AEROSPACE

SAFETY

UNITED STATES AIR FORCE

JULY 1966

THE LAST DECISION

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AEROSPACE SAFETY

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AFRP 62-1 JULY 1966 VOLUME 22 NUMBER 7

FALLOUT

LANDING TECHNIQUES

I've read the article "Never Excelled" (April issue) and thought you might be interested to know that with the completion of the 389th Tactical Fighter Squadron's rotation to Alaska, the 366th Tac Ftr Wing was relieved of its northern obligations and PCS'd by squadrons to Southeast Asia. The 389th is now back to the air-to-ground business in the Republic of Vietnam.

Curiously enough, the landing techniques developed in Alaska have proved particularly beneficial in a climate that is directly opposite in nature. A thoroughly rain soaked aluminum plank runway has been proven to contain the same characteristics as an icy runway with the exception that it is less than half as wide. As a result, it did not take much prompting to continue with the "crunch—trust your antiskid" type of landing that keeps you and the F-4C out of serious difficulties when the RCR hovers around 12 or less.

Lt Col Felix C. Fowler, USAF

MISSILANEA

May I direct your attention to the photo on page 25 of the May issue? I believe that old Atlas F (HGM 16-F) crewmembers and maintenance personnel will feel a bit of nostalgia as they recognize a silo-to-LCC shot of the Utility Tunnel through which we passed many times. "Minutemen" may not recognize their "implied" home.

With the absence of the third blast door (a late program modification) and the presence of the "silo controller" at the top of the steps, this picture may have been taken during the I & C phase of the Atlas program (1961-1962).

Along with this "nostalgic" observation, may I add praise for all your efforts and very fine magazine? For over three years of the "underground duty," your publication was a source of contact with the rest of the Air Force.

Here's to continued success.

Capt Raymond W. Danielson, Jr
46 Air Def Msl Sq (BOMARC) (ADC)
McGuire AFB, New Jersey 08641

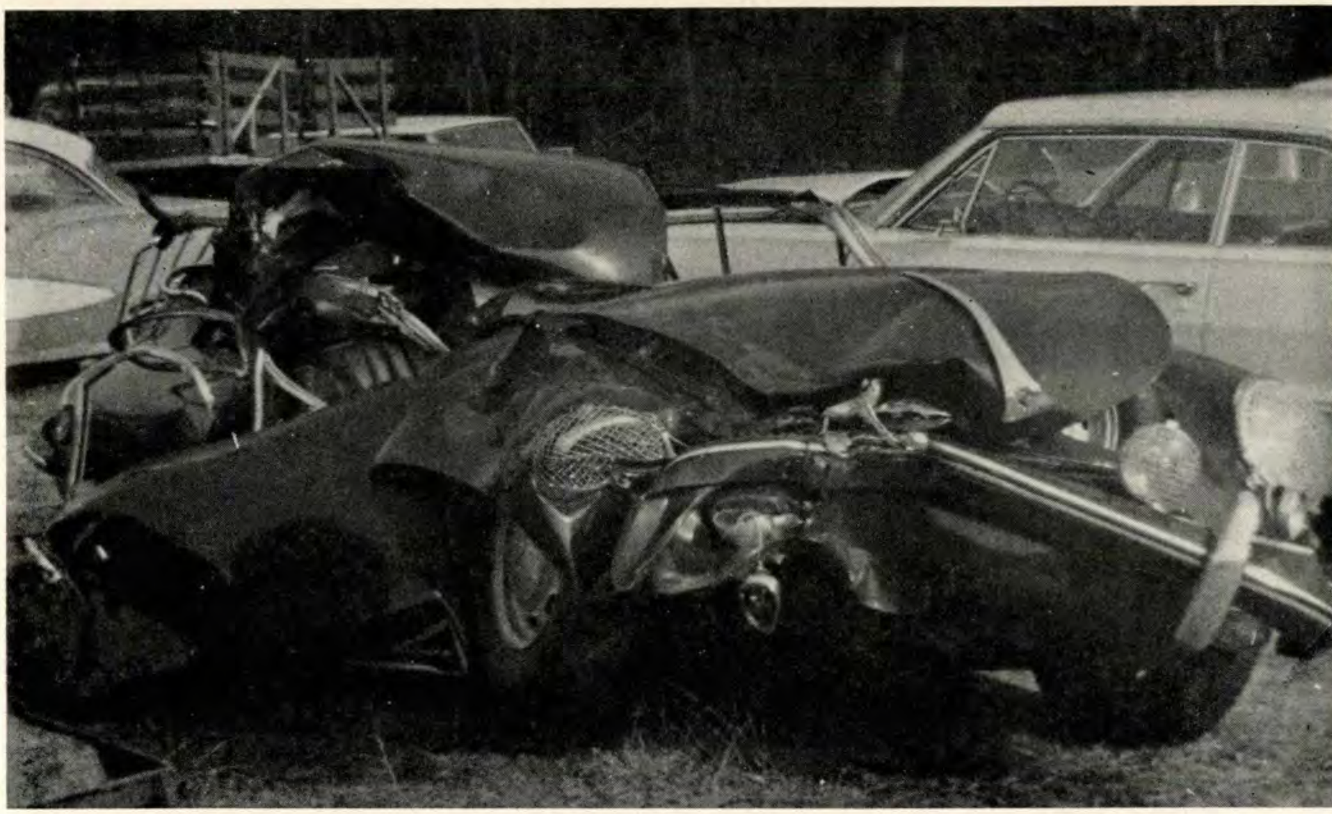
Thanks for writing. Just proves that you can bury a man in a hole underground but you can't keep his mind out of the sky. As for the photo, the artists plead "artistic license." Guess this is what they call a mood pic, not intended to portray a specific situation.

TOP BUTTON

After reading your article "Fasten That Top Button" (May issue), I must admit that I required several minutes to calm down, but I believe the pilots who are still flying the fighters (and damn proud of it) deserve their say.

I think what I noted first was the author's decided lack of "professionalism" as a fighter pilot (kick the tires, etc) went out a long time ago and if that was the author's idea of being a fighter pilot, then all my associates are glad the recip troops are stuck with him.

continued on page 28



Gamble of Life

Capt Guy K. Buesing, 509 Bomb Wing, Pease AFB, N. H.

Most of us have been subjected to safety lectures well larded with statistics. The figures tell of the number killed in automobile accidents, show that most accidents occur within a 25 mile radius of home, and prove that safety belts save lives.

This is not another lecture based on statistics. Instead it is the story that goes with the picture above. Look at the condition of the car. Is it possible that the driver could remain alive? And if he survived, it would seem obvious that he would be a permanent invalid destined to dependence on others.

I was in that car. I am alive without any disability whatsoever. I have full coordination and mental alertness. Granted, there was a period during which I was in critical condition, but recovery was swift and complete. This quick recovery I attribute to my general good health. But that I recovered at all can be attributed to something else: The attending physicians, as well as the New Jersey state policeman involved, have stated that the only thing that saved my life was the fact that I was wearing the seat belt-shoulder harness combination.

My most serious injuries resulted not from the impact, but from shock as a result of blood loss after I got out of the car unaided. It is hard to believe that I got out of the car alone, but that I did is supported by the police and medical reports.

Most people consider themselves safe, conscientious drivers who would never get into an accident like this. People who know me personally classify my driving habits as safe. I have been driving for more than 10 years and using seat belts for the last eight. These belts were used on base and off base, whether traveling a few blocks or several miles. Finally an accident occurred where the belts unquestionably proved their worth.

Many people refuse to wear seat belts. Their rationale is that a friend or relative lived because he was not wearing a belt, or they know of a person who died because he happened to be wearing a seat belt. Some of us don't use seat belts because of the inconvenience and the few seconds necessary to fasten them. This article has been written mainly for all of these people.

Police and medical reports state that fatigue, drinking, speeding, and careless driving were not factors in my accident. Without going into details, this collision with a tractor-trailer was not my fault, but it happened. Why? Call it the law of averages, fate, or just "one of those things." Regardless, even the safe, conscientious driver is subject to accidents.

In many ways life is a gamble. No one can accurately predict the future, but perhaps one can shape it by playing the so-called odds in his favor as much as possible. Driving can also be classified a gamble. One of the odds on your side is wearing seat belts all the time. ★

The temperature was —45° F, his signal devices didn't seem to work and he had a broken shoulderblade. But knowledge, courage and self-control are powerful weapons, and they brought this pilot through his . . .

ARCTIC ORDEAL

On 10 March Captain Roy MacDonald was the pilot of an F-106 that collided with a T-33. The T-Bird landed safely with four feet of the right wing missing but the F-106 was not controllable and Captain MacDonald ejected. This is his story of the 51 hours he spent in the frozen wasteland of central Alaska before he was rescued by helicopter. His experience and excellent recall of the events of those 51 hours provide valuable lessons in survival and rescue. The story is essentially as Captain MacDonald told it with some editing to provide continuity and to avoid redundancy. Editor's comments are in italics.

The aircraft was inverted in a 30-40 degree nose down attitude. Just as I pulled the ejection handles the airspeed was .95 mach and the altitude was between 25 and 30 thousand feet. The right handle was no trouble – got it the first try. Evidently I was on the right side of the seat, as I had to make two or three attempts to get the left handle. I don't remember any specific sequence in the ejection system, such as the canopy leaving, the seat firing, and the man/seat separator working. The next thing I remember I was out of the seat in a face upward position and spinning quite rapidly. I attempted to stop the spinning by putting out my arms and legs and this stopped the spin quite well. But when I tried to turn over on my stomach I would get back into a spin, so I left my arms and legs out and held that position in a free fall.

I don't remember any especially hard opening shock of the parachute – I let it open by itself. After the chute opened and I looked up I saw there was one rip in the canopy, and I realized I had lost my helmet, although my chin strap had been fastened. *(The knob had come off the visor earlier and MacDonald put it in his pocket. He said the visor, being loose, came down and protected his eyes. He felt that if the knob had been in place he would not have had time to lower the visor.)* After checking the canopy, I attempted to cut the marked lines with the knife that was attached to the right side of the right risers. I did get the two right lines cut but could not cut the left ones because of an injury to my left shoulder. *(His left shoulder blade was broken, apparently from the opening shock.)* I then deployed the survival kit and started checking my wind drift along the ground as best I could. The wind appeared to be blowing hard as I was drifting quite fast.

As I neared the ground, I pulled the quick release cover and just prior to hitting the ground, I put my fingers in the quick release rings and assumed the landing attitude or position. When my feet touched the snow I jettisoned the çanopy. Clean separation — no problem of being blown by the wind. I did not specifically notice any oscillation during the letdown. It appeared to be quite stable, and I did not notice any rotation. This was demonstrated at Life Support School. During the drop in the parachute, I was surprised that I wasn't cold—no sensation of being cold. I landed in about three feet of snow and there was no big landing shock — quite a smooth landing.

Immediately after landing and after trying to calm down and get my senses together, I started looking for a place to make a camp. I think the first thing I did was take off my summer flying gloves and put on my winter gloves and put up the hood on my flying suit. I had landed just off the top of the ridge on the downwind side. Approximately 75 yards down the ridge there were quite a number of trees, both evergreens and dead timber. I thought this was the area to make my camp and started down, pulling the life raft and survival kit with me.

After getting down to the area and looking it over, I decided it would be suitable for my camp and then decided I should get the parachute out in case rescue aircraft flew over. Prior to starting back up the ridge to my parachute, I took two day/night flares out of my survival kit and put them in my flying jacket pocket. I then climbed back up on top of the ridge, spread the parachute out and tied it to low bushes. While I was putting the chute out, two F-106s flew directly overhead. I set off one of the Mark 13 smoke flares but then realized that the 106s were moving too fast and would not see the smoke. I cut off part of the parachute to use as a shelter and for any other items I might need, and started back down off the ridge to my camp. I left a total of four panels on the ridge, two orange and two white, for signaling devices.

