flying

SAFETY

OCTOBER 1985

When Autumn Arrives . . .

Let George Do It. . .BUT WATCH HIM

Firefighting — Hot Business!

THERE I WAS

■ Years ago, I was flying F-106s at Loring AFB, Maine. We were to have a 4-ship flight for an intercept training mission. We briefed to depart in radar trail as the ceiling was about 500 feet. I was Number 4 and determined I would keep track of the three aircraft ahead of me on my radar, maintain a good radar trail position, and not get lost from the flight as we climbed up through the soup.

I tuned up the radar for optimum detection for immediately after takeoff. During takeoff roll, I glanced at the radar at times to pick up those ahead of me, and, immediately after takeoff, began working hard to maintain radar contact with the other flight members. Things were going pretty well as I had the flight on radar. With all this attention to my radar work, I suddenly noticed one of those big barns they have on the farms in Maine go past my left wing tip! I had gotten so engrossed in the radar work that I had not paid proper attention to flying the airplane and came very close to making an undesired contact with the ground shortly after takeoff.

Lesson: Continually be aware of what the aircraft is doing while working weapon systems, etc., put your attention in the proper place, and divide efforts appropriately to always maintain situational awareness and aircraft control. ■

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Regular Features

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If It Ain't Broke

■ Win a million dollars! Win a mink coat — even better, win a mink ranch! This type of promise is being used by almost everyone to attract people to everything from magazine subscriptions to charitable contributions.

I don't have any great prizes to offer, but I do need your help. This is my first issue as editor. I want to make *Flying Safety* the best magazine it can be.

Major Richardson, the former editor, and his staff produced an excellent magazine. I believe in the philosophy, "If it ain't broke, don't fix it." So, I'm not planning an overhaul. But, I ask for your inputs.

This magazine exists for one purpose — mishap prevention through safety education. We won't fulfill that purpose if you, the aviation professional, don't read it. That's why I'm asking for your inputs. Drop me a note. Tell me what you like or don't like about the magazine. Tell me what subjects need more coverage or less. Try your hand at writing. I only ask that your article contain a flying safety message.

I'm interested in doing everything I can to improve *your* magazine and get the safety message out. Take a few minutes and send me your ideas. ■

Jimmie D. Martin

Jimmie D. Martin, Lt Col, USAF
Editor

WHEN AUTUMN ARRIVES...

LT COL JIMMIE D. MARTIN
Editor

■ Why should you, as a flier, be especially interested in autumn? Because winter, with its inevitable extremes of weather, follows close behind. Now is the time to ensure you're prepared for these differences.

You will see days that are cold and clear and absolutely exhilarating for flying. But there are hazards.

You will see days in which the clouds are on your eyebrows and you have no desire to fly. In addition to the obvious hazards, there also are unseen ones.

You, as a professional flier, will encounter these hazards. Are you prepared? Will you be up to the challenge?

In winter, you should expect to have your instrument flying abilities sorely tested. A day that begins as an incredibly beautiful one in which you revel in being airborne may suddenly change to one unfit for man or beast, especially if that man or beast is in an aircraft. After you encounter nasty weather is not the time to start trying to recall instrument flying procedures. Like the Boy Scout motto, "Be Prepared."

Too many times, fliers pay lip service to instrument practice. There are lots of other legal things you can do in an aircraft that are more fun than practicing precise airspeed, altitude, and heading control. But, find yourself trying to land with the weather at or very near minimums, and this type of flying suddenly becomes *very* interesting. The one who has diligently practiced instrument flying will probably find this a "no sweat" approach, while the one who just "filled his squares" is now discovering sweat glands he never knew he had.

Now, compound the situation with a serious aircraft malfunction. Which pilot do you think will be able to analyze the problem and take proper action without losing control? If the answer to this question isn't immediately obvious, please remove yourself from the flying schedule.

To drive home my point that we need to be mentally and physically prepared at all times for weather flying, I've included some examples. I consulted our safety muse, the computer, for weather-related mishaps. Each of these mishaps resulted in at least serious aircraft damage and, at worst, death of aircrew members. As you review these, see if you have made the same mistakes. Maybe you won't be as lucky the next time.

■ Two A-7s were entering a low level route where the weather was worse than they had been briefed. When the leader realized the weather was getting worse, he directed his wingman to close up formation. The wingman interpreted this as a call to join and initiated a joinup. The flight leader decided to abort the low level and pulled up into the weather as his wingman was joining. The wingman failed to transition properly to instruments and pulled the nose up to an excessive attitude, became disoriented, and lost control of the aircraft. He ejected in a dive, and the aircraft was destroyed.

There were a lot of mistakes made here by both the leader and the wingman. The leader apparently became so preoccupied by the

continued

WHEN AUTUMN ARRIVES . . . continued

weather and what to do with the mission that he forgot his wingman. The wingman not only misinterpreted his leader's instructions, he became so preoccupied with trying to complete his rejoin before losing sight of the leader that he flew his aircraft into a position from which he couldn't recover because he didn't transition to instruments. A very expensive lesson. Don't let it go to waste.

▪ An F-15 was No. 4 in a radar trail departure. The flight entered the clouds shortly after takeoff. The mishap pilot lost radar contact, discontinued flying the SID, and attempted to regain a radar trail position. The aircraft entered a diving right turn in the weather. The pilot recognized the dangerous situation and attempted a recovery, but the aircraft was too low, and impacted the ground. The aircraft was destroyed, and the pilot was fatally injured.

Another case of failing to properly transition to instruments upon entering weather. The pilot channelized his attention on the radar instead of flying the SID. Spatial disorientation probably contributed to this mishap.

▪ The mishap aircraft was No. 4 in a flight of F-4s on an air-to-ground gunnery flight. Although the forecast weather had been satisfactory for a visual joinup after takeoff, rapidly deteriorating weather conditions at takeoff precluded joinup. The flight lead decided to use a radar trail departure. The No. 3 aircraft aborted on the runway, thus delaying the mishap aircraft and resulting in 6 NM spacing behind the No. 2 aircraft.

To reduce the spacing, the mishap aircraft accelerated to 400 to 425 knots and closed to within 2.5 to 3.5 NM of No. 2 as the flight entered the range holding pattern in IMC at 350 knots. The mishap aircraft failed to check in after a channel change. The aircraft wreckage was later discovered near the top of a mountain. Both crew members were killed. The aircraft deviated from protected airspace during the initial inbound turn to the holding pattern. Exactly why the pilot widened his turn without due regard for the holding airspace will never be known. Whether it was because radar contact was lost, an attempt to reduce excessive closure, or several other possible causes, proper instrument procedures weren't followed, and the result was tragic. In this case, there were two crewmembers involved, and they both made fatal mistakes.

Crewmembers, don't get so intent on your own particular duties or problem that you lose situational awareness. Remember crew coordination, especially when the situation is out of the ordinary.

