed on ADC T-33s by November 1972. (See ADC message 261700Z July 1972)

Our own Roger Crewse also did a study of T-33 flameouts in July 1970. Of the eighteen he studied, twelve occurred in actual IFR conditions. Six others occurred when the aircraft were in VFR conditions, but had just exited IFR conditions. Three of the pilots reported heavy rain; four reported light rain. Five reported no visible precipitation. Seven of the twelve pilots who flamed out in the clouds reported structural icing. In four of the six clear air flameouts, structural ice had been noted while in the clouds. Flameout altitudes ranged from 16,000 to 28,000 feet. Twelve occurred at normal cruise; one occurred right after level off; three occurred in a descent. The remaining two occurred while leveled but after a descent.

In four cases small amounts of water were found in the fuel tank sumps or the low pressure fuel filter. In the remaining flameout incidents, no free water or contaminents were found, which might have clogged the fuel system.

Coolstone concluded that in 17 out of the 18 flameouts, external icing of the main fuel control aneroid was the most probable cause although he states that flying in icing conditions does not necessarily guarantee a flameout. He recognizes that there is perhaps an unknown environmental factor present that we have yet to identify.

In researching the subject, we also looked into the Dash-One. Here, brief and paraphrased is what it tells us about icing of all types.

On structural icing:

"when flying in weather, the possibility of engine or airframe icing is often present and ice can form in critical accumulations in relatively light icing conditions. If the airplane does ice up the two most serious aspects are that ice can result in major engine damage and that any accumulation of airfoil ice destroys lift and increases drag which results in abnormally high stall speeds.

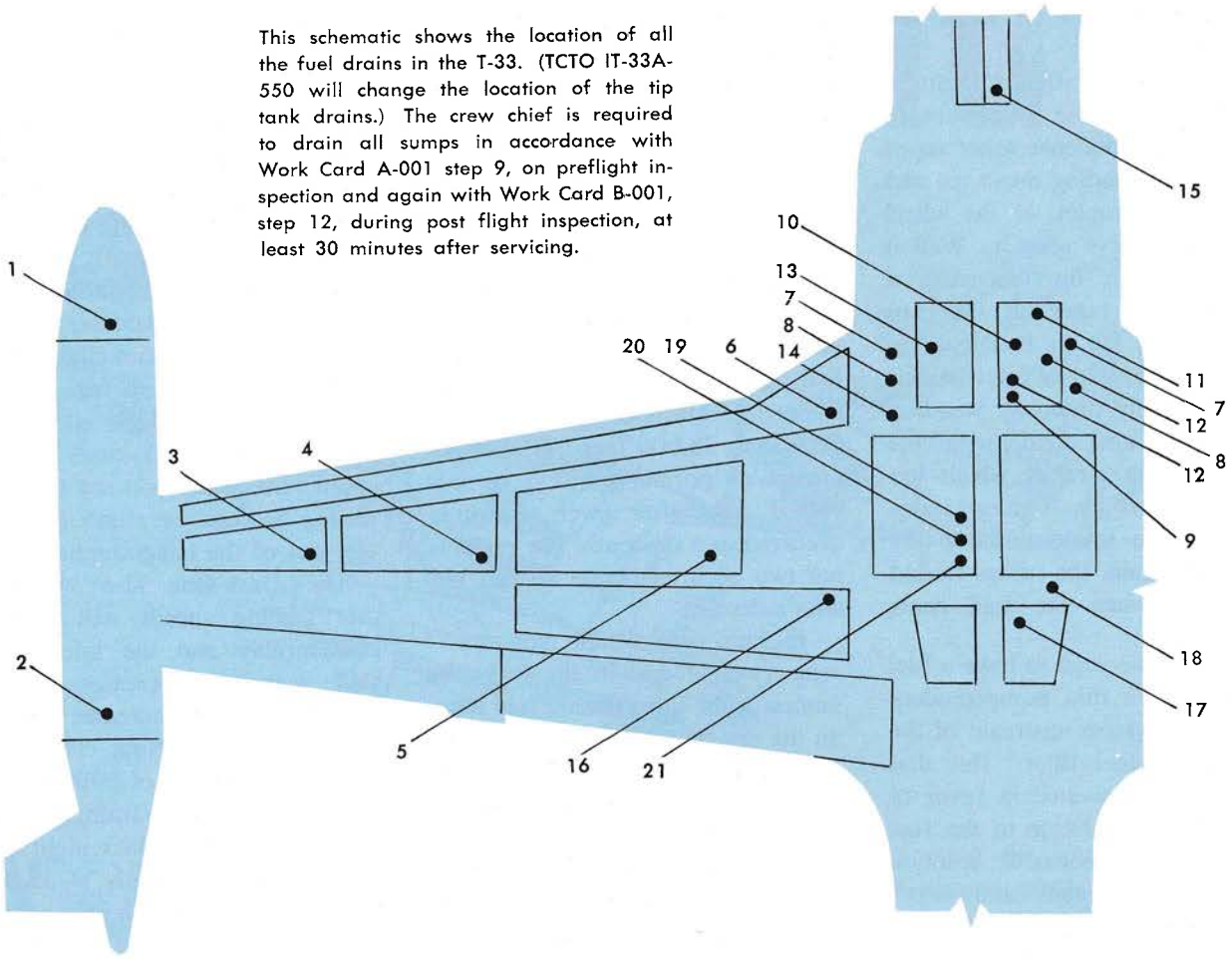
"Ice will normally adhere to the windshield and may extend out to three inches in moderate to heavy icing conditions. Rime ice, normally associated with stratus type clouds, will usually form in horizontal ridges along the leading edge of the wing. Clear ice, normally associated with turbulent air conditions, does not assume a particular pattern. When heavy ice accumulates on the airframe, control can become very sluggish. If it's thick enough we can lose up to 80 knots cruising speed. So, when you see this happening descend or climb (if possible) out of the icing conditions."