BUILDS SHELTER

The snow depth in the area varied from three or four inches on top of the ridge to several feet in my camp area. At times I could walk on top of the snow and at other times I would sink up to my knees when going from the top of the ridge down to my camp. I made an A-frame type shelter by tying nylon parachute cord between two trees and putting the parachute over this cord and tying it down to other trees. Prior to making my shelter I had walked on the snow and tramped it down as much as possible. After I had put my shelter up, I took one of the saws out of the survival kit and cut the snow deeper inside the shelter and tried to make the floor as smooth as possible. I inflated both LPUs and put them inside the life raft, snapped the cover and turned it upside down to use as a mattress or to keep me off the snow. I then took all of the padding that I could get, such as the cushion on the back of the parachute and the seat cushion on top of the survival kit and put these on top of the raft to insulate me against the raft.

During this time I could hear search aircraft in the area and I was using both the SARAH radio and the URT-21 radio. I immediately found out that the battery in the SARAH was weak. I could hear the tone in the battery after I turned it on and it would last four to five minutes before dying off. I would then turn the SARAH off, wait a few minutes, and try it again. The battery would last four to five minutes each time I tried. I had trouble with the antenna on the URT-21. The top two sections of the antenna separated from the bottom three sections and there was a problem in getting the antenna out. Also, I noticed that the plastic plug on the URT-21, which is supposed to automatically turn on the radio on bailout, had not pulled and the radio had not been turned on. I pulled the plug out and was hoping the radio was working. I wasn't 100 per cent sure whether I was supposed to hear a tone in the radio, but I assumed that the set was working. *(He kept the radios as warm as possible by placing them under his flying suit, in the sleeping bag at night, or by the fire.)*

The remaining time before dark I spent mainly trying to get the camp set up, getting dead wood, and trying to find a place to build a fire where it wouldn't sink completely out of sight in the snow. The snow in the camp area was deep enough that I would sink down to my knees, and in some places, clear down to my armpits. Getting wood started to be a problem after a while because I got every thing that was easily accessible; then I had to start foraging

SURVIVAL CAMP—This is where Capt MacDonald spent 51 hours awaiting rescue after bailing out of damaged F-106. Despite deep snow and extreme cold, he survived in good shape.

to the deeper areas of snow. In trying to find a place to build a fire in snow country, it had always been my experience to use green logs as a base on the snow. The green trees weren't too big in this area, and I didn't feel like taking the time to cut them down, so I used the top portion of my survival kit and built a fire on it. This part of the kit lasted pretty much throughout the evening before it eventually burned up.

GETTING ORGANIZED

During that first evening I separated my equipment into several different groups so I could find any item I wanted in a minimum of time. I put all of my flares, radios, signal mirror, strobe light and flashlight in one group, food in a plastic bag in another group, clothing in one group, and miscellaneous items I left in the kit. For my first meal I had bouillon by using one of the bouillon cubes in the survival kit. Drinking this bouillon really pepped me up and helped me get going again. I had felt a little letdown after seeing airplanes in the area but none of them coming too close.

For sleeping I used the walk-around sleeping bag and it was quite adequate. I did get a little cold at times throughout the night, but I got several hours of sleep. When I got cold, I would get up and walk around or start a fire and make some tea, or even drink warm water with a little sugar in it. I was quite concerned, of course, about what had happened to the people in the T-Bird and about my family at home. However, I did get several hours of sleep.

On the second day I got up quite early and started to build signal fires. I built two fires, one about 20-30 yards up the ridge from my camp, and I was using my cooking fire. I was wondering about the value of these signal fires though, as I had already experimented with the green boughs and found that the smoke was quite white in color and blended with the snow. For breakfast the second morning I had part of the candy ration, which is included in the kit, and hot tea.

Throughout the day there were many aircraft in the area. The helicopters came to within a quarter to half a mile of my position several times but they were searching down in the canyon, while I was quite far up the slope. I would see the blades of the choppers flashing through the trees below me but they were just too low. Also, several C-130s or C-54s came fairly close, but they didn't spot me. During the second day I used up the remainder of my smoke flares. I used the signal mirror and, of course, the SARAH and URT-21 radios. The battery on the SARAH radio finally gave out on the second day. I had turned it on and the tone in the battery would last from a minute to a minute and a half and then quit. I wasn't too certain that the URT-21 was working, because of the antenna problem and the fact that many aircraft had been in the area when I had the radio on, but apparently didn't hear it. I also looked for cabins or any other buildings in the area by climbing back up on top of the ridge but all I could see was snow and several frozen rivers.

WRECKAGE SPOTTED

In the afternoon, a commercial aircraft flew quite close to my position and I shot off a pengun flare, but apparently he didn't see it as he flew on by. *(The pilot of this light plane located the wreckage of the F-106 about seven miles from where Captain MacDonald landed.)* I also saw a helicopter working across the river to the north and saw him eventually drop a smoke bomb. I thought possibly he had at least located the immediate area where I was; however, later, after I was rescued, I found that he was marking the spot for a fuel drop by the C-130. During all of this time I was using my radios, mirror, flares, and I even lit a signal fire, but it didn't do any good.

During the second day I cut down several green trees and made a fire base out of these. I built my fire on top of the green boughs, but eventually even they caught on fire and I finally had a hole about four feet deep directly in front of my tent, so I then used the bottom portion of my survival kit to build a fire in. Gathering wood for the camp was getting to be a bigger problem, as I had already burned all the dead wood in my immediate camp area. I was not especially hungry during the second day, but drank a great quantity of liquid. I would melt snow and either drink just the water or tea or coffee. Again for supper the second night I had hot bouillon.

To try and sleep a little more comfortably the second night, I climbed back to the top of the ridge, took my parachute signal down, and made a sleeping bag with it. This helped a little and I was a little warmer the second night. One of the things that bothered me after a while during the second night was that I would just get to sleep when a rescue aircraft would fly in the area. I didn't know if it was coming into my immediate area or not, but I would get up out of bed and take all of my signaling devices back out into the open to wait and see if the aircraft would fly over or near me. Sure enough, the aircraft would fly in the other direction. It happened several times during the second night and I began to wish that they would just go away and leave me alone until morning. One aircraft, in particular, on the second night flew quite close. I fired a pengun flare and also had my strobe light on and hanging about two feet above the snow on a small tree. This made a very bright flashing light, but the aircraft did not see it. On both the first and the second nights I had both radios in bed with me, trying to keep them warm.

RESCUE NEAR

On the morning of the third day I was up early, as there was already a great deal of activity in the area. I took my parachute signal back to the top of the ridge, spread it out and tied it down. This was when I first noticed that I was losing strength and didn't have as much energy as I had the first two days. It took longer to climb through the snow to the top of the ridge, and I had to stop and rest more often. Throughout the day I tried to keep busy by collecting wood and green boughs or just by doing minor things around my camp. If I got cold all I had to do was walk a little or saw a little wood and I was quite warm.

Again, on the third day, I drank a lot of liquid. There were aircraft all around the area and I was trying to use all of the signal devices I had. Finally, in the afternoon, I saw a C-123 headed in my direction, and I turned on the URT-21 and also used the signal mirror. As the aircraft approached my position, I fired a pengun flare but the aircraft kept on going. He then made a 180-degree-turn and came back in my direction and I fired another flare, but again the aircraft flew right on. I thought that he was leaving the area, as he flew quite some distance this time, but he finally made another 180-degree turn and came back. I set off one of my signal fires and one of the night ends of the Mark 13 flares, and shortly I heard the helicopters coming my way. It was then just a matter of minutes before the choppers landed and I was picked up and taken back to Galena.

° °

In addition to his statement, Captain MacDonald answered a number of specific questions, and other items of interest were brought out during the accident investigation. These are summarized here:

Captain MacDonald ejected at about 1245. The aircraft IFF squawked automatically, was read by a GCI controller for about 20 seconds and was used to mark the area. However, it was 28 hours before the F-106 wreckage was found and 51 hours before he was located and picked up by the chopper.

Intermittent signals were received from the SARAH during the first two days but the URT-21, which eventually led to the rescue, was heard on the third day only. Electronics specialists say that, with the URT-21 and SARAH transmitting simultaneously, the SARAH receiver would be affected by the URT transmission, but that the direction finding function of the URT-21 would not be impaired. The SARAH later was found to have a weak battery (dated March 1962) and bent pin in the antenna canon plug. The cord from the parachute to the URT-21 was not prop erly fastened which precluded automatic operation of the URT-21. Captain MacDonald had trouble extending the antenna and it came apart. He did not remove the flex antenna as directed in the instructions.

Other signal equipment: Captain MacDonald had three day/night flares, a pengun and seven flares, a signal mirror, strobe light and a .38 revolver with tracer ammunition. All the flares except one pengun flare worked, but he had some difficulty with the day/night flares in that the metal ends broke off. Although the strobe light was used both nights, it was never seen by searchers. Nor did they see flashes from the signal mirror. MacDonald didn't use the tracer ammunition, figuring that if the other devices weren't seen, it would be futile to use the tracers.

Survival training: Captain MacDonald had no formal arctic survival training, although he had some briefings. He attributed his ability to cope with the situation to his camping and hunting experience as a boy in Idaho.

Survival equipment: The standard seat kit was considered good but lacking in some items. The two bouillon cubes were missing from one of the two plastic packets and there was no weapon (.410-.22 shotgun-rifle combination). MacDonald had an ADC minimum survival kit in his flying suit leg pocket, but the pocket came open during the ejection and the kit was lost. The walk-around sleeping bag he considered excellent, but he recommended the kit contain more bouillon cubes and possibly some dry soup mixes. He used the candy bar container for water and for melting snow. An additional item, he suggested, is a piece of metal in the kit upon which to build a fire in deep snow.

Clothing: Although the temperature hovered around −45°F., MacDonald was comfortable most of the time. He was wearing ordinary underwear under thermal underwear, a winter flying suit, winter jacket, light cotton socks, insulated socks and mukluks. He had bunny boots, although the valves were missing. As long as he moved about his feet did not get cold. He had extra socks and he changed from time to time to keep his feet dry. The wool hood over his face plus the winter flying suit hood provided good protection from the wind even though ice formed on the wool hood around his nose and mouth.

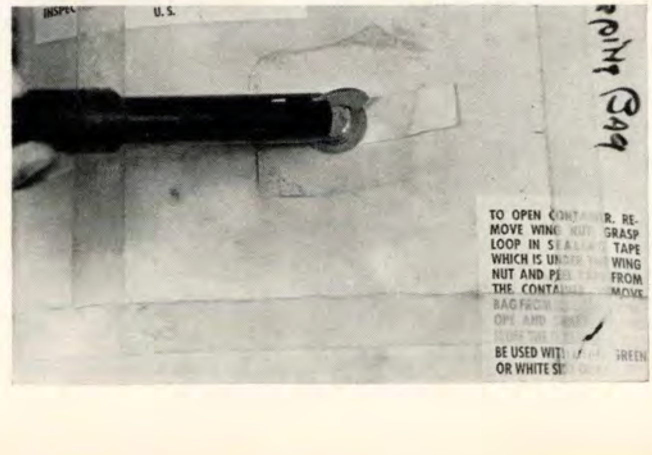
The man: Undoubtedly the most important factor in his survival was Captain MacDonald himself. He exhibited unusual ability and excellent control of himself as demonstrated by his first two thoughts after landing. His first was that he must keep warm, and his second was that he must remain calm and conserve his energy. ★

Personal Equipment Notes

The photos at right of batteries taken from survival radios carry a message. Unfortunately, there are some who don't know how to read that message. The numbers pointed out by the arrows indicate the expiration date; for example 0265 means February 1965. SEG recommends shelf life not to exceed two years.

The photo below shows a D-ring that was discovered safety wired. According to the folks who sent us this picture, this chute could not have been successfully deployed. Apparently this is not a one-time incident; others have been shipped with the safety wire installed.

In the April issue of AEROSPACE SAFETY there was a short item on the problem of opening some survival sleeping bag containers. A1C Lewis Smith, 840 Supply Squadron (TAC) at Lockbourne AFB, has an answer to this. SAC MD-1 kits contain the SRU-16/P combination digging tool. A slot on the end of the handle is just the thing to turn a reluctant wing nut on the container. Caution: unfasten the wing nut before removing the container binding tape — the tape relieves some pressure on the bolt.



DIG, DISTILL & SURVIVE ★ ★ ★ ★

Adapted from a paper "Water for Survival" by R. D. Jackson and C. H. M. van Bavel, Research Physicists, U. S. Water Conservation Laboratory, U.S. Dept. of Agriculture, Tempe, Arizona.