▪ An OV-10A launched on a weather reconnaissance mission. Shortly after takeoff, the Bronco inadvertently flew into a cloud while on a VFR clearance. Very shortly thereafter, the aircraft was observed exiting the cloud in a dive and crashed into the ground. The aircraft was destroyed, and the pilot was killed. The pilot had recently returned from leave and hadn't flown in 24 days. When he flew into the cloud, he failed to properly transition to instruments, became spatially disoriented, and lost control.

Whether you accidentally or intentionally enter clouds, it's essential to first transition to a basic instrument cross-check before beginning any aircraft maneuver. The basic requirement in any situation is: *Maintain aircraft control*. Once you're sure you have control, you can take the next step to put the aircraft where you want.

Also, remember, a long layoff from flying will reduce your proficiency. Don't overestimate your own ability to handle things. Fly a simulator mission first, if possible. At the very least, review a complete mission in your mind before you fly. At that time, consider the unexpected, including potential weather problems.

■ The mishap F-16A was lead of a three-ship, low level navigation mission. During the low level, while flying a chase position from the No. 2 aircraft, the mishap pilot transmitted to the flight that he had a problem, instructed No. 2 to rejoin, and instructed No. 3 to continue the mission. The mishap aircraft then turned left and entered IMC in a descending turn. The mishap aircraft impacted the terrain in a steep dive at high airspeed and was destroyed. The pilot was killed.

Another case where the pilot inadvertently entered IMC and crashed. From all indications, he became disoriented because of failure to properly transition to instrument flying and lost control. His situation was compounded by an unknown problem, and his channelized attention probably contributed to the mishap.

In case all you heavy drivers aren't paying attention, you can get into trouble, too. Here are a couple of examples:

■ A C-130A was en route on a routine channel mission. The aircrew couldn't receive a terminal weather update for their overseas destination because of an absence of communications and weather observations in the area. The aircrew elected to descend into the area based on a departure weather briefing which included a forecast for VFR conditions upon arrival. The actual weather was significantly worse than forecasted, but the pilot operated the aircraft at low altitude in marginal weather conditions, probably in violation of the visual flight rules in AFR 60-16, General Flight Rules. For undetermined reason(s), the aircraft impacted the water 300-500 meters out to sea. The aircraft was destroyed, and everyone on board died.

The most likely reasons were one, or a combination of, the following: (a) spatial disorientation, (b) visual illusion, (c) channelization of attention, or (d) possible mechanical problem.

Remember crew coordination. Did the whole crew help with the situation, or did the pilot go it alone? We'll never know. But the Air Force wouldn't put more than one person in the aircraft if they weren't needed. Make sure you're doing your part.

Also, weather forecasts are not guarantees. Either get a local update or look out the window. Your premission planning should allow for weather worse than forecast with a backup plan of action. Don't push your luck.

■ A C-130E on an exercise mission was landing at an overseas base. The weather conditions were 1,000 scattered, 1,500 broken with 4 miles visibility. Winds were 060 at 12 gusting to 20. The temperature was 34 degrees F. Freezing drizzle was falling and the runway was covered with slush.

The pilot landed left of the centerline in the touchdown zone in a right crab. The aircraft entered a skid and departed the left side of the runway at the 2,000 foot mark. The left wing was torn off by a snowbank, and a fire started, but was quickly extinguished. The crew egressed with only the pilot receiving minimal injuries.

Subsequent investigation revealed some interesting things:

■ The weather observer didn't pass correct airfield wind speed and directional variability to the aircrew.

■ The aircraft commander didn't cover the gust increment and crosswind effect on slippery runways in his descent checklist crew briefing.

■ The aircrew didn't adjust the approach, threshold, and touchdown speeds for the 10-knot gust factor in accordance with TO 1C-130B-1-1.

■ A turbulent downdraft destabilized the approach ¼-mile from touchdown, past the commit point into the one-way site.

■ The pilot recovered from the downdraft, but was unable to fully cope with the crosswind.

Again, I wonder what happened to crew coordination. Why didn't the copilot ask about the omitted briefing items? Did the aircrew coordinate the planned landing speed? Was this a crew or pilot and passengers? I think you see my point. Crewmembers, don't just go along for the ride. Do the job the Air Force is paying you for.

I can sum up what I have been saying in one word — *preparation*. In premission planning, briefings, and during flying, we must be prepared for both the expected and the unexpected. This is especially true as we enter the winter season. ■

Fast-moving winter weather systems can change your destination weather from a 2,500-foot ceiling to zero-zero in less than an hour.

The Birds Are Back

PEGGY E. HODGE
Assistant Editor

■ In the past, there have been several forums for discussing bird problems, such as the US Fish and Wildlife Workshop on Wildlife Hazards to Aircraft and the Federal Aviation Administration's Wildlife Hazards to Aircraft Conference and Training Workshop. Although military aspects of bird hazards were discussed briefly at these workshops, there has not been a meeting to deal strictly with the unique considerations of military flying operations. Recently, however, the Air Force's Bird/Aircraft Strike Hazard (BASH) Team hosted a bird hazard conference at Vandenberg AFB, CA to discuss all aspects of BASH reduction at military installations.

Two of the objectives of this conference were to present specific guidance on how to conduct a base level program and to identify the type of help bases can get from other agencies to resolve their bird problems. Collisions with birds cause a loss of millions of dollars of Air Force aircraft and aircrews each year. Being aware of what our base can do and knowing who to contact just may save us millions of dollars this season. Let's take a look at what makes up an effective base level program (airfield bird control and flight operational considerations) and the technical assistance available to us. (This also gives us a chance to take a look at some of the things in our new bird strike hazard regulation.)

The Bird Hazard Reduction Program

Air Force Regulation 127-15, The Bird Strike Hazard Reduction Program, requires each Air Force installation to address potential hazards caused by bird strikes to aircraft. The situation varies for each base and mission. Birds may flock to airfields or cause hazards en route. Hazards may be seasonal or year-round. Bird activities may change as crops change, sanitary landfills are opened, or wildlife refuges are created. People at base level must be aware of bird attractants and bird control techniques. The following guidelines provide only a brief outline for bird hazard reduction.

The basis for any effective bird hazard reduction program is a concise, well-defined plan that outlines specific steps to follow when bird hazards become known. The plan should inform new people of local hazards and document reasons for airfield activities which reduce bird populations (e.g., long grass, insect reduction, water drainage). Although some bases may have minimal bird hazards, each installation with a flying mission must develop a contingency plan that defines responsibilities and lists procedures for bird control. The Bird Hazard Reduction Plan should meet these needs. It should be prepared by a Bird Hazard Working Group (BHWG) composed of people concerned with airfield bird control, operations, and safety.