The Dash-One also warns us that stalling speeds will increase considerably and the intensity of stall warning decreases as the amount of ice increases on the aircraft. (Editor's Note: This writer had the experience of falling out of the sky (with no warning) at 135 knots on final one black night after flying in stratus clouds at 35,000. What he thought was a light coating of rime ice turned out to be three inches of clear. So there is at least one exception to the rule where clear ice will form.)

Pressing on with the warning notes on page 9-6 of the Dash-One, we also learn that heavy icing may close the static inlet ports which may cause airspeed errors. We note that such errors will be on the safe side. However, the testing for this malfunction was conducted in 1964 and may not be valid with the AIMS installation.

(Editor's Note: If you encounter heavy icing, can't get rid of it, and don't know what to expect from the airplane, your best bet is to make an approach stall series, if conditions permit; e.g., 15,000 feet, VFR,

This schematic shows the location of all the fuel drains in the T-33. (TCTO IT-33A-550 will change the location of the tip tank drains.) The crew chief is required to drain all sumps in accordance with Work Card A-001 step 9, on preflight inspection and again with Work Card B-001, step 12, during post flight inspection, at least 30 minutes after servicing.



DRAINING LEGEND

1. TIP TANK (2 ea.)
2. TIP TANK (2 ea.)
3. OUTBOARD FUEL TANK (2 ea.)
4. INNER OUTBOARD TANK (2 ea.)
5. FORWARD INBOARD TANK (2 ea.)
6. LEADING EDGE TANK (2 ea.)
7. LEADING EDGE TANK PUMP ADAPTER (2 ea.)
8. SIPHON BREAKER (2 ea.)
9. FUEL LINE
10. FUEL LINE
11. FUEL LINE
12. COCKPIT WATER DRAIN (2 ea.)
13. FUEL LINE DRAIN
14. FUSELAGE FUEL TANK PUMP SEAL
15. COCKPIT WATER DRAIN
16. AFT INBOARD FUEL TANK (2 ea.)
17. HYD. RESERVOIR
18. WING TANK FUEL LINE
19. LOW PRESSURE FUEL FILTER
20. LOW PRESSURE FUEL FILTER
21. FUSELAGE FUEL TANK

and enough fuel.)

Fuel system icing can also come from structural icing on the main fuel control. Engine surging and flameout have frequently occurred during or shortly following flight through heavy precipitation between 20,000 and 30,000 feet. The Dash-One warns pilots to anticipate this condition and be prepared to react to partial power loss or flameout by activating the gang start system. Among other things, this switches the fuel control over to the emergency side which is not affected by structural ice.

Although rare, induction icing can occur when icing conditions are extremely severe. The initial indication of induction icing is an increase of EGT and a loss of thrust. This is usually the only indication prior to complete engine failure. When induction icing does occur, the power should be reduced immediately until the EGT is within normal operating limits. In severe cases it may be necessary to shut down the engine and glide to a warmer temperature where the ice will melt and then make an airstart. But, if you're flying out of the North Country where the surface temperature is way below freezing and where ice won't melt at lower altitudes, your best bet is to avoid icing conditions whenever possible.

We recently had a typical case of fuel system icing and flameout. Once upon a time . . . and so the story goes . . .

A pilot and his passenger took off from an intermediate refueling stop and began a climb on course. Their route was through a forecast thunderstorm area caused by a front that had just passed by, but they expected to top these by filing for FL 330. They entered a scattered layer at 10,000 feet and shortly thereafter some thick stratus. At about 17,000 feet they hit a thunderstorm cell with accompanying sleet. The airframe picked up a layer of 1/4 inch to 1/2 inch of ice which looked like a combination of clear and rime. Ice formed along the leading edges of the wing, around the nose and on the windscreen. At 24,000 feet they broke out completely and then it happened. The engine quit — just like that. The pilot described the flameout as a kind of "whoof" — like the sound of a gas stove coming on. He eventually got the engine started, but not without overtemping it.

So, in conclusion, what have we learned about T-33 icing and flameouts? From this dissertation the only valid conclusion we can draw is that they are unpredictable. We wrote this article on the premise that we have a greater chance of icing up in the winter. That's true for structural ice on the airframe and internal fuel swstem icing resulting from water in the fuel. On the other hand, experience tells us that most of our flameouts occurred in the summer months and that external icing of the main fuel control aneroid was the culprit.

The Dash-One mentions that we should avoid probable icing conditions but that's only under the heading of induction icing. Since we're not cautioned elsewhere in the text, we could assume it's OK to fly in light icing conditions. However, ALSAFECOM 15/70 warns T-bird drivers to avoid areas of visible moisture, and to move the throttle periodically during flight if visible moisture is unavoidable. (This is intended to keep the main fuel control from freezing fast.) To our knowledge, this message has not been followed up with permanent guidance.

Obviously we can't always avoid flying into areas of visible moisture. Weathermen just aren't that accurate at predicting it and our mission dictates that we have to fly into clouds sometimes.

So what can we do? Probably our best bet is to make certain that the maintenance people keep our fuel as "dry" as possible and that all the sumps get drained in accordance with the preflight and postflight work cards. Secondly, when we start to get structural icing in clouds we ought to do something about it by changing our direction or altitude as quickly as practical. Thirdly, we should know the proper air start procedures; e.g., our first move should be to hit the gang start switch fast in order to catch a potential flameout in its early stages. We don't have much time to assess the situation. In fact, at 20,000 feet we've only got 2.5 seconds; much less than that at higher altitudes. According to the Dash-One, page 3-7, quote: "Prompt action can prevent an incipient flameout from becoming complete . . ." However, if you do this above 25,000 feet and the engine doesn't catch immediately, shut off the throttle and glide down to an altitude below 25,000 feet and try again with the Bold Faced Procedure for low altitude air starts. If that doesn't work, you have several other alternate air start procedures to try. And, if *they* don't work, or you don't have time to go through them all before you reach a safe ejection altitude, *excuse yourself from the cockpit. Do not attempt futile airstarts when the situation is obviously hopeless.* Fourthly, if you do get the aircraft started on the emergency fuel control, don't switch over to the main fuel control on shutdown after landing. Our experts will want to examine its condition and sample the fuel in it to see what happened. Maybe, they'll be able to pinpoint the cause and do something about it for the rest of us. ★

check points

For the occasional visitor to HQ ADC via the runways at Peterson Field, Colorado, we have this word of caution. We no longer have a precision radar approach. Colorado Springs is famous for its beautiful weather, as long as the wind blows down the mountain. But should the wind change to an upslope breeze, our jackrabbits travel in IFR conditions. We still have an ILS and ASR to one runway and a back course ILS to the opposite end; but if you're one of those pilots who arrives here with little fuel and lots of faith, you'll probably need all of both. Times are changing and your best friend is the Enroute Supplement. (SED)