Survival experts say that to live in the desert in summer a person needs about a gallon of water a day. The amount varies with one's activity.

Where is one to get this water? To the casual visitor the desert looks inhospitable in the extreme; to the survivor the desert no doubt seems downright hostile, and the availability of water nil.

Well, there is water and it can be obtained by a method known as a survival still, which distills water from the soil or other water-bearing material. The only tools needed are a sheet of plastic film, sunlight, and a container.

Construction is simple: dig a hole in the ground about 40 inches wide and 20 inches deep. If you leaped from an aircraft you are not likely to have a shovel with you. No sweat – use a stick or flat rock (if there's one thing the desert has in abundance it is flat rocks).

Now place your container at the bottom of the hole. The container can be anything that will hold water. If it is flexible (foil or plastic) shape the bottom of the hole to support the container.

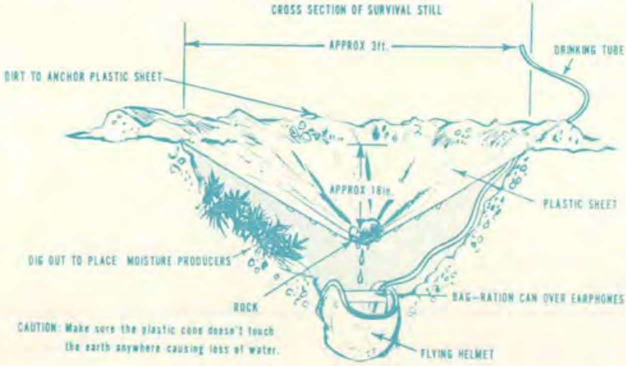
Install the plastic sheet (see diagram) and secure with rocks or soil. Place a rock at the center of the plastic so that the center of the sheet is about 15 inches below the surface. A wettable plastic sheet is preferable (water drops cling to the plastic). One such product is DuPont *Tedlar*, Nr 100 BG-30.

If there are fleshy plants available, such as prickly pear or barrel cactus, pieces can be placed in a trough dug into the side of the hole Or polluted water from a brackish pool, or even urine, can be used to wet the sides. This may be necessary if the ground is excessively dry.

As sunlight passes through the plastic, heat is absorbed by the soil and plant material, or other wetting agent, and evaporation takes place. This forms on the plastic and runs into the container.

If the soil is very dry – such as loose sand – don't expect much, perhaps one-half pint a day or less. Denser soil that contains some moisture or damp clay, for example, may produce four or five times as much. Of course, you could set up several stills with sufficient material. Since the plastic film is light and requires little space, flight crews might carry the plastic and a piece of foil for a container in a pocket or personal survival kit just to be sure it is handy.

The person using this method of obtaining water must be patient. The air under the plastic will become saturated in about an hour. But the process is slow and several hours will pass before there is much water in the container. Don't disturb the apparatus to get at the water any more than absolutely necessary. In this regard, a piece of plastic hose is a luxury. Run it down the side the hole from surface to container. Then you can draw water out without disturbing the still. ★



BIRD WAR

For thousands of years man looked into the sky and envied the birds. He decided he had to fly; finally he did. And he learned well. Soon he was flying higher than the eagle, faster than the hawk and could hover in place as well as the hummingbird. But one thing he failed to take into account was that he would be competing with the birds for the airspace.

This wasn't too serious at first – the birds were every bit as fast as the airplanes and a lot more maneuverable. They probably considered man and his flying machines a nuisance they had to put up with.

Then came the jet and the birds had a problem. Man also discovered the problem and the war was on. So far, man has been winning most of the battles but the birds have been winning the war.

We are all familiar with the more lethal encounters between aircraft and birds: The Electra that crashed at Boston in 1960 after striking a flock of starlings on takeoff; the disaster at Ellicott City, Md., in 1962, when a Viscount received severe structural damage in a collision with a whistling swan and crashed killing 17; the death of astronaut Theodore Freeman after a snow goose went through the canopy.

While such disasters are infrequent, strikes occur daily and the cost is tremendous. Last year, 839 birdstrikes were reported by the Air Force. (The large number was the result of special reporting for 1965 only, in which all strikes were required to be reported so the Air Force could get a better idea of the magnitude of the problem.) During the first two months of this year, Air Training Command reported 26 bird strikes, nine of which resulted in damage.

The Air Force is not alone in suffering damage from bird strikes. In a paper on bird control, Roger G. Flynn of the Air Transport Association of America stated: ". . . in 1964 our 43 member airlines reported 413 strikes. In only 156 instances was damage incurred. We estimate the repairs necessary for these incidents cost in excess of $1,500,000 that year."

An FAA advisory circular, Bird Hazards to Aviation, contains this statement: "At the Congress on Bird Hazards at Airports, Nov. 25-27, 1963, a BOAC representative reported that 'in 4½ years, Comet IV (aircraft) required 178 engine changes (due to bird ingestion) costing 2,500 to 15,000 Pounds Sterling ($7,000 to $42,000) each.' A single bird strike caused total loss of one DC-8 engine with a total expense of $140,000, including dumped fuel. . . ."

The problem is international in scope and is being attacked by many countries. It is apparent that not all birds can be eliminated nor would such a course be desirable. Therefore, efforts have been concentrated on (1) making aircraft more bird proof, and (2) eliminating concentrations of birds around airfields.

So far it has not been feasible to do much about aircraft, other than provide bird-proof windshields. The greatest hazard has been to jets, because of their greater speed and there is no bird shredder whirling around in front of the engine. Consequently, sterilization of the areas around airfields appears to have most promise, and, in fact, this is the area of greatest potential hazard. But this is not simple. After several years of research there is still much to be learned about birds habits.

Air Training Command has accepted a new helmet visor that gives aircrews better protection against bird strikes. Designed to protect the pilot's eyes from flying plastic or glass and high velocity air, it consists of two visors, one clear and the other dark. The clear visor is worn down at all times, the dark one as light conditions dictate.

The FAA and Department of Interior have been the principal agencies in the United States investigating methods of reducing the bird strike problem, and they have been sharing data with agencies in Canada, England, Holland, France and other countries. From their studies a number of actions have evolved that have been partially successful in alleviating the bird strike problem. The Fish and Wildlife Service recommends:

For Temporary Relief:

- Flush birds prior to takeoff and landing.
- Require control tower operators to advise arriving and departing aircraft when an unusual influx of birds has been reported on the airfield.

Permanent Control:

- Eliminate dumps and other unsanitary conditions. These attract gulls, starlings and other birds that eat waste food.
- Destroy potential roosting sites. Tall reeds, weeds, or brush attract many birds, primarily starlings and blackbirds.

• Berry and seed producing shrubs should be replaced by shrubs less attractive to bird feeding habits.

• Ponds and other accumulations of water should be drained.

• Keep grass cut near runways and in adjacent areas to control insects.

• Apply herbicides and weed killers to eliminate broadleaf seed plants and weeds.

Listing these methods is a great deal simpler than accomplishing them. For example, flushing birds is not as simple as it may seem. One method that seemed effective was the use of cracker shells, fired from a shotgun device. They make a loud noise and do the trick – for a while. But birds are adaptable and learn to ignore the noise when they discover it is not a threat. Taped distress calls are effective to some degree. But it is the same story: birds get used to the calls and become quite blasé.

As might be expected, gulls are the biggest problem and appear to be the most difficult to eradicate. For one thing, there are several different species, and distress calls for one apparently don't work for another species. And it is extremely difficult at airfields near the coasts to make the environment unattractive to them.

Elimination of feeding and roosting sites is effective but not easy. Sometimes this requires cooperation with nearby property owners and civil authorities. And a one-time mowing of the areas near the runways won't do the job. You have to stay with it; it is a year-around-effort in some places.

A number of methods for making airfields unattractive to birds are presently being tested. One of these is the use of poison. A product that appears to have promise is Avitrol 200, produced by the Phillips Petroleum Co. This chemical causes death to birds after a period of distress in which the affected bird's squawking and strange actions alert his friends who take off for safer hunting grounds. The product has been used at some civil airports and is being tested by MAC.

Bio-acoustics (use of bird communication sounds) is one of the newer methods being researched. This has promise, but bird communication sounds are specific to a species so a great deal of work remains to be done.

Larger birds are, of course, more dangerous. Attempts are being made to use radar to detect flocks of ducks, geese and other large birds in order to warn pilots of their presence.

Air Force bases have been using a variety of methods to keep the airpatch bird-free. At McClellan, for example, bird squawkers (taped starling distress cries) have been used with some success. The squawkers were installed after a flock of starlings flew into a C-130 causing damage to two of the engines. They are automatically turned on at 0630 and off at 1800.

At Laredo it was discovered that birds, primarily buzzards, were roosting and congregating near a small rendering plant. The base Staff Judge Advocate and the County Health Department were successful in having the plant relocated.

Randolph AFB in cooperation with the U.S. Fish and Wildlife Service has one of the most ambitious programs we have heard of. Here are some of the methods they have been using:

• Frequent mowing around the runways and airfield to provide less cover and food for birds. This is a continuous operation.

• Periodic controlled bird shoots in open field and designated roost areas. Only limited effectiveness; it is inadvisable to carry out large scale shooting operations in the base housing areas where most of the birds roost.

• Destruction of bird nests in roosting areas by flushing them out with fire hoses. Most effective during hatching season.

• Experimented with greased ropes (poisoned) in hangar lofts for sparrow control. Unsuccessful; the birds would not sit or roost on them.

So much for the birds. They are clever, cunning and tenacious. And, for the present at least, they cannot be completely controlled. But a good bird removal program will help and might prevent a serious accident. As more information becomes available, AEROSPACE SAFETY will keep you advised. ★

TECHNICAL ASSISTANCE in combating bird problems may be obtained from Regional Offices of the Bureau of Sport Fisheries & Wildlife, at the following addresses:

1101 N. E. Lloyd Blvd
P.O. Box 3737
Portland, Oregon

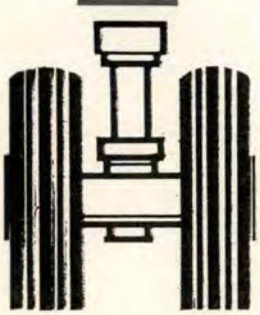
906 Park Ave., S. W.
P.O. Box 1306
Albuquerque, New Mexico

1006 West Lake St
Minneapolis, Minnesota

620 Peachtree St
Atlanta, Georgia

1105 Blake Bldg
59 Temple Place
Boston, Massachusetts

T-39 NOSE WHEEL STEERING



C. Livergood, North American Aviation, Inc.
Los Angeles

The T-39 landed and was cleared by the tower to make a 180 degree turn on the runway. Nose wheel steering was engaged and worked fine. As the aircraft started its turn, nose wheel steering disengaged and the aircraft left the runway. With the exception of some frayed nerves, the crew and aircraft came through unscratched.

After a preliminary analysis and a couple of taxi runs to duplicate the original situation, it was presumed that loss of steering was caused by one main gear oleo load switch opening during the taxi turn. However, this was not the case, since opening of either main landing gear oleo switch singly will not deactivate the steering system. This is a design feature that prevents a single (main gear oleo switch) failure from rendering the steering system inoperative.

For the benefit of the more technical types, a look at T.O. 1T-39A-2-8, pages 3-47 and 3-49, will show that depression of either LH or RH main gear oleo switch will energize the CPD relay in zone 5 and close contacts D_2-D_1 in zone 3, thereby completing the power circuit to the nose gear steering control relay in zone 2. If nose gear steering is selected and the nose strut oleo switch is depressed, nose gear steering power is available to the nose gear steering control box in zone 3 and to the steering system hydraulic power and control valve shown on pages 3-48 and 3-50.

The purpose of this article is to review the operational phases of the steering system and to dispel any misconception that a single main gear oleo switch (either broken, disconnected, or misrigged) can render the steering system inoperative. Let's discuss the operation of this dual (main and stand-by) system, a phase at a time.