The BHWG is organized to draft and implement the Bird Hazard Reduction Plan. The BHWG allows all base offices affected by the bird problems the opportunity to meet and discuss possible solutions. The BHWG should meet regularly with representatives from Civil Engineering, Flight Safety, Airfield Management, Base Operations, Air Traffic Control, and any other organization concerned with bird hazards.

The BHWG is usually chaired by the base commander or vice commander. Conceivably, the BHWG would meet on a recurring basis as an agenda item for ongoing committees such as the Air Traffic Control Board or Integrated Safety Council. This eliminates additional meetings, committees, and paperwork. Bird hazards can be discussed in these meetings as needed. For example, the Flying Safety Officer might report to the BHWG an increase in bird strikes or bird activity. The BHWG can then discuss the procedures outlined in the Bird Hazard Reduction Plan to deal with the problem.

The BHWG should meet as often as necessary to remain current on bird hazards and to discuss solutions and results. For bases with minimal bird hazards, the BHWG might meet as seldom as semiannually. If birds cause a severe hazard, weekly meetings may be necessary. An important concept is that the BHWG address bird problems as they develop, *before* they create a serious safety hazard. The Base Self-Inspection Checklist could be used by the BHWG to determine areas of deficiency in their attempt to reduce bird hazards. (See AFR 127-15, Attachment 2, for a sample.)

Airfield Bird Control

Birds are attracted to airfields by food, water, or shelter. To rid the airfield of these birds, base personnel must recognize the hazard, determine why birds are coming to the airfield, and take corrective action. An important part of evaluating airfield bird hazards is learning about local bird activities, species that cause hazards, locations of local bird refuges, daily bird movements, seasonal bird populations, potential airfield food sources for birds, etc. A simple way to obtain this information is with a daily bird survey. A great deal can be learned about bird problems by regular observation. When the information is compiled over several seasons, a more effective bird hazard reduction program is possible. Information that should be on the bird survey includes date; time; weather conditions; bird species; bird locations on the airfield; bird flying activity (soaring, to and from roosts, feeding); and bird activities (loafing, feeding, drinking, etc.). Notice if birds come to the airfield when it is mowed, record increases in insects on the airfield that attract birds, and observe if crops harvested in the area attract birds to feed. Periodically evaluating the information you gather will give a clear picture of the hazard.

continued

The Birds Are Back continued

Proper documentation of the local bird problem, technical assistance received, and recording the success of actions performed are essential parts of any bird hazard reduction program. Sufficient documentation is necessary to acquaint new people with the problem and may be required in any litigation regarding bird hazards.

Photograph all hazardous situations that birds create on base and write a summary. For example, pictures of gulls loafing on the airfield accompanied by observations that show the birds are using a nearby sanitary landfill can provide a strong case against future expansion of the landfill. Good documentation of bird hazards cannot be overemphasized. It gives credence to the problem and shows that solutions are being considered.

After defining the problem, steps should be taken to rid the airfield of the bird hazards. Several active and passive techniques can be successful in reducing bird population levels. These techniques vary in cost and effectiveness depending on the situation. Active control involves dispersing birds from an airfield to give short term relief from an immediate safety hazard. Passive techniques are more long range in nature. They involve managing the airdrome to eliminate those factors that attract birds to the airfield.

Pyrotechnics, bioacoustics, and depredation are examples of active methods used to disperse birds from airfields. Passive methods include the controlling of grass height management, edge effects, reforested areas, landscaping, standing water, sewage lagoons, and sanitary landfills. If out of control, these provide attractive airfield features that may lure birds. (See AFR 127-15 for appropriate action in each case.)

Flight Operational Considerations

When environmental modifications and active control measures do not satisfactorily reduce bird hazards on the airfield, another option is to modify flying operations to reduce the risk of bird strikes. These operational changes will be dictated by the severity of the problem, the performance capability of the aircraft, and the training or readiness requirements. Bird hazards, like any other safety hazards, must be assessed with respect to operational requirements. During contingency operations or advanced stages of readiness, bird hazards have minimal safety priority during training to maintain operational readiness. However, certain changes can be made to improve safety, reduce costly repairs, and protect aircrews.

A knowledge of unit operational and training requirements, combined with an understanding of local flying restrictions, is necessary to properly evaluate possible modifications to local procedures.

The following are offered as recommendations to aid in reducing bird hazards through modification of operational procedures. Many of the recommendations apply to bird hazard reduction at any base. It is important to remember the key to reducing bird strikes by changing flight operations is to avoid known locations, concentrations, or movements of birds.

- **Mission Aborts Caused by Bird Strikes** Abort a takeoff or planned touch and go if a bird strike occurs and sufficient runway remains to stop. Bird strike damage cannot be accurately assessed inflight and may result in a complex airborne emergency. Only maintenance personnel on the ground can make accurate damage assessments. Several bird strikes which appeared to cause minor damage have proven to be much more substantial and, had the pilots continued the mission, a serious emergency would have resulted. Structural damage, such as a dent in the wing, has led to fuel and hydraulic system failures.

- **Takeoff Procedures** Aircraft making formation departures increase the risk of damaging bird strikes when birds are feeding or loafing on or near the runway. Wing and interval takeoffs (with the wingman taking 6 to 10 seconds spacing) often result in birds being scared up by the lead aircraft resulting in the wingman being hit by the birds. If

When birds are flying in the area, departures may need to be modified to reduce the risks.

When flocks of migratory birds are a problem, aircraft formation departures involving rejoins after takeoff increase the risk of serious bird strikes.

large flocks of birds are scared up by the lead aircraft, wingmen may want to delay their departures until the birds are clear of the runway. Pilots of lead aircraft must be alert and warn wingmen of bird hazards during takeoff roll if possible. This is especially important for wing takeoffs when all the wingman's concentration is on his leader.

■ **Migratory Bird Problems** When flocks of migratory birds are a problem, aircraft formation departures involving rejoins after takeoff increase the risk of serious bird strikes. Turning or straight-ahead rejoins require greater attention by pilots to the lead aircraft's position. Pilots cannot adequately clear for birds while simultaneously attempting to join on the lead aircraft's wing. When birds are known to be flying in the area, departures under visual meteorological conditions may require modification to reduce the risks. Departures should be made in trail with the rejoin beginning after the aircraft pass 2,000 to 3,000 feet AGL. If aircraft are to immediately enter a low level route or stay at an intermediate altitude for a prolonged period, a tactical formation provides sufficient aircraft clearance to allow wingmen to clear for birds. When weather is a factor, wing takeoffs are preferred because many bird strikes occur just before entering a low overcast or immediately above an undercast sky condition.

■ **En Route Bird Strikes** Aircrews experiencing en route bird strikes should consider aborting the mission. While an engine ingestion or a canopy strike may be readily apparent from the cockpit, many fuselage, wing, tail, or radome strikes cannot be adequately assessed for damage. Continuing a mission may result in greater structural damage and an emergency situation later in the flight.