A recent incident pointed out the high cost of aircraft luggage — better known as a travel pod. When a T-33 lands without its well oiled carrier, the price tag to replace the missing item (besides the dangers from, and possible litigation because of, dropped objects) is $505.00. The next time you place your wrinkled suit and checkbook in a travel pod, take a good look at the JATO latches that hold it on. The time spent is well worth it. (SED)

How many of you have played the "What if . . ." game lately. Remember how we played it for hours and hours during UPT and how much fun it was—for our IPs. The game is played by imagining all the aircraft system failures that could occur during all phases of flight, and then the player that is "it" tells his corrective action. A winning player is one who, when confronted with the real situation, does exactly as he has planned. A loser suffers in indecision until his crippled air-

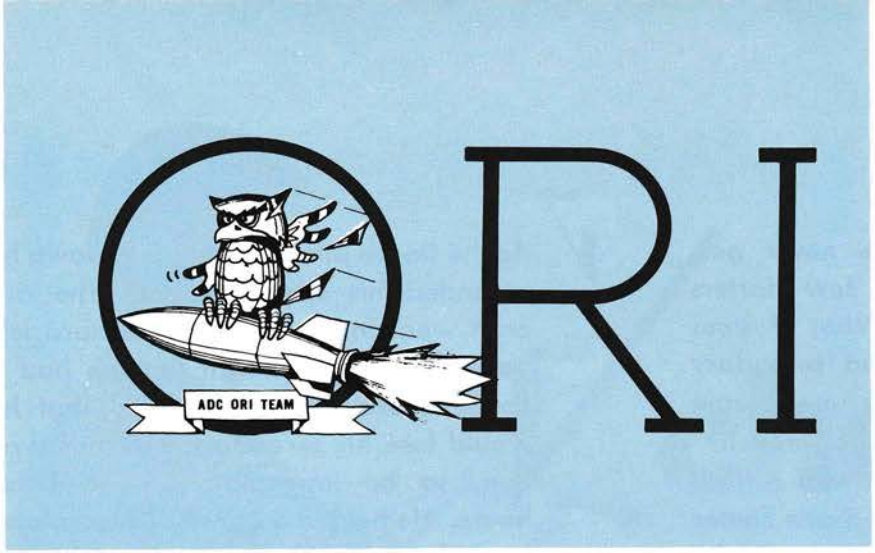
craft hits the ground. He never gets another turn! Here are a few starters for your next round: "What if your F-106 loses AC power and secondary hydraulics in flight; how much rpm must you maintain on final approach?" "What if your T-33 collides with a flock of ducks at low altitude and one comes through the windscreen?" "What if the angle drive shaft shears in your F-102, what have you lost?" "What if you are low level in a B-57 and the control column snatch unit fires?" "What if you are low level and your life raft inflates or your parachute deploys — into the cockpit?" Simple game, but when **you're flying you're always "it."** (SED/Safety Management Newsletter)

✓ As the Deuce pilot started his letdown he extended his speed brakes. The aircraft went into an immediate hard left yaw. The pilot thought that he had a speed brake malfunction and that he would lose his secondary hydraulic system, so he immediately headed for home. He held in a bunch of rudder and landed without incident. After he landed he found that he could neutralize his controls with the Takeoff Trim button, but as soon as he released it, the rudder would go full left again. Maintenance discovered that a screw from the right NESA switch had come loose and was resting on the contacts of the rudder trim switch causing the yaw. What will Murphy think of next? (SED)

SAGAS SING THEIR SAD SATIRE

In Memorium

The fighter base and the nearby bomber base were always at each other. If the fighters weren't tearing up the bomber flight line or bouncing the bombers in the local area, the bombers would get together and fly over the fighter base housing area — in the wee hours of the morning. Each act was followed by a retaliation which significantly increased the level of aggression. Plans for parades and formations on the ramps were guarded like the War Order and Intelligence and Counter-Intelligence activities flourished. It was the day of the monthly parade at the fighter base and, although officials had placed a tight security lid on the date and time of the event, everyone kept one eye on the horizon. Finally, at the peak of the Pass In Review, a lone bomber came across the flight line at low altitude. As he reached the formations on the ground he opened the bomb bay doors and distributed a generous amount of equine agricultural growth encouragement material upon the assembly below. The bomber hurried home to await the fighter onslaught. In about an hour they saw a single fighter appear on the horizon. As the fighter passed over Base Ops, he opened his speed brakes and an object suspended by a parachute floated to the ramp. The bomber guys cautiously approached the object to find that it was a black wreath upon which was attached a banner reading, "We regret to inform you that this morning at 1100 hours your Wing Commander fell to his death from one of your planes during a fly-by over our parade formation. We will accord him all due military honors."



OPERATIONAL READINESS INSPECTION TEAM

HQ, ADC

THE GREAT YELLOW HEALERS

Although the following article appeared in the August 1970 issue of INTERCEPTOR, the message carries such impact that a reprint is worthwhile. In particular, we think the new F-106 ANG units will find it interesting and hopefully keep in perspective the design, intent, and limitations of the Fault Detection Tester. In the past we have found some criticism regarding the capability of this equipment. However, we are convinced that if properly used and maintained, no more valuable tool is available for the technician to properly evaluate and troubleshoot the highly complex F-106 MA-1 system. So until we are blessed with something better, we strongly urge you electronic wizards to objectively and faithfully give this tester every opportunity to help you in assuring the quality systems we know you want to produce.