TAXIING

With the weight of the airplane on the landing gear, the steering circuit may be energized by pressing and releasing either nose wheel steering button (on the outboard grip of each control wheel). Pressing and releasing either button the second time deactivates the steering system. If in doubt, press and hold for nose wheel steering. When steering is available the two green NOSE STEER ON indicator lights are illuminated. For all normal operations, the steering system selector switch shall be in the MAIN position.

If taxiing over rough terrain or with an overinflated nose gear strut, steering may be momentarily interrupted as the nose gear oleo switch opens and closes. It is not necessary to re-engage the steering system with the steering button each time such an interruption occurs, because steering will be operative as the nose strut oleo switch again closes. Uninterrupted steering is available even if, during a high-speed taxi turn, the inside main landing gear strut extends enough to open its respective oleo switch.

In the event of a main system failure during taxiing, an automatic transfer to stand-by will take place. The transfer is indicated by illumination of the MAIN STEER FAIL and MASTER CAUTION lights. It is recommended that flights not be conducted after a failure of the main system, since a subsequent failure could result in a hard-over steering condition.

If a failure occurs in the normal hydraulic system, the steering system may be powered by placing the AUX SYS hydraulic switch in th ON position. However, remember, when the auxiliary system is used (accumulator pressure only), the speed brake, wheel brakes, and nose wheel steering are all depleting the pressure, and when this pressure is reduced to 1700 psi, the engines should be shut down and the airplane towed back to the line. As a last item, and added only as a reminder, don't forget to check both main and stand-by steering systems during taxiing, just like it says in the T-39 Dash One.

TAKEOFF/AFTER TAKEOFF

At approximately 60 knots, rudder control will begin to take hold and the nose wheel steering system may be manually disengaged. After liftoff and before landing gear retraction, check to ensure that the green NOSE STEER ON indicator lights are out. If failure of the main system and automatic transfer to stand-by occurs during takeoff, the MAIN STEER FAIL caution light and MASTER CAUTION lights may also be illuminated after liftoff. If these lights are not out, indicating steering is still engaged, the nose wheels will turn in the wheel well after gear retraction, with subsequent rudder pedal movement. If this should occur, minor damage could be inflicted to nose gear well equipment. The lights and steering may be de-energized by momentarily placing the steering selector switch at STAND-BY and back to MAIN. If this does not extinguish the lights, do not retract the landing gear.

LANDING

After landing, with the nose gear on the runway, use the rudder for directional control, and when required, engage the nose wheel steering system. The nose wheel steering circuit is energized at main gear touchdown, and may be activated any time after nose wheel touchdown, by the control-wheel-mounted steering buttons. If, for any reason, the left or right main landing gear strut extends, and its respective oleo switch is opened, the steering will not be deactivated. If *either* the left or the right main gear oleo switch (and nose strut oleo switch) is depressed, steering will be available.

If, during takeoff, an automatic transfer to stand-by occurred and it was necessary to cycle the selector switch to STAND-BY and back to MAIN to deactivate the indicator lights and steering system, engage nose wheel steering after landing by placing the selector switch at STAND-BY. If steering is selected in the normal manner (through actuation of either control wheel button), the malfunctioning main steering system may be actuated prior to an automatic transfer back to stand-by steering. Leave the selector switch at MAIN until the nose wheels are firmly on the runway, then place the steering selector switch in the stand-by position.

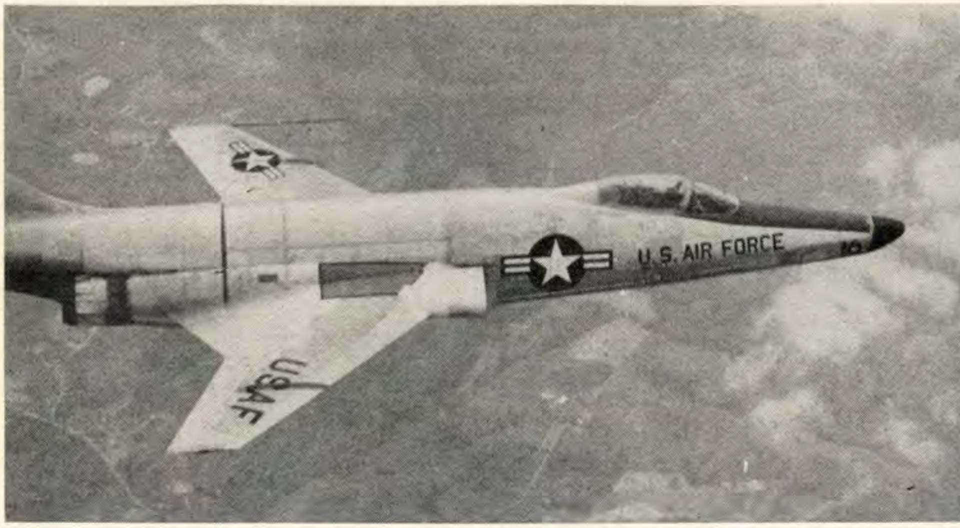
STAND-BY STEERING

The airplane should not be operated with a known failure of either the main or the stand-by nose wheel steering system. The stand-by is not an alternate system, but is a reserve system which is automatically engaged when the main system becomes defective. Both of these systems function essentially the same. However, the stand-by system has several characteristics not found in the main system. In stand-by steering, the steering buttons on the control wheels are inoperative; therefore, steering will be engaged from the moment of transfer, and the only way to isolate the steering systems completely is to momentarily turn the electrical master switch off or pull the main and stand-by nose wheel steering circuit breakers. If it becomes necessary to completely isolate the steering system by pulling the two circuit breakers after an automatic transfer to stand-by steering, pull the main system circuit breaker first. If the stand-by circuit breaker is pulled first, steering will automatically transfer back to a failed main system.

When operating with a known failed system (main or stand-by) there is no backup system, and, in the case of operating on stand-by with a failed main system, a subsequent failure of the stand-by system will not result in a free-caster condition.

If an emergency condition warrants or if an operational necessity dictates that the airplane be operated with a known failed main or stand-by system, read and understand the instructions provided in Section VII of the T-39A Dash One.

These instructions provide the safest methods of operation. As a last word of advice, when operating with a known or suspected failure of the main or stand-by nose wheel steering system, taxi with caution at a conservative speed, especially in the vicinity of other aircraft and equipment. ★



CROSS CHECK

Maj Donald R. O'Connell, Directorate of Aerospace Safety

Don't fly by the seat of your pants, trust your instruments. This has been the basic philosophy of instrument flying and it is a sound philosophy – if you can trust your instruments. Pilots flying our jet fighters know that it is impossible to fly by the seat of the pants. They also realize that it is becoming harder and harder to trust some of our instruments.

In a 22-month period, 1 January 1964 to 1 November 1965, there were 342 reported incidents of inflight failures of instruments in USAF aircraft. In 1965 there were 58 reported inflight failures of the F-101 attitude indicator. ADC ran a two-month check and found that there were 74 inflight failures of this instrument in the F-101, F-102 and F-106.

Fortunately most of these happened in VFR conditions, but not all. One young troop, 115 hours in the F-101, was trying to punch up through a thin overcast at a high rate of climb when the attitude indicator tumbled. He became disoriented and ejected. Another young pilot, 57 hours in the F-101, scrambled at night. Immediately after entering a 3000-foot overcast he reported that the attitude indicator showed a 90-degree left bank. Stick corrections had no apparent effect so both crewmen ejected. A related incident involved an older troop with over 1300 hours, but only 95 in the F-101. While he was penetrating a thin overcast, his airspeed indicator failed and he thought he had pitched up. Forward stick pressure caused the canopy to leave the aircraft and the resulting flying debris so blinded the pilot that he ejected.

These are only three of the most recent F-101 accidents. There have been others where suspected attitude indicator failures have been contributing factors. There also have been many incidents that easily could have resulted in accidents except that the pilots did an excellent job of recognizing the situation and using other available instruments to recover. A recent example involved an F-101B on a ferry flight. The pilot was flying number two in a two-ship flight and was given separate letdown instructions because of the terminal weather and runway conditions. The pilot said that, because of the weather, he turned the pitot heat switch on before starting the penetration. However, during the letdown the attitude indicator precessed excessively, the airspeed bled off rapidly to 120-130 KIAS and there appeared to be a drastic reversal in the vertical velocity and altitude indications. The pilot closed the speed boards and selected afterburner, but the resulting gyrations caused all gyro instruments to appear unreliable and the off flag appeared intermittently on the attitude indicator. The pilot regained positive G control by using primarily the PBI. The pitot heat was recycled and normal pitot static instrument indications returned. It was estimated that 9000 feet of altitude was lost during this maneuver and the G meter registered plus six, minus two. Preliminary investigation points to icing in the pitot system.

The cause of the failure is not the important factor here; the point I'm trying to make is that the pilot was able to cope with a critical situation because he was able to analyze the situation and use the other reference instruments available. Our instrument training programs emphasize the primary instruments so much and we learn to depend on them so much that we tend to forget we have other reference aids available. It is easy to sit at a desk and second guess the quick decisions to eject. I certainly agree that at low altitude you don't have much time to study the situation; however, at altitude there is normally time to analyze the problem a little more thoroughly and study other indications and indicators.

Many people are working to obtain a more reliable attitude indicator system. Money is the big problem. The Voodoo will start phasing out in the next couple of years, which makes it difficult to justify the expense of an extensive modification program. However, there is a proposed modification of the MD-1 gyro in the mill, and it looks like the components will be made time change items. Also efforts are being made to improve quality control procedures at the overhaul facilities. These actions should improve the reliability of the primary system. In addition, all F/RF-101 A and C aircraft will be outfitted with two-inch stand-by attitude indicators. The indicators are now available and being installed.

On 2 March, AFLC approved a request for stand-by attitude indicators for the B fleet; however, it will take approximately 7 to 9 months to procure them. Effort is being made to decrease this time delay.

In the meantime we are going to have to do the job with the equipment available. Because of this I feel each unit should review its personnel and the training program to see that they match. I think we will all agree that an old experienced head who is flying regularly is more capable of handling an instrument failure situation than the new head. Therefore, it isn't fair to levy stringent training requirements on all units and all individuals. However, it might be wise during this critical period to give additional instrument training, especially in the simulator, stressing partial panel recoveries from unusual positions.

Even though the seed of doubt may have been planted, the odds are tremendously in favor of the instruments. You have to trust *them.* The emphasis is on *them,* and not *it.* Cross-check. ★

discipline

Maj Saul Faktorow, AFSWC, Kirtland AFB, New Mexico

Recently one of our Flight Section Chiefs and I were discussing Safety, what it means and what is needed. He said that discipline is an important part of any good operation. I didn't challenge him but suggested that if everyone did what he knew he should and could do, there would be no need for discipline. "But that is discipline," he replied. I finally got the idea.

Discipline to him doesn't mean punishment. It means self-discipline, adherence to rules and regulations, the use of your own good sense to do a job properly within the limits established by the powers that be.

For the past several weeks I have been particularly watchful of the traffic on base and how it moves. There is no question in my mind that a large percentage of drivers obey the speed laws only when they feel they are being observed. They take short cuts, drive 40 in a 25 mph zone when they think they are not being watched. They have accidents; they do not have self discipline! If caught they will be disciplined.

Rules and regulations are established as guidelines, usually having been developed from past experience. If you don't obey them and you are caught, you may be disciplined. Worse, you may cause injury to yourself or others, damage to vitally needed equipment, and delay or failure of the mission.

"Self Discipline" can make or break an outfit. Likewise, it can make or break you. It is a responsibility for everyone. A commander by ignoring established directives leads his men to do likewise; a mechanic using the improper size cotter key can destroy an aircraft or vehicle. With self discipline the commander would have taken the time to follow directives and the mechanic would have walked to the parts bin and obtained the correct item. A pilot violates airspace or aircraft structural limits, and there is big trouble, maybe a big loss. A secretary misfiles something—a mission may be delayed waiting for replacement instructions.

I'll be the first to admit that there are regulations and rules that I don't believe are productive. But the proper way to handle them is to get them changed; until then comply with them. I recently saw a good illustration of this. Certain equipment was needed to be carried on one of our newer aircraft. It was prohibited and so was not carried. The men involved stated their requirements in writing. A new study was made; the prohibition was removed.