■ **Low Level Bird Strikes** When flying low level routes, higher aircraft speed and greater exposure within the bird's flight environment have led to many damaging and injurious bird strikes. Many of these strikes occur at low level and bombing range entry points. Pilots and weapon systems operators are then involved in cockpit duties which cause crewmembers to reduce their eye contact outside of the cockpit. Emphasize "heads-up" flying during these critical transitions.*

■ **Checklist Procedures and Prebriefings** Checklist items should be accomplished in such a manner as to allow for maximum eye contact outside of the cockpit. Briefing bird strikes is much like briefing a takeoff emergency where urgency dictates a preplanned course of action. As a minimum, pilots should brief or be briefed, on the following:

■ Potential bird problems along their proposed route of flight.

■ Using the double helmet visor during daylight hours, especially during low level operations, and the clear visor at night.

■ Locking shoulder harnesses of injured crewmembers to prevent them from falling forward onto flight controls.

■ Evasive maneuvers at low altitude.

■ Appropriate actions if flocks of birds are encountered (e.g., initiate a climb since most flocks are distributed in a downward direction in the airspace).

■ Engine failure procedures if birds are ingested.

■ Lost cockpit communications including change of aircraft control and aircraft recovery procedures.

■ Use of autopilot to control the aircraft if pilot is temporarily blinded.

■ The procedures for a controllability check if the airframe is damaged.

■ Crew egress procedures if control cannot be maintained.

■ Periodically review bird strike procedures during continuation training and safety meetings.

■ Inform transient aircrews of local bird hazards. Transient crews are often unfamiliar with airfield hazards, including birds. Many bird strikes happen away from home base, and at some bases, the most damaging bird strike incidents happen to transient aircraft. Information in the Flight Information Publication (IFR — En Route Supplement and Area Planning/1B), the use of NOTAMs, and broadcasting information on either Automatic Terminal Information Service (ATIS) or on initial radio contact can alert the aircrew of potential bird hazards. NOTAMs can identify problems of long duration (migration, bird roosts, heavy feeding on the airfield, control measures being used, etc.). Advisory reports can inform aircrews of the timing and lo-

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*The BASH Team developed a computer model to predict the relative bird strike risk for flying along military low level routes. The model is based on waterfowl migration data and provides graphic information concerning bird strikes from September to May. The graphs display the risk for flying these routes during day, dawn/dusk, and evening periods on the same graph. By comparing graphs or different routes and the times they are flown, determinations as to which route and time are least hazardous are possible.

■ **Published Routes** Submit requests for graphs to the BASH Team using the low level route number.

■ **MOAs, Ranges, and Proposed Routes** Submit longitude and latitude of perimeter of MOA, range, or turn points of proposed routes to the BASH Team for evaluation of these areas.

cation of transient birds.

■ **Pilot Responsibility** Pilots must help detect birds on the airfield and in the local flying vicinity. When pilots sight birds, they should notify other pilots and the control tower so that others can be informed of the hazard. Pilots may also help tower personnel become aware of bird hazards by requesting bird hazard information before takeoff or landing. These requests will remind air traffic controllers to inspect for birds before authorizing movement.

■ **Bird Hazard Identification** Operations personnel should monitor populations both in the local area and in regions where low level sorties are flown. They then need to brief pilots on the potential hazards they may face on particular missions. Information on bird concentrations and movements can be obtained from local universities, State and Federal wildlife agencies, and private organizations such as the National Audubon Society.

■ **BIRDWATCH** To help inform pilots of operational changes required by bird activities in the local areas, use the term BIRDWATCH. Similar to a METWATCH for severe weather, BIRDWATCH alerts aircrews to possible flight hazards from increased bird activity. BIRDWATCH conditions should be incremental to reflect varying degrees of bird hazards. For example, BIRDWATCH RED would exist when birds loaf on airfield runways and taxiways, BIRDWATCH YELLOW could signify flocks feeding near runways, and BIRDWATCH GREEN would indicate no particularly hazardous situations in the airdrome. Operational changes for each BIRDWATCH condition would be defined by each installation. BIRDWATCH could be declared by the Chief Controller, Supervisor of Flying, Runway Supervisor, or air traffic control personnel. Pilots flying in the local area should use BIRDWATCH terminology to inform other pilots about bird hazards in the traffic pattern. A BIRDWATCH alert is particularly useful to inform transient crews and can be broadcast over the ATIS.

Technical Assistance

We should all be aware of agencies that help us solve local bird problems, proven methods for bird dispersal, bird avoidance procedures, and land management techniques that discourage birds.

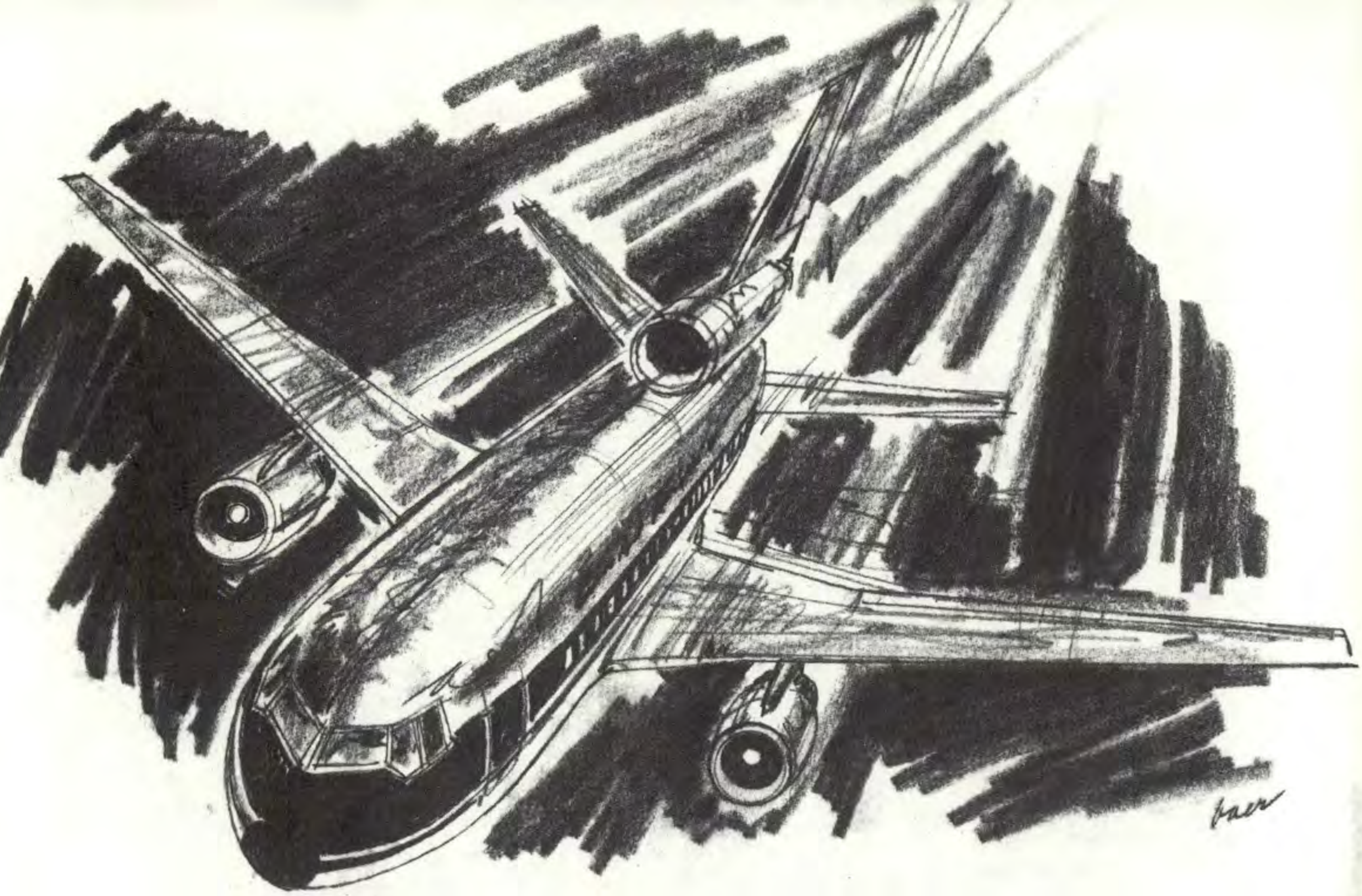
■ **BASH Team** In many cases, individual bases may not always be aware of the best methods for bird control and hazard reduction. Help is available from several sources. The BASH Team, HQ AFESC/DEVN, Tyndall AFB FL 32403, AUTOVON 970-6240, is tasked with assisting in bird hazard reduction Air Force wide. They are trained in bird control and have experience in wildlife ecology, land management, and flight operations. They also have current information on authorized bird control equipment and techniques.