Some years ago two brothers transported a fragile, kite-like machine to the sands of Kitty Hawk beach. They put it together and, while testing the engine, Orville discovered a miss in one of the cylinders. "What do we do about that?" he asked his brother. "Don't worry," said Wilbur, "I'll find the problem. *I designed a piece of test equipment to take care of that.*" Wilbur quickly diagnosed the problem and repaired it. With the engine running smoothly., Orville made man's first powered flight.

When Orville was debriefing with Wilbur after the flight he said, "Say, Will, that's a pretty good piece of test gear, but you had better paint it some color other than yellow or you'll lose it in the sand."

Let's analyze what Wilbur said, "*I designed a piece of test equipment to take care of that.*" This may have been the statement or misconception that has caused much of the trouble we have had in the Air Force with the introduction of new equipment. Not one piece of test equipment has ever or will ever fix a malfunction; all they have done is *help* diagnose problems.

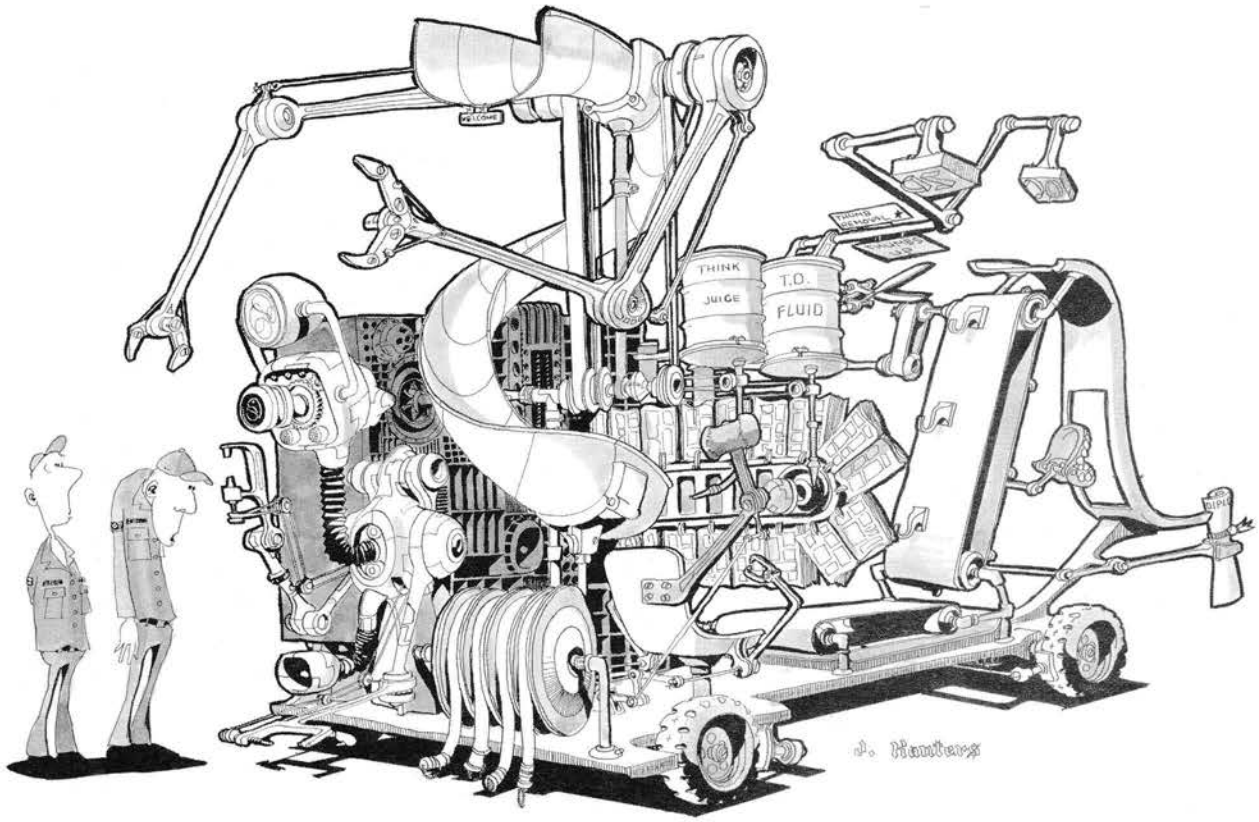
Through the years, our aircraft have increased in complexity — and our test gear has followed suit. Until the Century series interceptors were introduced into the inventory, maintenance technicians were able to stay abreast of the technological progress and things stayed fairly well in hand.

As the F-102 was being designed, someone took a look at the "hodge podge" of test equipment we had and decided that we needed a new item that would combine many of their features — one that would make a *dynamic* test of the entire Weapons Control System. A large electronics firm took up the challenge and the (what else?) Dynamic Accuracy Test System (DATS) was born. The electronics firm, extolling the capabilities of this new piece of AGE, said, *"We have just the thing for you. It will take care of all your problems!"* (There's that statement again.) In addition, they painted it yellow without a worry. It was too big to get lost in the sand!

The DATS was a very complex piece of gear. Naturally, when it showed aircraft system faults, the technician's first thought was that the "Yellow Hog" was busted again. His airplane was obviously working properly. Granted, the DATS had many problems associated with it; but, when properly maintained and used, it would pinpoint many WCS problems that could have gone unnoticed. Incidently, the DATS never, repeat *never*, fixed an airplane. All it did was help diagnose the problems.

Our next Century series bird was the F-101. It had a slight aerodynamic problem of swapping ends while in flight. Since this could be a nagging problem to pilots and commanders, a pitch control system, coupled with the auto-pilot, was installed to prevent this problem. These systems received inputs from a Central Air Data Computer. New sophisticated systems require sophisticated test equipment to diagnose sophisticated problems. Thus, the UG-897 automatic tester and the Yellow Peril, sorry about that, Yellow Pearl, were designed.