In summary, exercise self-discipline, follow the rules or, if you can design better rules, have the old ones changed; you might get a suggestion award. You will certainly do a better, safer job. ★

REX RILEY CON

AIR DEFENSE COMMAND

DAEDALIAN TROPHY 1965

The Daedalian Flying Safety Trophy is awarded to the Air Defense Command for having the most effective aircraft accident prevention program of all major air commands for calendar year 1965. During the period of this award, the Air Defense Command established the lowest accident rate in its history. The well defined and effective Air Defense Command accident prevention program proved itself in the successful completion of thousands of sorties flown in special exercises and the unique defense mission. By conserving lives and materiel, while accomplishing its worldwide commitments, the Air Defense Command has made a substantial contribution to the mission of the USAF. This accomplishment was the result of superior teamwork of unit commanders, aircrews, maintenance and support personnel. The achievement made by the Air Defense Command in aircraft accident prevention perpetuates the highest standards and traditions established for the Daedalian Flying Safety Trophy, and reflects the highest credit upon the command and the United States Air Force.

Lt Gen Glen W. Martin, left, Air Force Inspector General, presents the Daedalian Flying Safety Trophy for 1965 to Lt Gen Herbert B. Thatcher, commander of the Air Defense Command.

GRATULATES

CAPT. ROBERT E. WATKINS

KOREN KOLLIGIAN TROPHY 1965

The Koren Kolligian, Jr. Trophy is awarded to Captain Robert E. Watkins, United States Air Force, in recognition of his accomplishment of an outstanding feat of airmanship. Captain Watkins distinguished himself by an extraordinary achievement while participating in aerial flight on 12 October 1965. Captain Watkins was pilot of an F-104 aircraft on a deployment to Southeast Asia. During the fourth refueling at 29,500 feet, the basket assembly separated from the drogue and slid all the way down the receiver aircraft's probe, causing serious damage to the probe head. Captain Watkins remained calm throughout a long, highly involved emergency including materiel failure, inclement weather, and inability to refuel. He finally succeeded in receiving fuel and proceeded to the home station. His courageous action and skill saved a combat ready aircraft. Captain Watkins' outstanding feat of airmanship in coping with an airborne emergency conforms to the high standards established for the Koren Kolligian, Jr. Trophy and reflects great credit upon himself, the Tactical Air Command, and the United States Air Force.

Captain Robert E. Watkins, F-104 pilot, receives 1965 Koren Kolligian, Jr. Trophy from General William H. Blanchard (deceased), former Air Force Vice Chief of Staff.

HILLS HEIGHTS & HELOS

Maj R. A. Bonney, USMC
(Reprinted from APPROACH, October 1965)

Let's say you're a helicopter pilot. If it's a normal day you haven't been thinking much about things that happen above 1500 ft MSL. Then comes a message: A helo trip to the mountains is requested. Well, you're a helo pilot w/helo, so you go — but only after a bit of planning. First, do some thinking in a high level vein.

For all its talent, the helo is comparatively fragile in certain situations, such as high altitude maneuvering and rough area landings (RAL) at mountain sites. At altitude it is not the same aircraft, as many well-qualified "sea level" pilots have found.

Your primary job is to calculate whether the helicopter is capable of completing the task. Consider the load: What kind and how much?

Then, what about the destination? This involves more than just direction, and distance from home base. Preferential helo routes are seldom direct and generally twist around through valleys and passes for lowest enroute altitudes. Examine the charts for your route *before* climbing into the cockpit.

Evaluate the elevation of your destination. Wind and temperature are necessary for planning but if you have up-to-date information you are lucky. Without on-site data, use no wind and estimate temperature from time of year and time of day then add a few degrees for a cushion.

Terrain itself must be considered. Is the landing site a wide, flat meadow or a skimpy ridge which gives you cheese parings and candle ends for a touchdown space?

When these elements are all taken into account, an uncomfortable situation may result. Here's why.

For getting a job done, a lot of people think in terms of a helo. The natural flexibility of the machine allows it to perform tasks with an apparent ease which makes other methods time-consuming or cumbersome by comparison. Consequently there is a temptation to assume the helo can do just about anything — and it can, within its operating envelope. As a helo pilot it might be your task to temper enthusiasm with cold facts on allowable payload versus altitude or fuel weight required.

Also, you must be suspicious of a landing site that the ground party has picked out until you have seen it yourself and can judge it as adequate. Enthusiasm for the helicopter's abilities gives people the tendency to overestimate its capabilities. For example, the site may appear satisfactory from the ground but be unsafe for the pilot because there is no waveoff "escape or abort route."

It is true that a helo pilot can be diverted from a low altitude flight up to the hills without any chance to run weights and altitudes through his Flight Manual. In this case you should have done your homework and established some estimates on what is possible.

As important as planning is, it is no guarantee of success. There has to be some headwork involved when the actual operating area is reached. Since 1 July 1962 helicopter mountain operations figured in 29 mishap reports. Twenty accidents have resulted because pilots were unable to cope with the high density altitude, vertical currents and turbulence associated with unprepared landing sites.

As an example of planning plus headwork let's take the case of a fairly experienced pilot with 1200 total hours and 1000 helo hours.

Elevation of a mountain camp site where cargo and personnel were to be delivered was 3000 ft MSL. The pilot calculated that the aircraft was capable of hovering *in* ground effect at that altitude (density altitude would be about 5000 ft). Since the weight was such that the helo would not hover out of ground effect, the pilot had a "fixed-wing" situation on his hands. He *had* to keep a certain amount of forward speed. However, he had been into the landing site a number of times and no difficulty was anticipated.

When about five miles from the landing site, the pilot observed clouds in the vicinity of the mountain top. He continued inbound but turned back when he saw the site was obscured. This was in accordance with briefed procedures.

Then the clouds broke and the helo was maneuvered into a long straight-in approach. When close to the site, clouds again covered the area. The approach was continued while reducing forward speed in the hope that the landing area would clear.

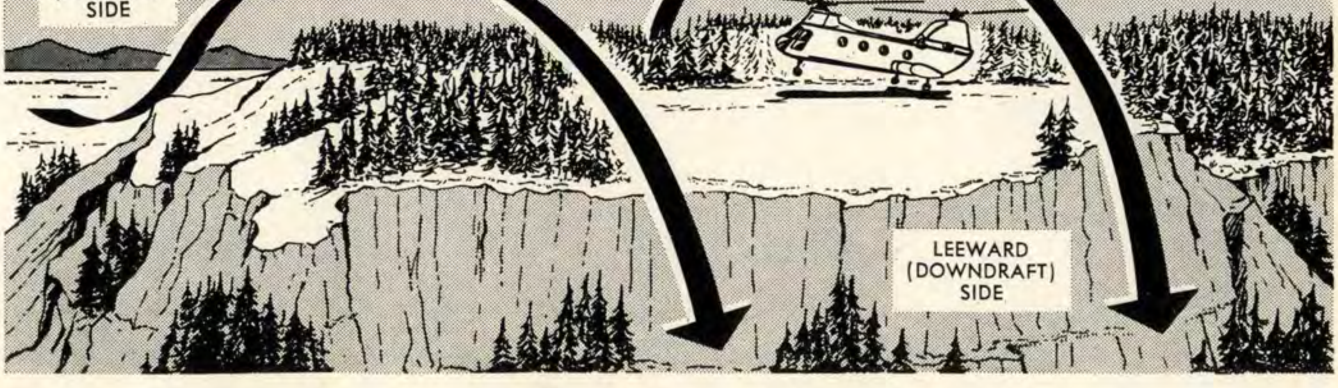
Unfortunately, the landing area remained obscured and about the time a decision was made to discontinue the approach, the airspeed had fallen to the point that the helo began losing altitude. Full throttle failed to prevent it from settling slowly into the trees.

The accident board confirmed that under identical conditions flight could *not* be sustained without translational lift (forward speed) or ground effect. When forward speed was reduced below that required, settling was inevitable. Without adequate airspace above the terrain, a waveoff was not possible.

In effect, the pilot simply painted himself into a corner. But consider what one of the chain-of-command said in an endorsement:

WIND EFFECT ON RIDGELINE APPROACH

1. Approach the upwind side parallel to, or, at as slight an angle as possible to the ridgeline, rather than perpendicular to the ridgeline.
2. If terrain does not permit a parallel approach, make approach as steep as safely possible to avoid leeward burble and downdraft.



HILLS HEIGHTS & HELOS continued

"This is a case where a pilot, well experienced from the standpoint of hours in type, failed to cope with a variation of the unpredictable situations so frequently encountered in mountain terrain. In mountain terrain the winds, shifting cloud cover, variations in temperature and humidity are seldom reported for the actual area of the intended landing site.

"This is undoubtedly the greatest area of challenge to the helicopter pilot; that of attaining and perfecting his judgment and technique to the point of being able to operate the helicopter through its full range of flexibility."

Air Force helicopters are frequently called upon to fly missions in mountains. This article provides some good advice.

These words deserve a little more attention, because they lead into another aspect of helo mountain flying. It is perfectly logical for a pilot to want to operate his aircraft through its full range of flexibility. And as long as people are human, the "sea level" helo pilot will sense a challenge toward the high altitude portions of his flight manual graphs.

Shortly before noon on a warm, July day, a West Coast air station received a request for an immediate helicopter search mission into a nearby mountain range. The request passed through several people and after the pilot was told of the situation it had taken on an urgent nature in his mind. The helicopter had previously been preflighted and turned up, and 16 minutes after the search request originated, the aircraft was airborne with a total of five people on board.

The pilot had a total of 2000 hours with 150 in helos. This would be his first mission in mountainous terrain as aircraft commander. He had one previous mission as copilot operating at 3000 ft MSL in mountainous terrain.

Objective of the search was some equipment which had dropped in a remote area on the side of a mountain. When the equipment was sighted the pilot radioed the location back to base. He was asked to land if at all possible and discharge two men from the helo who would then attempt to recover the equipment.

A Ranger Station on the top of a 6000-ft mountain appeared to be the nearest possible landing site and the pilot advised he would land there and discharge the two-man recovery team.

Here is an appropriate place to review the guide lines for mountain and rough terrain flying:

- Make a continuous check of wind direction and estimated velocity.

- Evaluate temperature with the thought that it may increase as you get close to the ground.

- Plan the approach so that an abort can be made downhill and/or into the wind without climbing.

- If wind is relatively calm try to select a hill or knoll for landing so as to take full advantage of any possible wind effect.

- When evaluating a landing site in non-combat operations, execute as many fly-bys as necessary with at least one high and one low pass before conducting operations into a strange landing area.

- Evaluate the obstacles in the landing site and consider possible "null" areas (loss of wind effect on downwind side) and routes of departure.

- Landing site selection should not be based solely on convenience but consideration should be given to all relevant factors.

- Make a power check: Determine power available and ability to hover out of ground effect prior to attempting a landing.

- Whenever possible, approaches to ridges should be along the ridge rather than perpendicular.

- During the approach smooth movements of the controls are essential. Movement of the controls in a sharp or abrupt manner may lead to loss of RPM.

Now let's see what happened at the Ranger Station.

The pilot circled the area twice while checking the wind and evaluating the landing site. A shallow approach to a hover was decided upon and the H-34 came in with 2700 rpm, approximately 25 inches MAP. It began slowing to approximately 30 kts, 50 to 100 ft above the ground and short of the intended landing site.

As the aircraft approached a hover, the pilot applied 40 inches MAP (full throttle position) at which point the aircraft began to settle with rotor RPM starting to decrease.

When RPM passed through 2200, the pilot warned the crew and passengers that they were going in and he applied maximum collective prior to touchdown. The helo hit hard, landing on an approximately 15-degree incline 200 ft short of the landing site. Fortunately, there were no injuries. The Ranger Station was found to be abandoned.

Although it does not sound as if the pilot made any gross errors, a comparison of the mountain helo guidelines and his actual procedures does show some omissions.

In orbiting the landing site the pilot estimated the wind as calm but made no estimate of the air temperature, except to note that it was "warm." Later calculations of the conditions gave a density altitude of 8000 ft.

No check of "power available" was made prior to commencing approach thus the pilot did not know how close he was to maximum under prevailing conditions.

The approach was too shallow to provide an adequate abort route in the event of unforeseen difficulties.