■ **Federal and State Agencies** Often, bases employ professional foresters or agronomists who have valuable insights to base problems. Local expertise and assistance is available through the US Fish and Wildlife Service, the State Department of Fish and Game, or State Natural Resources Departments. Current information concerning these agencies is maintained with the Environmental Technical Information Service which is available through your MAJCOM Environmental Coordinator. (See AFR 127-15, Attachment 1, for a listing of Federal and State agencies.)

■ **Universities** In addition, local universities can assist through their Departments of Biological Sciences.

The time and effort required to maintain a safe airdrome depends upon the severity of the hazard and the preparation of the people responsible for reducing bird hazards. People at each base must take specific actions to solve their particular problems. The key to a successful BASH reduction program is an active concern with responsible, well-trained individuals assigned to specific tasks. We can never entirely eliminate the possibility of a bird strike, but we can minimize both the potential and the damage with an aggressive, well-planned program that considers bird habits, the environment, and the mission. ■

When pilots sight birds, they should notify other pilots and the control tower so others can be informed of the hazard.



Let George Do It -

BUT WATCH HIM!

■ It's a beautiful day for flying. You've left behind the smog from the city. The air outside is clear and blue. The scattered cumulus clouds provide a nice contrast to the blue skies. Remember when you were a kid how you used to see different shapes in the clouds? See if you can still do it. The autopilot is flying the aircraft, and everything is fine.

There's one that looks like Bob Hope. There's a Saint Bernard dog. Hey, this is fun! Might as well try a few more. There's nothing else to do.

Suddenly, the aircraft is out of control, and you're fighting to save it. It's no longer a beautiful, relaxing day. Now it's a desperate struggle for survival. What happened?

Sound farfetched? Consider the following incident:

A commercial DC-10 departed an overseas airport at about 2200 local time on an IFR flight plan to the US. There were 295 passengers, 3 crewmembers, and 13 flight attendants on board. Ground operations, takeoff, and the initial portion of the en route climb were uneventful. Air Traffic Control cleared the trijet to climb at 283 knots, the appropriate speed for the heavy weight of the aircraft. The captain controlled the aircraft manually to 10,000 feet. According to the crew, after reaching 10,000 feet the autopilot was engaged in the indicated airspeed (IAS) hold mode and the autothrottle system speed selector was set at 320 knots. Climbing through 14,000 feet, the autopilot disengaged and was quickly re-engaged by the pilot.

A few minutes later, while climbing through 27,500 feet about 100 miles west of the departure airport, the DC-10 started to vibrate slightly which, within seconds, increased in intensity. The crew suspected an abnormal vibration in the No. 3 engine, elected to reduce power, and then to shut it down. As soon as they reduced power on the No. 3 engine, the autopilot disengaged, the aircraft rolled first right, then left, and then the nose suddenly pitched down and they started to lose altitude rapidly.

As the aircraft's nose continued to drop, the captain deployed the spoilers to arrest the impending overspeed condition created by the aircraft's nose-low attitude. The flight recorder readout showed the recovery starting at 23,900 feet with vertical acceleration reaching a max-

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imum of 1.68 G during the recovery. The crew regained full control of the aircraft at about 18,000 feet.

Shortly after recovering control of the DC-10, the crew restarted the No. 3 engine, and it appeared to function normally. They had requested a diversion, but since all systems appeared normal, the crew elected to continue to their destination as if nothing had happened. The flight landed at their destination at 0105 local time.

After shutting down, the captain asked maintenance personnel to visually check the aircraft's exterior. Maintenance found that four feet of each outboard elevator tip and the aircraft's tail-area lower-access door were missing. The DC-10 was grounded, and it underwent a thorough examination. All systems that could have induced the condition experienced by the crew during the incident were functionally checked. These included the flight control systems, the autothrottle system, the flight director/autopilot, and the No. 3 engine. No malfunctions were found.

Analysis

The aircraft's flight control systems and power plants operated normally both before and after the incident. There was no evidence that any malfunction of the aircraft systems had occurred. The structural damage, which was limited to the empennage and aft fuselage, was attributed to the application of high loads caused by the stall buffet. No indication of pre-existing fatigue cracking was discovered.

The flight data recorder indicated the aircraft's airspeed continued to decrease during the climb. The stall speed of the DC-10 for its climb weight was determined to be 203 knots, and the buffet onset speed was approximately 234 knots. According to the flight recorder, the aircraft was operated below 234 knots for over 40 seconds while climbing above 26,000 feet. For half of this period, the airspeed was below 203 knots. The minimum speed recorded during this portion of the climb was 176 knots, well below the stall speed. The National Transportation Safety Board (NTSB) concluded the DC-10 entered a full aerodynamic stall.