Each one of these pieces of equipment successfully did



"It's something called an 'Aircraft Condition Analyzer and Maintenance Quality Assurance and Remotivation Unit' ".

the job for which it was designed. The maintenance technicians' confidence in them declined, however, when they found that neither would do what the technicians wanted. The UG-897 tested the auto-pilot, but not the CADC. The Yellow Peril separately tested each box in the CADC, but not the total system. Individual items could and did check good, but at times the total system would not work. The light began to shine on the horizon though, when the function of both testers was combined. We then had a unit that would test the entire system and diagnose problems; please note: it still would not *fix* them!

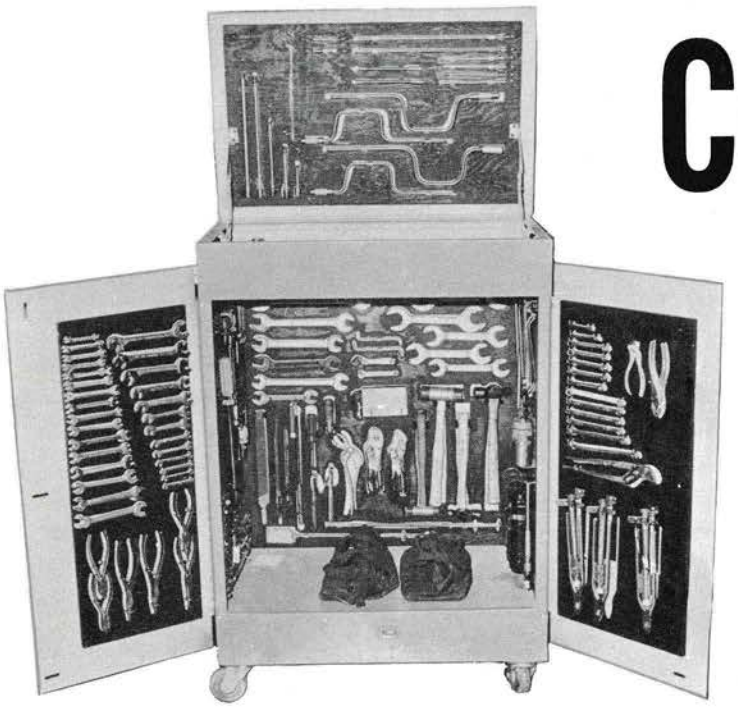
After the F-101 and the F-106 were in the inventory for a few years, we found that the MG-13 and MA-1 Weapons Control Systems were quite complex and difficult to maintain. We also found that we had no one piece of test equipment to tell us if these systems were operating properly. Great minds were put to the task, and what evolved has been called by such endearing names as the wine barrel, the garbage can, The Great Yellow Healer, and a few others. The great brains said that *it would take care of all of our problems.* (Those words again!) The official name for this new piece of equipment was the Fault Detection Tester.

As with all our other sophisticated pieces of gear, it had problems. It indicated so many faults in the aircraft systems that no one believed it. Again, the technicians were sure their airplanes were working properly.

Most of the tester problems have been worked out by now, and gentlemen, it still shows many faults in our aircraft systems. Perhaps we should take the hint that our aircraft systems may need some *quality* maintenance. Because of the shortage of skilled technicians and the fund limitations that have been imposed, quality — not shotgun maintenance — must be stressed. The Fault Detection Tester will help obtain this quality. It will not fix malfunctions, it will only aid in finding them.

All of the pieces of test equipment that have been mentioned, when properly used and maintained, will greatly simplify the technician's job of diagnosing or detecting malfunctions in our aircraft systems. Maybe we should call them the Great Yellow *Diagnosticians*, since only technicians can *fix* problems.

EWELL D. WAINWRIGHT, Colonel, USAF
Director, Operational Inspection



Composite Tool Kit

Courtesy AIRSCOOP

A lone F-4 roars down the runway, lifts off, turns out of traffic, and slowly disappears. The quick-check crew relaxes in the shade of their truck while the crew chief straightens up the parking area and ambles toward the flight shack to await the return of his aircraft. An hour and a half after takeoff the command post duty officer keys the intercom to maintenance control: "Say, how about confirming the takeoff time for Orbit 24. We show him off at 1425, but if that's right he should have called in his inbound info by now."

After a moment's delay, maintenance confirms the takeoff time, and a look of concern spreads across the faces of the command post personnel. Again the duty officer keys the intercom, this time speaking with the DO: "Sir, just wanted to let you know we might have a problem. Orbit 24 should be landing right about now, but nobody has heard a word from him since takeoff. I've alerted the tower to be on the lookout for a no-radio bird."

"Thanks for the call — I'll be on mobile radio. I'm going to drive down the line and see what's going on. Keep me posted."

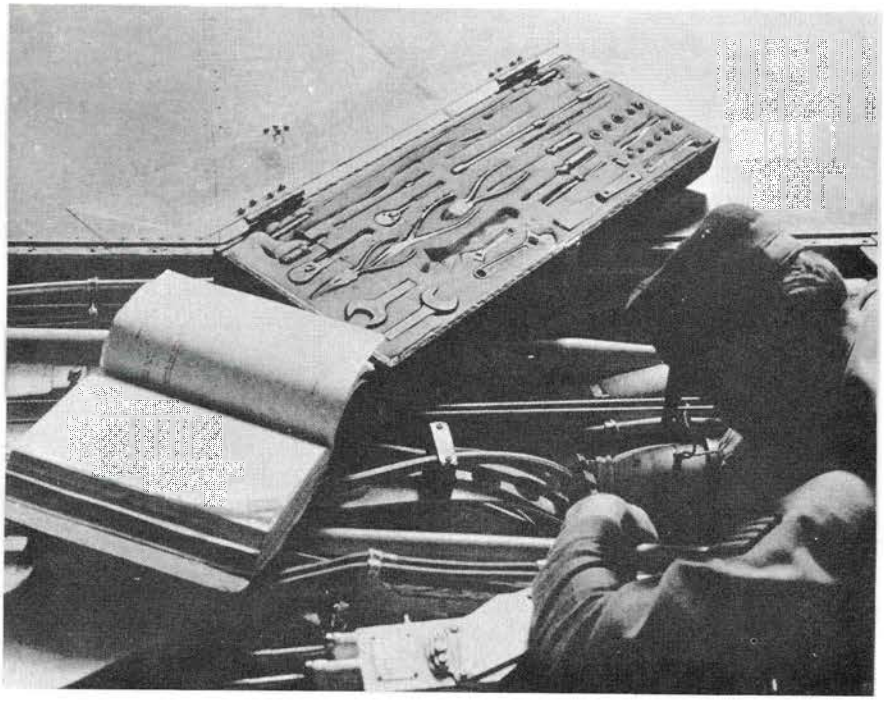
Minutes drag by and still no contact with Orbit 24. The wing commander is told of the overdue aircraft, the squadron commander quickly reviews the planned mission with the squadron briefing officer, and everyone feels a gnawing fear. The crew chief spends his moments alternately gazing out toward the initial approach and listening intently to the maintenance net radio.