These were small details but important ones. According to the graphs and charts, the aircraft should have been able to do the job. In actuality it was being asked to operate at the top limit of its capabilities.

The stranded pilot's statement throws some light on this aspect. "At about 1515," he said, "two helos arrived at the crash scene, one Coast Guard and one from a naval air station (NAS). The helo from NAS made several passes and finally came in from the north. By this time a 10-kt southerly wind had come up.

"I set off a smoke bomb to give the pilot further wind direction. He came into a hover and lowered the sling. My crew looked rather apprehensive that another helo of the same type as ours could hover and pick up anyone. I handed my flare to one of the crewmen and ran out and got in the sling.

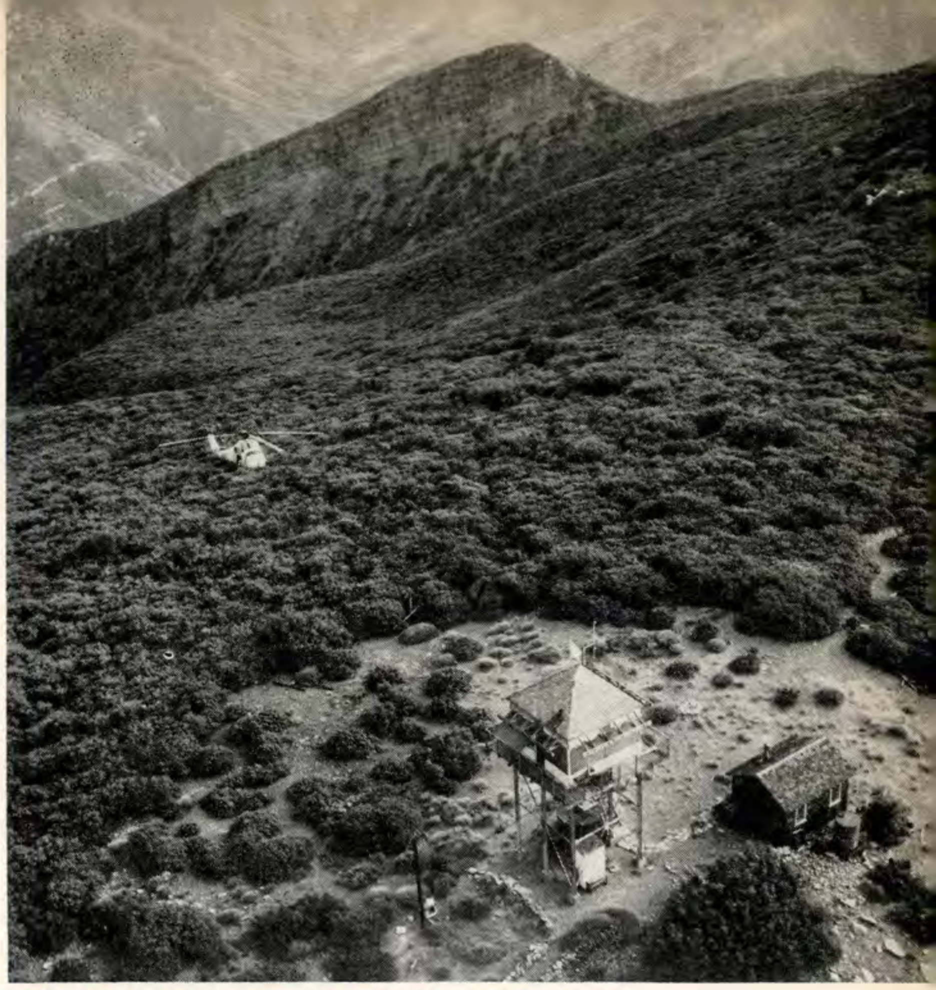
"As I was pulled into the cabin, I felt the helo start to settle. We hit the ground and I bumped my head on the overhead. I got out and talked to the pilot, advising him to come back later in the evening when it was cooler.

"He took off and another NAS helo appeared to be coming in for a landing try but we waved him off. The Coast Guard helo then came in and picked up one man. A short time later he was back, minus a co-pilot and internal gear and he picked up two men. On his third trip, the remaining crewman and I were picked up.

"In my opinion this accident could have been prevented had I refused the request that I land. *(Once the equipment was located the urgency of the mission decreased but this was never passed to the pilot.—Ed.)* I believe that I used proper procedures, but that the performance required of the helo was on the borderline of performance available. It is possible that had I made a precision type approach from a higher altitude, that I would have discovered the power deficiency early enough to have effected a waveoff."

What can you as a helo pilot learn from this accident, especially if mountain flying is not yet in your logbook? First of all, if you hunt hard enough through the Flight Manual, you will find a caution that the performance figures to be derived from the Appendix are guides, not decimal point guarantees. Secondly, what does the helo pilot have the most control over? Weight, of course.

So, load your aircraft to leave a healthy margin for error. If calculations show a proposed flight will be at the max limit, the apprentice mountain man may want to divide the load and make two trips instead of one. Decide if it is mandatory to have the tool box and crew chief as payload. As experi-



Pilot's first high altitude landing ended short of destination.

HILLS HEIGHTS & HELOS

ence is gained work toward maximum effort. Mountain helo flying is *advanced* flying. You're doing nobody a favor to settle into the ground short of destination while learning the ropes.

The number one guideline for mountain and rough terrain concerns wind; make a continuous check of direction and estimated velocity. Naturally this is not an exclusive rule for extreme elevation. It applies right on down to sea level. (Several classic cases of adverse wind effect on helos have occurred in the vicinity of the blimp hangar at Lakehurst, elevation 91 feet.) Wind flow in hills and mountains is a problem because of its erratic, unpredictable nature. However it does follow certain laws.

Wind action is given various names from the type of terrain. "Channeling" may occur when the wind flow is across a valley, but not at a right angle to it. The surface wind direction may turn parallel to the valley.

Light winds can often become much stronger when they are forced to converge and "funnel" through a narrow pass. Other local "deformations" of the air mass occur as it flows through a gorge or over a hill.

To further complicate the local wind flow, the valley-slope circulation must also be considered. During the day, the air over the slope is warmer than air at the same height over the valley. The rising of this warmer air creates a well-defined wind up the slope. The reverse is true at night, and the colder air over the slope flows downward into the valley.

The air within the valley becomes warmer during the day, and rising, is replaced by air from the plain. During the night a reversal occurs, and the air flows down the valley out to the plain. Slope and valley circulations decrease with height and disappear completely at about the tops of the ridges forming the valley.

A very localized feature is the heating of one side of a valley, as by the morning sun, while the other side remains in shadow. This may result in overturning of the air (warmed air rising on the sun side and cooler air sinking on the shaded slope).

Unfortunately, these typical terrain-temperature situations are not what the helo pilot often finds. One pilot attempted a rough area landing in a box canyon and as he got close to the spot he settled into the ground unexpectedly. Later it was found that when descending into the box canyon under conditions of light wind, there was a rapid rise in temperature with a difference of seven to eight degrees from the surrounding area.

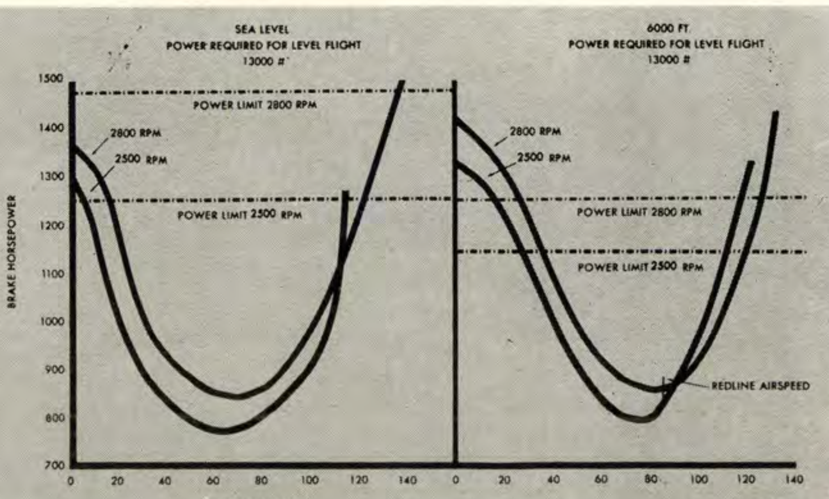
Then there was the helo pilot who attempted to takeoff near a fire area. He was unsuccessful because of one small detail. The nearby flames had increased the local temperature beyond the helicopter's operating capabilities. So when mixing heights, hills and helos, nothing is ever likely to be normal.

From the beginning of helicopter training, pilots are taught to "keep your turns up." Rotor RPM is the critical factor since it determines the air velocity over the blades. Engine power keeps the rotor blades turning and horsepower is a function of engine RPM. At lower airspeeds it takes more power to go slower. The elements of this triangle (airspeed, power and RPM) are shown on the charts below.

The charts are approximate for an H-34 but are only a representation and should not be applied to specific problems.

An approach to a rough area landing or at high altitude is usually made with maximum allowable RPM (2800 for the H-34). However, an examination of the actual charts in the H-34 Flight Manual shows slightly better weight lifting

The curves at right are approximate for the H-34 and illustrate the power available and power required for two rpm's and two altitudes. Weight is constant at 13,000 pounds. At sea level and 2500 rpm, power available is less than power required to hover out of ground effect. At 2800 rpm there is 100 brake horsepower in excess of hover requirements. Somewhere before the RPM deterioriates to 2500 rpm the helo will fall.
At 6000 ft hovering out of ground effect is not possible.



capability with 2700 rpm. Why then, is maximum RPM used for approaches?

It is easy enough to lose RPM but rougher than a cob to try to increase it when you are committed. If you start with a high RPM and lose a little, for example from 2800 to 2700 rpm, your position has not been hurt – if no more RPM is lost. Curves on the charts show the results when too much RPM is lost; the power limit or power available decreases.

Note that on the charts minimum power required for level flight is from 60 to 70 kts TAS (bottom of the curves). Using this speed range gives the maximum excess brake horsepower available, 640 excess BHP at sea level at 2800 rpm for example. Therefore, best climb will be at that airspeed which provides maximum excess BHP and it is not mere coincidence that the H-34 NATOPS/Flight Manual says climb at 70 kts. (NATOPS-Navy Air Training Operations Procedures.) A recent accident shows the possible consequences when such a point is overlooked.

The flight was a logistic support mission with cargo to be picked up at a mountain Ranger Station heliport and then carried to a site further into the mountains. Upon arrival in the vicinity of the Ranger Station, the pilot made a low and slow approach and personnel on the ground were able to point out hand signals. The site was a cleared the direction of the heliport by area on a slope approximately 450 ft higher than the Ranger Station and approximately 1500 ft distant.

After spotting the landing site, the pilot turned, departed directly toward it, and commenced climbing. "In starting a 40-kt climb to the landing area," he said, "I pulled about 45 inches MAP with approximately 2600-2700 rpm.

"The climb seemed to start normally. Then I noticed the airspeed drop off and the RPM begin to deteriorate. To my recollection I had not increased power."

Witnesses noted that as the aircraft neared the landing site, the rate of climb appeared to diminish in relation to the terrain. The helicopter then veered slightly right, clearing a ridge which projected from the landing site. It passed near the landing site and proceeded into a rapidly rising box canyon. The aircraft settled to the floor of the canyon and caught fire but none aboard were injured.

The steps which led to the point of impact are summarized by a paragraph from the accident report: "Progress of the flight was normal until the aircraft transitioned from a near hover over the Ranger Station to a low airspeed, steep climb over rapidly ascending terrain with a quartering tail wind."

Based on the information in the NATOPS/Flight Manual and the prevailing conditions in the area, the accident board determined that the maximum increase in altitude that could be attained in the distance involved (maintaining 40 kts and 45 inches MAP) would be approximately 325 ft. The altitude gained did exceed that 325 ft but airspeed and RPM were sacrificed for altitude in order to remain clear of the terrain.

In so doing, the aircraft entered an emergency condition. When the pilot recognized the fact, he attempted to recover by dropping the nose, increasing throttle to full on, and lowering the collective. This action was taken well past the effective recovery point and the aircraft settled into the trees.