Why would an experienced, professional flightcrew unknowingly allow a DC-10 aircraft to fly into a full aerodynamic stall? Evidence clearly indicates the aircraft was maintaining a constant vertical speed (1,200 feet per minute) during the period immediately preceding the stall, and thrust from all three engines was at an autothrottle limiting value for several minutes during which pitch attitude increased and airspeed decreased. Here the DC-10's autopilot system was commanding aircraft pitch attitude and the autothrottle system was controlling thrust during the climb. The aircrew had mistakenly placed the autopilot system in a vertical speed mode rather than an airspeed or Mach command mode. This was contrary to both the airline's normal procedures and the manufacturer's prescribed normal operating procedures and recommendations.

From the time the pilot re-engaged the autopilot up to the point the aircraft stalled at 28,800 feet, the DC-10 was in this vertical speed mode. Meanwhile, airspeed was bleeding off, and the aircrew were not aware of it. The autopilot was commanding an increasing pitch attitude necessary to achieve the selected vertical speed, regardless of the aircraft's airspeed or pitch attitude (which increased to 14 degrees nose up). Add the DC-10's stickshaker alert (which investigators determined was indeed activated) to the situation and you have multiple warnings available to alert an aircrew of an impending stall.

The Safety Board concluded that the crew's attention must have been diverted from the control of the aircraft and from instrument scan soon after re-engaging the autopilot at 14,000 feet. Believing the autopilot was effectively maintaining a satisfactory climb attitude and speed, they were probably quite surprised at the onset of sudden vibrations, buffeting, and activation of the control column "stickshaker." They consequently misinterpreted the cues as an engine problem. When they retarded the No. 3 engine throttle, the resultant decrease in total thrust along with the thrust asymmetry only aggravated the aircraft's entry into a full stall.

Probable Cause

The NTSB determined the probable cause of this occurrence was the failure of the flight crew to follow standard climb procedures and to adequately monitor the aircraft's flight instruments. Their inattention resulted in the jetliner entering a prolonged stall buffet which placed the aircraft outside the design envelope.

Although the crew failed to recognize the approach and entry to the stall, they did, after approximately one minute, recognize the aircraft's stalled condition. They also responded with proper control inputs to recover the aircraft. A full minute for stall recognition is excessive, however, and at a lower altitude it could have very well caused the destruction of the aircraft and the deaths of hundreds of passengers.

The Safety Board also believed either a visual or aural warning device for the DC-10 would have aided the crew's stall recognition problem and might have prevented the material damage to the aircraft by causing the crew to react faster.

In this mishap, the crew flew a transoceanic crossing to their destination after the occurrence. The violent and unexpected nature of the stall and recovery maneuver and the crew's lack of understanding as to why it happened should have been sufficient reason to get the plane on the ground as quickly as possible. Normal caution should have dictated this action.

In this case, "letting George do it" would have been fine if someone had taken a more active interest in what "George" was doing.

— Adapted from *Aviation Safety Digest*. ■

Do You Understand WAKE TURBULENCE?

A Quick Quiz

■ Listed below are 10 questions about wake turbulence. Each question is worth 10 points. If you score less than 90 points, please refer to "May the Force Be With You," which will be published in *Flying Safety*, November 1985. If you score 100 points, you're knowledgeable in wake turbulence, but we still think the article would be interesting for you, also. Check your answers against those listed at the bottom of the page.

1. When does a departing aircraft start producing wingtip vortices?

- ☐ At the start of the takeoff roll
- ☐ At approximately 50 knots
- ☐ At rotation
- ☐ At liftoff

2. The winds are calm, and you're awaiting takeoff on Runway 32R. A jet transport takes off on 32L. How long should it take for the turbulence to reach your runway if the runways are 1,000 feet apart?

- ☐ a. 1/2 minute
- ☐ b. 1 minute
- ☐ c. 1½ minutes
- ☐ d. 2 minutes

3. When departing behind a large cargo aircraft, which of the following types of wind would result in the most long-lasting runway turbulence?

- ☐ a. Calm winds
- ☐ b. Direct headwinds
- ☐ c. 5-knot crosswind component
- ☐ d. 10-knot crosswind component

4. What conditions of airspeed, weight, and configuration would generate the greatest amount of wake turbulence?

	Airspeed	Weight	Configuration
☐ a.	Slow	Heavy	Flaps down
☐ b.	Slow	Heavy	Clean
☐ c.	Fast	Heavy	Flaps down
☐ d.	Fast	Heavy	Clean

5. At what rate and to what altitude will the vortices generated by an aircraft descend?

- ☐ a. 500 fpm for 900 feet
- ☐ b. 500 fpm for 500 feet
- ☐ c. 1,000 fpm for 2,000 feet
- ☐ d. 1,000 fpm to ground level

6. When taking off behind a departing jet, a good technique would be to:

- ☐ a. Delay lift-off as long as possible to gain extra airspeed for penetrating the vortices.
- ☐ b. Plan to lift off before the rotation point of the departing aircraft and continue climb above or away from its flightpath.
- ☐ c. Climb to 500 feet, level off, and turn to cross the vortex path at a 90-degree angle.
- ☐ d. Adjust your flightpath to penetrate the vortex core 500 feet below the departing aircraft.

7. Under what wind conditions will the movement of vortices in ground effect cause the greatest hazard to following aircraft in the touchdown zone?

- ☐ a. Light and variable winds
- ☐ b. 5-10 knot quartering headwind
- ☐ c. Light quartering tailwind
- ☐ d. Strong headwind

8. Vortex cores range from 25 feet to 50 feet in diameter. How are the two vortices from an aircraft affected by time?

- ☐ a. The cores rapidly expand until they overlap and dissipate.
- ☐ b. They stay very close together until dissipation.
- ☐ c. They gradually reduce in size until dissipation.
- ☐ d. They either increase or decrease in size, depending on atmospheric conditions.

9. The vortices created by the C-5A or 747 have tangential velocities of approximately:

- ☐ a. 500 fpm
- ☐ b. 5,000 fpm
- ☐ c. 9,000 fpm
- ☐ d. 15,000 fpm

10. Which of the following encounters with wake turbulence would probably result in the greatest loss of control of the penetrating aircraft?

- ☐ a. Flying 1,000 feet below the generating aircraft
- ☐ b. Crossing the wake at a 90-degree angle
- ☐ c. Climbing through the wake at a 90-degree angle
- ☐ d. Climbing through the wake on the same heading as the generating aircraft.

— Adapted from *Aerospace Safety*, Apr. 79. ■

ANSWERS TO THE ABOVE QUESTIONS

1.c, 2.d, 3.c, 4.b, 5.a, 6.b, 7.c, 8.b, 9.c, 10.d.

Firefighting...Hot Business

JAMES RACKL
Assistant Chief, Operations
321st Civil Engineering Squadron
Grand Forks AFB, ND

■ "MAC 876, cleared on course; climb, maintain FL 350." The pilot acknowledges, then after adjusting power and trim, settles back to enjoy another routine airlift mission. Then . . .