A phone call from the local police brings the dreaded news. An aircraft crash has been reported by a farmer a hundred miles from the base. An investigating party goes to the scene and confirms that Orbit 24 crashed and exploded. Although the rear seater had tried to eject, his seat had not even started up the rails. An airplane and two irreplaceable men are gone.

The investigating board finds its job too easy. In the wreckage is a pair of pliers. A part of the stabilator control system bears the clear imprint of the pliers showing that they had become jammed in the controls.

This isn't the first time that tools or other foreign objects have caused an aircraft accident, but hopefully it will be the last! USAFE is adopting the composite tool kit (CTK) concept in hopes that an aircraft will never again be lost because of misplaced tools or equipment.

Tool control has long been a problem in the Air Force. At the end of the working day no one really knows where all the tools are — some are in cribs and others in tools kits scattered all over the base. Unfortunately, some may be



With this shadowbox kit, the mechanic can easily tell if he has left a tool where he shouldn't.

lost in an aircraft. Since July 1971, the CTK has been studied and tested in USAFE and the results are in — USAFE is going to the CTK command wide.

What is the CTK concept and how does it work? Basically, the CTK eliminates individual tool issue and provides a means to account for every tool on base at all times. Tools will be checked out in the morning and turned back in at night. There are two general types of kits. The work/dispatch kit is a bag or pouch which contains only the minimum tools (usually 8 to 10) required by a crew chief or flight line specialist on a day-to-day basis. These are inventoried each time they are turned in to be sure all tools are there.

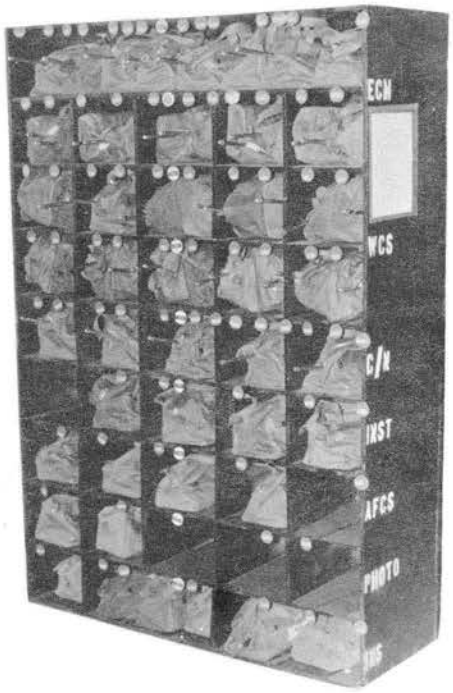
The second kind of CTK uses a shadow board with a place for each tool in the kit. Some of these kits will be maintained in central cribs with individual tools being checked out on an "as needed" basis. Other shadow board kits will be checked out as a complete rollaway kit. The crib is particularly useful in a shop, while the rollaway kits are appropriate in maintenance docks or hangars.

In practice, each maintenance man will be issued several tool discs or chits. When he wants a specific tool from a crib or an entire tool kit, he exchanges the disc for the tool. When a tool is missing — and since the shadow boards and tool bags can be readily checked, a missing tool would be quickly noticed — work stops and everyone looks for it until it's found. Each tool is marked, so identifying the missing one is easy. This may sound like a very time-consuming procedure, but the time is well spent when measured against the lives and equipment that lost tools have cost in the past.

CTK offers several advantages in addition to being an effective way to prevent foreign object damage and the possible loss of aircraft. One area that has ever-increasing importance is money. Because the kit doesn't have to have as many of the same kinds of tools, one field maintenance squadron was able to reduce tool costs by over 55 per cent! Another big benefit of CTK lies in quality control of the tools themselves. The mechanic no longer has to go to the trouble of turning in an old wornout screwdriver — replacement will be done automatically by the man maintaining the tool kit.

CTK will also insure that the proper tool is used for the job. Water pump pilers and adjustable wrenches, for example, won't be issued unless the mechanic has a job that requires them. Homemade tools can also be brought under control. If they're good, they can be shared by all — if they're bad, they can be eliminated.

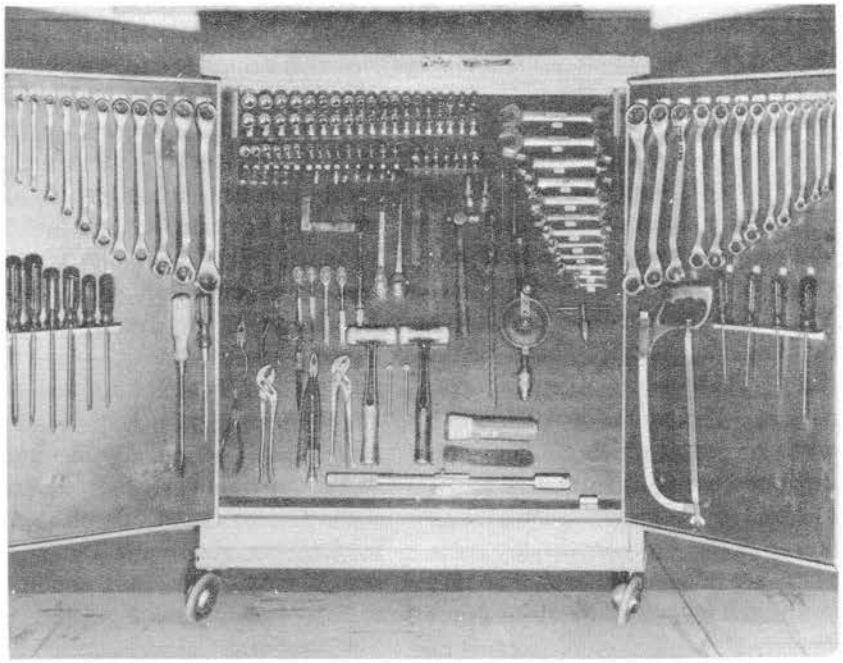
As with any new or different system, there will be skeptics and people who will resist change. The idea of not having a "personal" tool kit is going to make some maintenance men unhappy. But the system has demonstrated that it works and works well. A brochure that outlines implementation procedures is being distributed at this time, and the conversion is expected to take several months. To make the change-over to CTK as smooth as possible, everyone who uses tools will have to cooperate to make the system work. Those who have tried it are believers. When CTK comes your way, you'll soon be one too. ★