By referring to the power curves previously discussed, you can see that the three elements of Power, RPM, and Airspeed result in a tricky triangle. The effects can be summarized as follows:

- Power required increases very rapidly when the airspeed falls below the minimum power required airspeed (approximately 60 kts TAS).
- Power required does not vary much with altitude.
- Power available changes rapidly with changes in altitude.
- An increase in either RPM or airspeed will increase amount of excess power or decrease a power deficiency.
- An increase in both airspeed and RPM will make a startling change in power excess at any altitude. ★

The last moments of 303. Seconds later a climb toward heliport ended in trees. (See text.)

THE LAST DEC

Although flight and ground safety have been emphasized more and more during the design, phases of the aircraft business, the final decisions which directly affect flight

New aircraft, such as the General Dynamics F-111 (*Aerospace Safety*, December 1965), have received repeated consideration of the various aspects of safety; but the man at the throttle has the last look and the last decision. These determine the fine line between life and death of man and machine. The reasoning behind these decisions should be as sound and objective as the reasoning that goes into the making of the machine.

A "kick the tire, light the fire," attitude will hardly hack the decision course. Still decisions are often made with such reasoning as, *"the airworthiness of the aircraft is directly proportional to the desirability of the mission."* This is an axiom that can be developed when the flight crew makes judgment of an aircraft flight condition in a subjective rather than objective mood. Flight crews are not the only people involved with flying who are exposed to decisions regarding aircraft flight safety, but they are most often the victims of unsound decisions. It then becomes most important that a flight crew decision regarding safety be sound, and as free as possible of those factors which influence subjective thinking.

The chain of safety begins with the initial concept of an aircraft design and continues on through the actual design, the prototype, manufacturing, testing, changes, delivery, operation, inspection, maintenance, overhaul, modification, preflight and flying of the aircraft. Each of these major phases consists of hundreds of lesser operations such as the making of a single rivet or strand of wire. And each of these operations requires other major operations like the manufacture of the machine that makes the rivet. The total idea can be regressed all the way back to the gathering of the basic ore from which the aircraft parts are made. This transition from the depths of the earth to the unlimited heights in space requires thousands of cogs in the giant machinery that produces an aircraft and demands that each cog work nearly perfectly. From each cog, and from each man involved in that cog, the base line of the safety curve is plotted. For each flaw that is created because of subjective thinking, or other reasons, the margin of safety grows smaller and the responsibility of the flight crew broadens.

In many cases, flaws or inherent defects that are created through any of thousands of ways are so small and so insignificant that they will never cause trouble. Other defects, normally dormant, will react when some specific set of circumstances conspires to demand unusual performance. It may be that this is the type of failure that causes an aircraft obituary to end in "cause undetermined."

As the aircraft progresses from design to operational use, many decisions are made. These decisions are made by humans and are subject to the foibles and fallacies of human understanding. A designer leaves off a line of a drawing because he is in a hurry to get to an anniversary dinner. The drawing progresses without the omission being noticed and a part is made. The part fails and through the normal UR reporting system a new, beefed up part is made. A TCTO is issued to change all existing parts to the newer part with a new dash number. A clerk is interrupted while typing an order and leaves off the dash number. A condemned part is sent to the field and installed in place of another part that is exactly the same. The inspector checks the work, fails to check for the dash number and the aircraft is cleared to fly—still in the same condition it was in before the part was changed. After a few flights, circumstances develop wherein the part is required to perform at its maximum and it is not strong enough. It fails and an aircraft and crew are lost.

One man in a hurry, others complacent, momentary distraction of a clerk, an inspector is too routine, and then — monumental disaster!

If such an event can be built into an aircraft, then it behooves the flight crew to practice flight safety to the utmost so that the curve of safety remains well above the base line. Judge harshly those things about the aircraft which you can see, for there are many things about the aircraft which you can't see and are not privileged to judge.

Usually it is not the big killer items that are accepted for flight when they are known to be marginal. Rather it is the small things that insidiously sneak up and suddenly become as deadly as the bigger items. If a collection were made of last words that preceded infamous flights that ended as "cause undetermined," it might contain such things as:

- "It'll hold together until we get to Madrid . . . we'll change it there."
- "Who wants to RON in this hole? Let's press on."
- "I'll sign it off for a one time flight just to get your requirements completed."
- "If the wind holds, we can overfly."
- "George said he thinks it's O.K. and he's been flying these birds for years."
- "If it doesn't control on takeoff, go to fixed pitch and we ought to make it O.K. like that."

ISION

manufacturing and maintenance safety will rest with the flight crew.

Grover C. Tate,
General Dynamics, Ft. Worth

• "Rules and regulations are only guide lines."

• "I don't have the latest charts, but this one should be O.K".

• "If it takes eight hours for that strut to go flat, it should be O.K. for landing when we get there 'cause it's only a six hour flight."

• "It's an external leak and besides that, we have plenty of extra fuel aboard."

• "Just take the bulb out, it's probably a circuit malfunction."

These quotations are not necessarily verbatim, but are pretty close. Each time a go-no-go decision is influenced by this type of thinking the curve of safety goes down. Because the sum total of all of the safety of the aircraft comes to a focal point with the flight crew, it is the responsibility of the flight crew to discharge that responsibility in the most professional manner of which they are capable.

Although helmeted heads are in the clouds, the booted feet of flight crews should be firmly planted on the ground when decisions are made. Personal desires should not influence these decisions and an oil leak at Gander should be considered just as serious as if it were at Orly – although the RON possibilities are not nearly as bright.

Mr. Einstein noted that all things are relative and are influenced by the observer. As flight crew, we are particularly susceptible to that relativity and our evaluation of the safety of things can be influenced by circumstances. Those pieces and parts that are unsafe on Tuesday are just as unsafe on Friday, so keep the safety curve solid and constant and stay around to enjoy those softer curves that are not so constant. ★

THE IPIS APPROACH

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

Q How will the new SID criteria affect aircraft operation? For example, if my aircraft will not meet the climb gradients specified on a SID, will I be authorized to fly that SID?

A No, you will not be authorized to fly that SID unless you have a waiver from your Major Command. However, there are several alternatives from which you could choose that would be authorized.

1. Select another SID with specified climb gradients you can meet or select a SID with no climb gradient specified at all. (NOTE: Only climb gradients of 150 feet per NM and above will be specified on a SID.)

2. Reduce aircraft weight so as to be able to meet the specified climb gradients.

3. Request a VFR climb (weather permitting). Naturally, the responsibility for clearing all obstructions rests with you.

4. Request a radar vectored departure, if available. Remember, however, that the radar controller probably does not know your aircraft's climb capabilities as well as you do. Also, obstruction clearance criteria for radar departures have not yet been developed. A radar departure, therefore, will not increase your aircraft's capability to clear obstructions.

Q Assume the situation where a published TACAN holding fix is not collocated with the associated Initial Approach Fix (IAF). If I have been cleared from my present position direct to the holding fix and subsequently receive clearance for the penetration/approach, should I alter my heading and proceed direct to the IAF, or should I proceed on to the holding fix and then to the IAF?

A Proceed via your last route clearance which is direct to the holding fix. If you desire to proceed direct to the IAF, request amended route clearance as such.

Q Holding pattern entry procedures specifically state: "All turns *during entry* to the holding pattern will be made at a rate of three degrees per second or 30 degree angle of bank, whichever requires the lesser angle of bank." Some aircraft are capable of turning at a rate of three degrees per second using less than 30 degrees of bank, particularly at low altitude. In a no-wind situation, after the initial turn to enter the holding pattern, should these aircraft use 30-degree angle of bank or a turning rate of three degrees per second for the remainder of the turns in the pattern? *(Capt Richard H. Deitz, 3501 Pilot Training Squadron, Reese AFB, Tex.)*

A Use either three degrees per second or 30 degrees of bank, whichever you prefer. For ease of timing in the pattern you may want to use an angle of bank equivalent to three degrees per second.

Q Often a TACAN Initial Approach Fix is formed by the intersection of a holding radial and the peneration/approach arc. (Pease AFB, low altitude TACAN-1; Griffiss AFB, high altitude TACAN-1). After clearance for the approach from the holding pattern, should I apply a lead point and turn onto the arc, or should I proceed to the IAF and then turn to intercept the arc?

A Apply a lead point and turn onto the arc. It is more important to turn so as to intercept the centerline of the arc than it is to cross the IAF exactly. Many TACAN arc penetration/approaches have a built-in lead point depicted on the approach chart. (Lemoore NAS, low altitude TACAN-1; Bergstrom AFB, high altitude TACAN-3). However, it is up to the pilot to determine the lead point required. Techniques for determining lead points for 90 degree arc interceptions were discussed in the February 1966 IPIS Approach. However, if you know your approximate turn radius in nautical miles, you already know your lead point (no wind). A turning performance chart which provides turn radii for specific values of bank angle and TAS is included in Chapter 8 of AFM 51-37.

POINT TO PONDER

We have recently overheard discussions involving the direction of surface winds – whether they are reported in true or magnetic degrees. This could be a significant factor when computing a crosswind component for areas of large magnetic variation, e.g., McChord AFB (22 degrees).

Locally disseminated surface wind information (Approach Control, GCA, tower, telautograph, television, etc.) has the variation applied and is magnetic.

All forecast surface winds and winds on the longline teletype will be true degrees. Also, existing destination wind obtained from an *en route* METRO will be true degrees, since this information is taken from the teletype sequence.

By the way, have you noticed that depiction of magnetic variation has been deleted from terminal instrument approach procedure charts? ★

Missilanea

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

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

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

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

Colonel W. R. Sturm
Directorate of Aerospace Safety

READY-AIM(9B)-FIRE. Everyone knows that checklist deviations and loaded missiles don't mix. When they do mix, the missile comes out second best, down for the count by a low blow to its vital parts. Such was the case in this story. Picture a normal preflight and loading of an AIM9B missile on the right pylon and a HVAR (High Velocity Aircraft Rocket) on the left pylon of an F-104C. By all indications the preflight and loading came off exceptionally well. The airmen involved then attempted to run a voltage check on the HVAR *after* the loading since two HVARs had malfunctioned on this aircraft previously. Because the AIM9B had already been loaded, the checklist deviation occurred at this point.

The airman set the selector switch to the left hand position and pulled the trigger. Sure enough, 28 volts appeared at the left hand pylon. However, 28 volts also appeared at the right hand pylon and fired the AIM9B Guidance and Control Unit. (Fortunately the missile had been properly safetied so the motor didn't fire.) Although the malfunction could not be duplicated (the 28 volts should not have appeared at the right hand pylon under the conditions stated), the fact remains that had the checklist been followed and the AIM9B not loaded, the incident could not have occurred. If this was an attempt to do maintenance the missile should have been downloaded. A serious accident was prevented only by the safety pin. Remember, many accidents result from an accumulation of faults or deficiencies. In this case, the check list deviation and the equipment malfunction were two of the three factors needed to fire the missile.

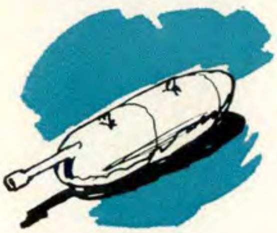
To quote from H. D. Mytinger, OOAMA, "A Technical Order is an order. In the Air Force, an order is an order regardless of whether it relates to combat operations, daily routine or technical matters.

"Like any other military order a Technical Order must be carried out completely, consistent with capability, safety and exigencies. Many accidents and incidents (such as the one above) can be traced to someone's failure to strictly observe TO requirements. Such failures are dangerous breaches of discipline which may hamper the mission and endanger lives. . . . At the same time, it is the duty of all concerned to be critical enough of a TO to detect any shortcomings it might have and to report them promptly and in accord with appropriate directives (TO OO-5-1)."

We think this is excellent advice and wish to pass it on.

Capt R. A. Boese
Directorate of Aerospace Safety

AEROBITS



AFTER A MALFUNCTION in the electrical system of an SUU-16A gun pod, it was found that particles of steel wool were shorting certain pins in a cannon plug. The plug was cleaned and functioned normally. As a result of this incident the installation is requiring that dust covers be used to cover exposed connectors whenever cannon plugs are disconnected. Also, it is only common sense to carefully examine both connectors prior to mating to make sure no contamination is present.