A loud explosion shatters the calm of the cockpit. The Starlifter shudders violently as the crew hears something which sounds like shrapnel hitting the aircraft. At the same time, the crew compartment fills with smoke and fumes. Through this haze, as the pilots struggle for control, they see the hazy red and yellow glow of multiple warning lights.

Now, although only seconds have passed, some of the smoke has cleared, and the first reports start coming in.

"Pilot, Engineer, we've lost number three, I've got multiple system failures."

The copilot doesn't say anything. He just points to the glaring red light in the fire warning indicators for engines three and four.

"Pilot, Loadmaster, we've got a cargo fire, and it's getting worse. We can't seem to control it with the fire extinguishers."

"Center, MAC 876, we have an in-flight emergency. Request immediate descent and vectors to the closest Air Force base."

SHORTLY AFTER, AT A NEARBY BASE

"Attention all stations on primary crash net. This is Tower with an aircraft emergency. A C-141, MAC 876, is inbound with an engine failure and a fire reported in the cargo area. Standby for fuel on board and personnel. All stations acknowledge."

Within seconds of that transmission, the first big yellow truck roars out onto the ramp and heads for its position. In a carefully planned sequence, other trucks follow. Each has its assignment.

Soon they are joined by vehicles from other agencies: The ambulance from the hospital, security police, maintenance, and crash-recovery crews all swing into carefully planned positions. Then, they wait.

"Attention all units responding to the in-flight emergency. The aircraft is three miles on final. Fire One, the pilot reports the cargo fire is spreading and is out of control."

"Fire One, Roger."

Everyone on the ground searches the grey sky on final approach trying to catch a glimpse of the troubled aircraft. Then, there it is, staggering drunkenly down the final glidepath. The observers on the ground can see smoke coming from holes torn in the right side of the aircraft.

The aircraft reaches the runway, and as if with a sigh of relief, drops to the concrete and rolls down the runway trailing smoke. A stream of emergency vehicles close in quickly behind. As the aircraft stops, fire erupts from the right wing. Immediately, it is ringed by fire trucks, while silver-suited firefighters charge up to the aircraft — intent upon rescuing the crew.

It is only a matter of minutes before all crewmembers are safely in the ambulance and on their way to the hospital. In the meantime, the fire is put out, and the aircraft has been declared safe for maintenance and the investigators to start their tasks.

In-flight emergencies are a part of every crewmember's experience. You study and train continuously to cope with such events. Most are simply routine. But what about a situation like MAC 876? Most of you will (fortunately) never be faced with such a problem. Someone will, though, and it *could be you*.

As I said, you, as a crewmember, are very well trained to handle emergencies in your aircraft, but when it comes to a serious fire situation after landing, you'll need help from other well-trained individuals. This is where we come in. The whole purpose for firefighters on the flight line is to protect aircrews, maintenance people, and aircraft from fire. To do this effectively, there has to be a cooperative effort between firefighters, aircrew, and other members of the response force. We need your help, and in this article I hope to explain a little about why.

First, let's talk about who needs to be in charge. There is no doubt that while the aircraft is airborne, the aircraft commander is. But in case of an aircraft fire on the ground and until the fire is out, the senior fire officer must be in charge. The rationale for this is the same as it is for the AC while airborne. You are the trained expert in your aircraft and its systems. Like you, we have trained long and hard, but fires are very unpredictable, so firefighters must assume worst case scenarios. This is why we sometimes appear to be overreacting to your emergency. We are preparing for the worst, because we know how quickly that can happen.

continued

Firefighting . . . Hot Business

That brings up the subject of time. Why am I so emphatic about our worst case scenario procedures? Because we don't always have time for a debate. Not too long ago a B-52 had an explosion in the wing. *Within 23 seconds the entire aircraft was engulfed in flames*! That fire took the lives of five maintenance people. We have to always assume there won't be much time to react.

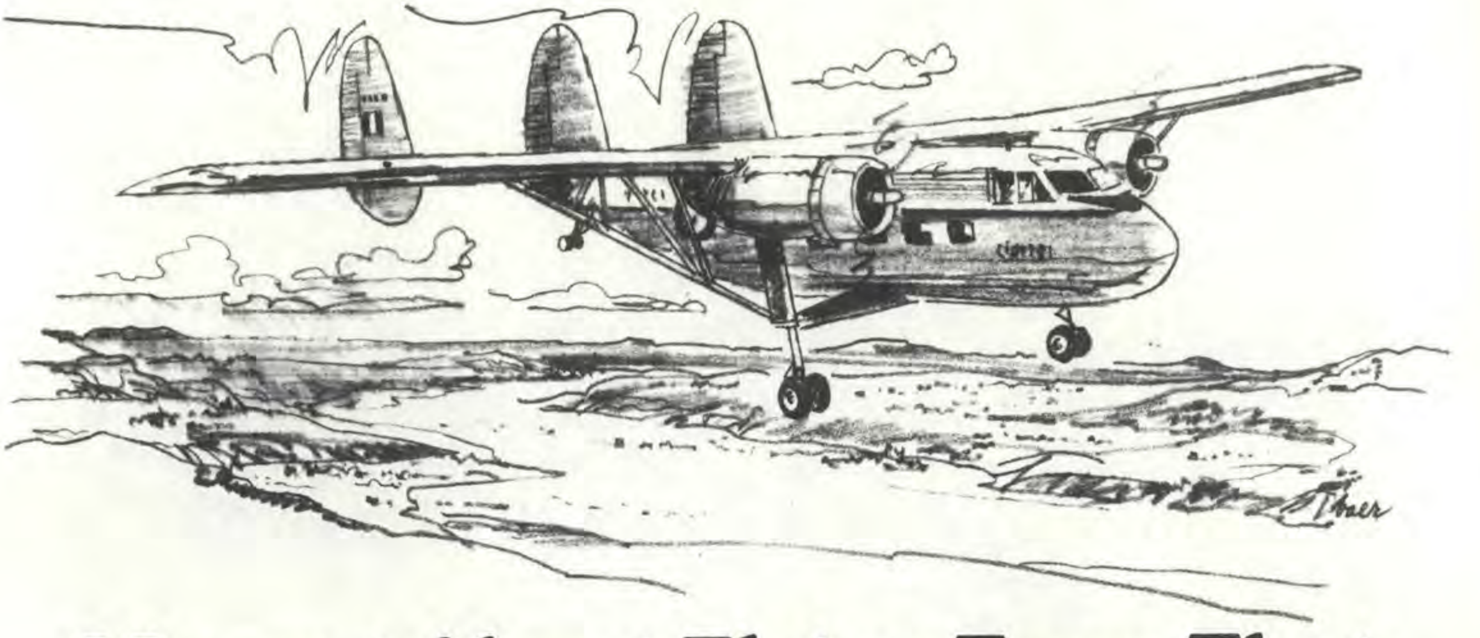
While we're talking about time, let's talk about timely declaration of emergencies. I have talked to many crewmembers who are reluctant to declare an emergency. But, you see, although the first truck is rolling seconds after we get the call, it can take us as much as four or five minutes to reach the proper point on the runway from the fire station. If you alert us early, we can be waiting for you as you touch down and can have fire suppressant on your aircraft almost immediately. That can be important, because studies and actual fires have shown that for an external fire we have about 45 seconds to get it under control before it will burn through the aircraft skin to where you are inside.