Dispatch tool kits. When a mechanic checks out a kit, he leaves his personal disc. With this system, every tool can be traced to the individual using it. Should a mechanic lose a tool, the effort to find it is reduced by knowing exactly which jobs he worked on that day.

EDITORS NOTEs This tool control system combines three "old" methods that have been around for many years: the shadow box, the tool crib, and the etched/marked tool method. Each of these methods has drawbacks in that each is inconvenient and requires additional men. However, the system described above has great merit when we consider the number of maintenance troops who have a personal set of tools valued as high as $150.00 Then we add in the fact that only one of three work shifts requires tools at any time. In most cases, this means that 2/3 of the tools are "waiting" to go to work. To this, we add just one irreplaceable aircraft and crew. Since maintenance problems vary, we have to leave the final arithmetic to the maintenance supervisor at each unit. Chapter 13, Vol IV, AFM 67-1, Base Tool Issue Center, gives this option to the supervisor:

"1. b. . . . The maintenance officer or supervisor may elect to use shadow boards or composite tool kits when considered effective and more economical, in lieu of issue of a tool kit to each individual."



A rollaway kit for shop use. Worn or defective tools can be easily spotted and replaced.

THE WAY THE BALL Bounces

ACCIDENT RATE

	ADC	ANG
1 Jan — 31 Aug 1972	3.1	8.1

MAJOR ALL AIRCRAFT

ON TOP OF THE HEAP

MO	ADC	MO	ADC	MO	ANG
59	49 FIS Griffiss	41	5 FIS Minot	57	158 Ftr Gp Burlington
53	57 FIS Keflavik	35	2 Fis Wurtsmith	52	163 Ftr Gp Ontario
47	552 AEW&C McClellan	31	95 FIS Dover	47	115 Ftr Gp Truax
42	4713 DSES Otis	28	87 FIS K I SAWYER	34	141 Ftr Gp Spokane

ACCIDENT FREE

CUMULATIVE RATE

ACCIDENTS FOR AUG / CUM TOTAL

	ADC	ANG
JET	3.3	8.8
CONV	2.6	0.0

BOX SCORE

UNITS DIRECTLY UNDER HQ ADC

			20 AD	21 AD	23 AD	24 AD	25 AD	26 AD	ADWC	552	4600	4677	4713	ANG
F-101	0	17.6												3
F-102	0	3.1												1
F-106	2.2		1 / 1											
T-33	3.6	15.8							1					1
B-57	11.1											1		
EC-121	0													
OTHER	3.9	0									1			

RATE = MAJOR ACCIDENTS PER 100,000 FLYING HOURS ALL RATES ESTIMATED

MINOR ACCIDENTS THIS PERIOD — 0
MINOR ACCIDENTS CUMULATIVE — 5

an ounce of PREVENTION

THE WHITE HATS RIDE AGAIN

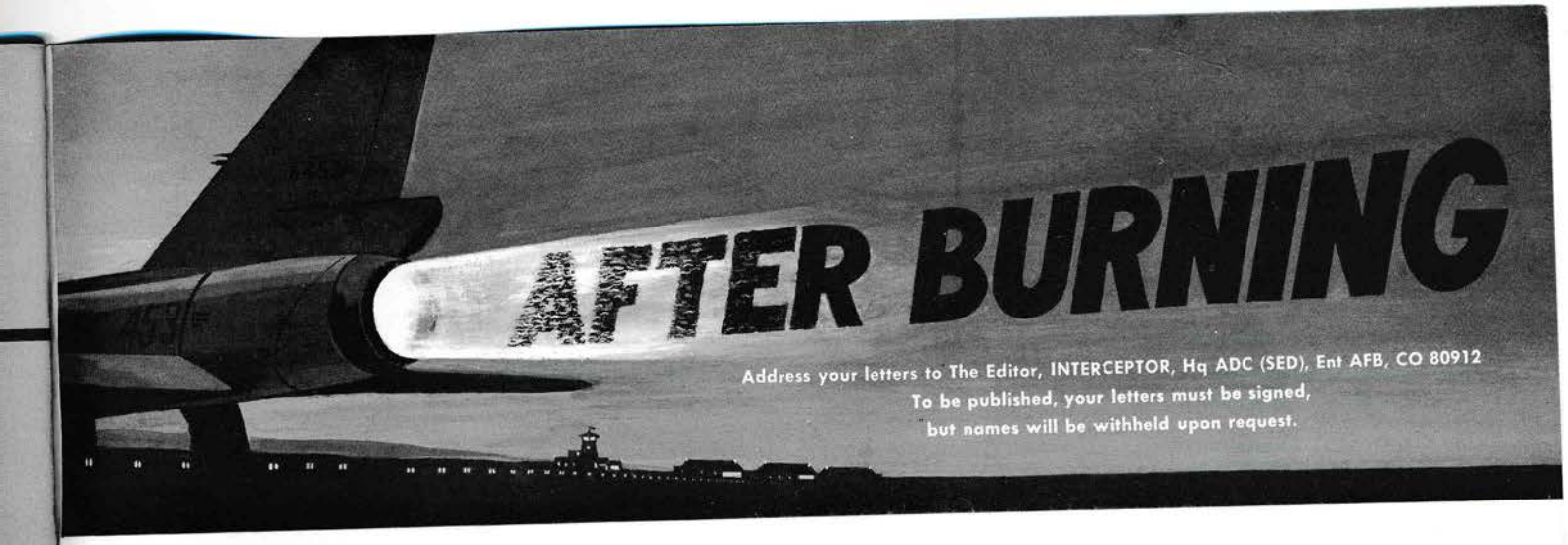
For the past two years the ADC safety staff has been augmenting inspections coordinated by the ADC IG. However, this practice will soon be discontinued. The Inspector General now has his own safety experts who will inspect units primarily from the safety program management viewpoint and also look for non-compliance issues in the functional areas.