AFTER LANDING, a C-135 inadvertently taxied over a drag chute. The pilot notified the tower of the chute location and recommended pickup. The aircraft then took off again and flew for over three hours. Postflight inspection revealed the drag chute around the nosewheel and numerous holes and dents on the underside of the fuselage. The damage was caused by continuous striking of the drag chute connector link against the underside of the fuselage while the aircraft was in flight.

Drag chutes should be picked up as soon as possible. In addition, at this base when a chute is reported for pickup and can't be located, baseops will be notified to stand down all aircraft until the chute is located.

FSO PHOTOGRAPHER—That's right! The FSO gets busier and busier. TA-142 was published in November 1965. An all commands message from SAAMA has added a 16mm magazine load motion picture camera to the list of items authorized in this FSO Table of Allowances.

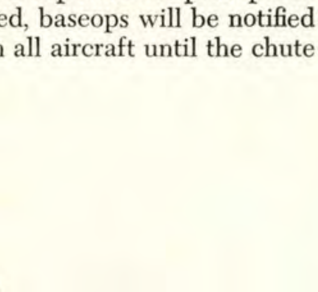
Now that we have the FSO equipped, how can he effectively use this equipment? Here are some suggestions:

Polaroid Camera:

- Aircraft incident/accident damage for immediate review by FSO and the commander.
- UR and Failure Report verification and documentation.
- Adverse airfield conditions such as ramp, runway and taxiway condition.
- Possible FOD hazard and/or areas.
- Vehicular and aircraft parking conditions or violations.
- Improper location or positioning of aircraft support equipment.

Motion Picture Camera:

- Barrier engagements.
- Emergency landings.
- Traffic patterns and landings for use at Flight Safety Meetings to encourage pilot discussion.
- General airfield activity of aircraft and other vehicular traffic to show any deficiencies and possible accident producing habits.
- Bombing/gunnery range patterns.



The general concept of photographic documentation is to provide material to point out problem areas and verify need for improvement. Study of problem areas can be enhanced through the use of the photographic medium.

When properly and intelligently utilized, these cameras will be a valuable contribution to the prevention of aircraft accidents. The final ingredient? FSO (photographer), Primary Duty: Accident Prevention.

Lt Col Richard R. DeLong
Directorate of Aerospace Safety

RAIN, RAIN . . . It's just about that time again when, in many parts of the world, we will be experiencing short but heavy torrential type rains in our operating areas. Annually, during this time period, we experience various problems with landing and airfield operations, and accident potentials increase. This is especially true in operating on semi-prepared strips where our assault type aircraft (C-130, C-123) are carrying the load.

Since areas adjacent to taxiways are, in many cases, excellent places to get stuck, caution should be exercised when taxiing. In addition, heavy pools of water on the runway can be extra hazardous during takeoff and landing phases. Particular attention should be given to the RCR factors in the appropriate Flight Handbook.

Last but not least, don't forget that any aircraft can hydroplane if conditions are right. Happy puddling!

Maj William M. Bailey, Jr
Directorate of Aerospace Safety

F-101—AS POWER was advanced to military for takeoff, there was an explosion, flames engulfed the cockpit area and the right engine appeared to have flamed out. The engine was immediately shut down and the takeoff roll terminated.

During the walk-around inspection prior to this mishap, the external fuel tank cap appeared to be okay but the pilot asked the crew chief to check it and make sure it was secure. This was done and the crew chief verified the cap as being tight. During the investigation that followed the incident, it was found that the fuel cap was forced out of the filler neck when the tank was pressurized, which allowed fuel to be sucked into the right intake duct causing an explosion and compressor stalls. The cap was defective and the aligning ears designed to assure the cap is in a locked position were bent. This made it impossible to determine whether the cap was locked.

A check turned up no other defective caps but the unit adopted a policy of leaving the caps on the tanks permanently both for servicing and defueling. Other actions are to paint marks on all caps to indicate proper installation and a stenciled warning that, if a cap is removed, the aircraft will be put on a red X until it is re-installed.

SURVIVAL RADIOS—After the pilot of an F-100 ejected he attempted to use his URC-10, not realizing that with his URT-21 operating, reception on the URC-10 was blocked. Here's the situation, according to our electronic experts: With both radios operating on 243.0 mc, direction finding will not be particularly affected as long as the two radios are in close proximity; however, reception on the URC-10 would be difficult, if not impossible, because the warbling tone of the URT-21 will be jamming the URC-10 receiver.

Probably the best method would be to use the URT-21 for a beacon, turning it off occasionally to attempt voice contact with the URC-10. Unfortunately, if you have only a URT-21, there is no way of knowing for sure whether it is working. But with a URC-4, 10 or 11, the receiver will indicate whether the URT is transmitting. Leave the URT on continuously except for the period when contact is attempted on the URC-10 or any of the other transceivers. With careful planning, assuming the batteries in both radios are good, one should get four days of almost continuous transmission. Caution: Don't attempt to extend battery life by operating a radio for just a couple of minutes and then shutting it off. This makes it difficult, if not impossible, for searchers to get a fix.

AERO BITS

AS THE F-4C was backing off after a midair refueling, the pilot felt a slight bump, similar to a compressor stall, in the left engine. Shortly, the instruments indicated a flameout. As the aircraft descended to 15,000 feet, several airstarts were attempted without success. Landing was completed on the right engine. Cause of the flameout was a sheared male spline in the fuel pump.

AS ANY HOUSEWIFE can tell you, a bad plug on the coffee pot can cause trouble. Usually all she has to do is make a run to the nearest supermarket or drug store for a new cord or wall receptacle. Aircrews in flight have a slightly different problem—there's no supermarket half a block away. A B-52 crew discovered this when suddenly the radar, pilot's attitude indicator, transponder, N-1 compass, fuel gages, cabin temp control and seat positioning switches became inoperative.

The report went on to say that the navigator investigated and found six blown fuses in the circuit breaker panel. After they were replaced with no results the aircraft aborted the mission and landed. The trouble was in the hot cup used to heat coffee. It had an internal short.

To prevent this sort of thing happening again, this unit has installed a checkout panel in the inflight kitchen where hot cups can be tested prior to use. A recommendation was that all organizations using these hot cups provide similar equipment. Sounds like a good idea. ★

FALLOUT

continued from inside front cover

Granted, many recips are considerably more complicated than the old T-Bird system-wise. But I think our friend would have his hands full today being completely up to date and capable of handling any situation in the F-106, F-4 or the F-111 with their standard aircraft, navigation and weapon systems.

Having been privileged to serve an exchange tour with the Air Force for two and a half years, the professionalism I have seen displayed in no way harked back to the scarf in the breeze days. Thoroughly trained, highly knowledgeable, and skillfully qualified are the rule in the fighter types I have been associated with, rather than the exception.

Also, the days of shouting as instruction are over, in fighters in the Navy and Air Force. I have instructed fighters in both. The fellow who feathered Nr 1 when Nr 2 has failed is the same guy who shuts down the starboard engine when the port has the fire, but the rate at which the resulting things happen is considerably faster than in the recips.

The student in the T-38 climbing to 40M in three minutes is considerably more pressed—reaction time and thinking-wise—than the student making 1500 fpm up in the recip.

The main point I am trying to make is that, in general, a high performance jet requires faster thought processes and reaction times than are required in recips. Having been heavily involved in transitioning multi-engine pilots to fighters, it was obvious that the talent was there but for a period of time, depending upon the individual involved, the thinking was 'way behind the aircraft.

Things happen a little faster when an F-104 flames out on initial versus a recip quitting at the same time. The time to react goes down in orders of magnitude for the silver dart jock. Things happen a little faster with an F-104 on ILS final at 175 KIAS vs. 120 for the ol' recip. And the recip jock in the lower part of the thunderstorm is no worse off than the fighter jock flamed out in the top of it due to ice and turbulence. Smoothly getting the passengers down in a recip requires no more skill than bringing a flight of four fighters home in good shape.

Among the fighter pilots I have known in the Air Force, if they wore the top button open, it was because they took pride in being able to quickly, professionally, and skillfully handle any situation presented to them.

My hat's off to the recip boys if they were able to instill that attitude in the author. Professionalism is the goal in all flight—recip, helo, jet, and I believe that's what we're all shooting for, so let's stop pumping up one branch at the expense of knocking the other.

J. L. Finley, Lt USN
USAF Aerospace Rsch Plt School
Edwards AFB, California

As expected, this letter really stirred up the fighter troops. But not one letter from the recip drivers. Space doesn't permit running all the letters, but Lt Finley's is representative of the many received. It is evident why the author refused permission to use his byline. Until a few months ago he was a fighter pilot—P-51, F-84, F-86, F-100—and served in Europe and in the Far East, as well as in the U.S. According to him, he had been talking the recip pilots down for so many years that he was amazed that they could actually fly. He was so amazed that he wanted to tell the world about it without having his old friends writing him nasty letters.

As Lt Finley points out, professionalism is the goal no matter what type of aircraft a pilot flies. We know our fighter pilots are the finest in the world, and we have the same opinion of those who fly the "Old Shakeys," the "Dollar Nineteens" and the rest of our cargo-transport aircraft. And we liked the spirit expressed by the fighter pilots who wrote to take the "deserter from their ranks" down a peg.

☆ U. S. GOVERNMENT PRINTING OFFICE 1966 201-218/10

WELL DONE

CAPTAIN JAMES D. JOHNSON

4510 COMBAT CREW TRAINING WING, LUKE AFB, ARIZONA

Captain Johnson was number three in a four-ship F-100 student training mission in the Gila Bend Gunnery Complex. After recovering from a VLADD maneuver, Captain Johnson, a recent basic flying school graduate with only 29 hours of F-100 time, was unable to bring the throttle of his F-100D inboard out of afterburner or retard the throttle below minimum afterburner range. He notified his flight leader and proceeded directly to the closest emergency field 30 NM away. Fuel indications at this time were 4300 pounds total and 1400 pounds in the forward tank. Minimum engine RPM attainable was 85 per cent. Fuel consumption in afterburner at this power setting and altitude was such that Captain Johnson had to plan his pattern and landing precisely.

Captain Johnson extended speed brakes as he approached the emergency landing field and attempted to slow his aircraft to below landing gear limit speed. He was not able to decrease airspeed below 310 KIAS in level flight as he passed abeam the departure end of the runway at normal downwind pattern altitude. Captain Johnson raised the nose and zoomed the aircraft up to approximately 500 feet AGL to obtain gear lowering speed. He decided he would have to fly a modified precautionary landing pattern to make the field. Captain Johnson had been briefed on this pattern, but had never had it demonstrated to him nor had he flown this type of landing pattern previously. Landing gear and flaps were lowered at the low key point, and the pattern was continued. Base leg and final approach airspeeds were controlled by use of speed brakes. During the flare over the runway overrun, Captain Johnson shut off fuel to the engine by turning off the Engine Master Switch. Touchdown was accomplished within the first 1000 feet of the 8500-foot runway, and the drag chute was deployed. Engine RPM did not start to decrease until there was approximately 4500 feet of runway remaining, but Captain Johnson was able to stop his aircraft on the runway with no difficulty.

Captain Johnson demonstrated outstanding airmanship and skill while handling this inflight emergency. WELL DONE! ★

MISSILE SAFETY AWARDS

The following units have been selected to receive Missile Safety Awards for calendar year 1965.

ADC	456 Fighter Interceptor Squadron Castle AFB, California 10 Aerospace Defense Squadron Vandenberg AFB, California
AFSC	6595 Aerospace Test Wing Vandenberg AFB, California 6555 Aerospace Test Wing Patrick AFB, Florida
PACAF	39 Air Division Misawa AB, Japan 18 Tactical Fighter Wing Kadena AB, Okinawa
SAC	455 Strategic Missile Wing Minot AFB, North Dakota 465 Bombardment Wing Robins AFB, Georgia
TAC	4510 Combat Crew Training Wing Luke AFB, Arizona 4520 Combat Crew Training Wing Nellis AFB, Nevada
USAFE	36 Tactical Fighter Wing Bitburg AB, Germany
ANG	147 Fighter Group Ellington AFB, Texas