The ADC safety staff will once again put on their white hats. Although our trip/visits will be called Safety Supervisory Visits, the old safety survey philosophy will be recognizable. To prepare for these *notice* visits, unit commanders and safety officers should familiarize themselves with the contents of Chapter 5, AFM 127-1.

POSITIVE ACTION

In the early 1930s, aircraft designers began building retractable undercarriages into their new machines and thus created a problem that still plagues us today — the gear-up landing. Although we have included many ingenious devices — the red warning light, the gear horn, the copilot — no one has produced a foolproof system to prevent this type of accident. In ADC we have already suffered two gear-up landings this year — and by experienced pilots. There still seems to be a shadow that can cloud men's minds so they are able to turn final with the gear horn blaring, mouth the words "gear checked," and be completely surprised as the underside of the aircraft slides along the concrete. But take heart, fearless aviators, the answer just may have come to us by way of the boys from down under. Captain Peter Fleischhacker has just returned to ADC after his three year "hardship" exchange tour with the Royal Australian Air Force, and one of his first actions was to submit an Air Force Suggestion on the prevention of gear-up landings. It seems the Australians use a "gear beeper" in the Mirage aircraft and they have never had a gear-up landing with this system. The gear beeper consists of an audio frequency oscillator that transmits a tone on the UHF transmitter when activated by the pilot. The circuit for the system passes through the downlock microswitches in the landing gear and will not operate unless all three wheels are down and locked. As a pilot turns base for a landing, the tower requests a gear check. Instead of the pilot vocally confirming the check, he simply presses his gear beeper. If the tower doesn't hear the "beeper," they don't clear the pilot to land.

At this time, the idea is only in suggestion form, and it will have to be evaluated by our R&D types. But we are glad to see some positive thinking on this problem. If this works for the Australians, maybe it will work for us. Beep, beep . . . !



Editor's Note: It is always a pleasure to receive fan mail praising our INTERCEPTOR Occasionally, we receive letters critizing the INTERCEPTOR; in this respect we are also pleased. Constructive criticism never hurts.

In regard to our recent story on "Lady Killers," we didn't realize how accurate the title was. Since the publication of that article (July) and our First Lieutenant Nancy J. Peter's response (September), INTERCEPTOR Magazine has been set straight on several points. Therefore, a thousand apologies are in order. In the first place, WAF do directly support the ADC mission. Secondly, as a result of the tremendous responses from the men and women in ADC, threats of bodily harm from our female counterparts, and specifically due to enlightened guidance from various echelons . . . the INTERCEPTOR staff is now wiser and more learned. Under the guidance of our managing editor, the *THREE WISE MEN* of the INTERCEPTOR staff have discarded their hardheaded stand and with farsighted perspicacity . . . have agreed to reword the masthead to dedicate INTERCEPTOR Magazine to the "Men and Women" of ADC.

WEA RECON FLYING SAFETY

Being an old ADC type (1955-66), I have always considered INTERCEPTOR to be one of the finest safety magazines around. Although I am now assigned to MAC (Air Weather Service, RB-57Fs), I feel that having a few copies of your outstanding efforts lying around would prove highly beneficial to our jocks, especially to those of us who are also flying the short wing RB-57C.

Therefore, to enhance our own unit Flying Safety Program, kindly request we be added to your growing distribution list for five copies of INTERCEPTOR per month.

Major Donald L. Evitt
Chief, Aircrew Training
58 Wea Recon Sq
Kirtland AFB NM

***You're enhanced. Five copies per month are on the way.**

OTS LIBRARIES

We are most interested in procuring four subscriptions to INTERCEPTOR for our library for the use of our Officer Training School students — they require the magazine for reference purposes in preparing speeches and briefings in support of their commissioning program. Since we do not have airplanes or flight crews at Lackland, copies of the magazine are not available in any office on base. We would distribute the subscriptions as follows: 2 each to the Main Base Library and 2 each to the Officer Training School Branch Library. The students study in both libraries.

Phyllis Morgan
Chief Librarian
Hq 3700 AB Gp/SSL
Lackland AFB, Texas

***Come fly with us — in the INTERCEPTOR You're on the list!**

Colorado Springs for MIA/POW in cooperation with the National League of Families of American Prisoners and Missing in Southeast Asia has commissioned this special Christmas seal to remind us all of our comrades who are prisoners of war and missing in action. Those interested in obtaining these seals may write to:

Colorado Springs for MIA/POW
Post Office Box 100,000
Colorado Springs, Colorado 80901

☆ U. S. GOVERNMENT PRINTING OFFICE 1972 — 784-109/3

Photo by SSgt Richard Thomas

You know any time something falls off your airplane it shows that you or someone else didn't follow the checklist — that's really embarrassing to the world's greatest fighter pilot. So far we've been lucky and haven't damaged anything but our ego. But, last April, if you remember, I told you that we had dropped sixty items in the preceding eighteen month period. That seemed bad enough then, but this year the score is even worse. By the end of August we had already dropped forty-two more. Quite frankly I'm getting concerned about your welfare — and that of the people on the ground. I certainly wouldn't want a drag chute or panel to fall on me and I know you wouldn't either. I've been telling all my friends that fighter pilots really do "do it better." Please don't let me down. Give your aircraft a thorough preflight every time.

—Carolyn