The time element plus the unpredictability of fires is why our first rule is always: Get the crew out. Some of you may have been puzzled by our insisting that you shut down and evacuate the aircraft during suspected fire emergencies. To you, it may be nothing more than a little smoke from some hot brakes, but I've seen that same situation erupt into a major fire. My choices are limited — follow Rule No. 1 and get you out and safe, or take your chances and leave you in the aircraft. In the fire protection business, our feeling is that it is always better to evacuate an aircraft unnecessarily than one a moment too late.

Firefighters are not heroes. We are simply conscious of our role in support of the mission. But our job does have some special risks. All military members, especially aircrews, know about job risks. Well, every time firefighters respond, we have to be prepared to risk it all to rescue an aircrew trapped by fire. It is our job to protect you. We are looking not only at the situation as it exists, but also at what could happen if things go wrong.

We hope you have a little better understanding of what firefighters can and will do to help you. You can help yourself most when you have a problem by, first, declaring an emergency early (give us time) and, second, comply with our requests and directions if at all possible. Please remember, we are only making firefighting decisions. In your entire career, you may never be involved in anything more than routine emergencies. But if you are, we think you'll want our best support. That's what we want. Help us give it to you.

If you have any questions about the fire department capabilities on your base, stop by the station. We'll be glad to talk to you. ■



I Learnt About Flying From That

■ The location was Sharjah in the Trucial Oman States, as they were then called. My task that morning was to fly east from Sharjah to a coastal strip beyond the mountains some 80 NM or so away. I decided to limit the fuel load. The Twin Pioneer could not carry a fantastic amount of supplies at the best of times but, over this relatively short hop, fuel would not be at a premium and, besides, why use two aircraft when one would suffice for the task?

That was flight commander thinking and, being the flight commander at the time, I was constantly on the lookout for ways of making our operation in and around the desert and mountains more efficient. It was a hot and hazy day. But it was always hot and hazy; sometimes very hot and very hazy. Up to this point, everything had been well planned, and I felt confident another tick would go on the operations board later that day.

Beyond the mountains, the coastal strip came into view, and we were soon on the ground supervising the offloading of the supplies. The Trucial Oman Scouts officer who met us had a request. "How about doing us a favor, mate?" he asked. "Why not?" I replied. He had two jundies (soldiers) he wanted at another location in the mountains a few miles to the north. It would save a whole day's donkey ride if I could drop them in there. No problem! Anything to oblige; support of the Trucial Oman Scouts was our main bread-and-butter. So over the mountains we went, and some 20 minutes later, the soldiers were "fuddling" with their mates at Tayibah.

With a job well done, it was now time to fly back to base. Quick DR calculations of fuel by both me and my navigator revealed that we should get back to base within safety margins. What we hadn't accounted for was the stronger headwind going west and fluctuations on both fuel gauges, which developed halfway along the route. The needles went from zero to full on both, every now and again settling at a reading which gave us some encouragement and faith in our calculations back at Tayibah. However, the DR calculations from the navigator were soon more accurately updated and he said rather sheepishly: "I think it's going to be a bit tight!" Well, we only had 30 miles to go. It would be OK, I was certain. We passed at least three locations where we could have put down in that last 30 miles.

With the airfield at Sharjah in sight and having elected for a straight-in approach, I noted that both fuel gauges had fallen to zero and stayed there. "Has to be an electrical fault!" I thought trying to reassure myself. Yes, we landed OK. My sweat-soaked flying suit had little to do with the heat or haze; more concern and then relief at landing at base with the engines still turning. No need to get excited about things though — my nav and I would discuss the morning over a beer or two at lunchtime.

"I think the fuel gauges are on the blink, chief," I said as I filled in the 700. "No sweat boss," he retorted, "she's going in the hangar for a check anyway." The check included draining the fuel tanks. The chief told me later that one bucketful came out of the starboard tank and half a bucketful out of the port. Whoops! I certainly learnt about flying from that. The lessons are self-evident. Recently though, I was forcibly reminded of this incident when the fuel gauge of my JP began to fluctuate wildly. This time I treated it as a potential emergency and responded accordingly! —

Courtesy RAF *Air Clues*, Vol 39, No 2, Feb 85. ■

I Learnt About Servicing From That

■ I was a crew chief on an overseas training sortie. We landed at our destination airfield in the Mediterranean, and I was faced with doing my job as crew chief for the first time in earnest. The door opened and I went down the steps with the undercarriage pins in hand, and I was immediately confronted by six people representing all the various support services, i.e., fuel, eng, catering, security, etc. Well, whilst I coped with all that, the aircrew offloaded the baggage and sat in the crew coach drumming their fingers, as I then struggled to refit the toilets. I must admit I was feeling a bit hurried when the Captain came up to the door and shouted "Come on chief, the bar's open." I hurried to finish off, shut the doors, and climbed aboard the crew coach.

The next evening, in the middle of a games night at the Officers' Mess, I suddenly wondered whether I had pulled the circuit breakers. I worried about it to myself for the rest of the evening because the aircraft was to be parked out over the weekend, and if the circuit breakers remained pushed in, the batteries would discharge — with an early takeoff on the Monday morning I would have looked pretty silly. The next day, complete with a hangover, I tried to get to the aircraft but was prevented by the security men. When I explained the situation, they took me to VASS, where the aircraft keys were held, only to find everyone was stood down for the day. After cursing under my breath several times, I decided to tackle the Captain, but I then realized what a dilemma I was in — if I admitted to not pulling the circuit breakers, I would probably be hung, drawn, and quartered, and if I did not tell, then my come-uppance would be on the Monday morning.

Whilst my mind was still in a whirl, I "bumped" into the Captain and I slowly worked the conversation around to operating procedures. Eventually I plucked up courage to say "who pulls the circuit breakers when you have not got a crew chief?" "Oh, I always do it," he replied. My relief must have been visible because he inquired what the matter was. "Oh, nothing" I replied somewhat diffidently!

This was a salutary experience which came in useful sometime later (earlier this year in fact) when I went on another overseas training sortie. Guess what happened this time? That's right, the Captain on this occasion (different from the one before) did not pull the circuit breakers. I did not bother to ask whose job it was, but pulled the circuit breakers myself.

So what lessons are there to learn from my little tale? Well there are several — the most important of course is the old chestnut, "Do not assume — Check." Secondly, never be afraid to admit your mistakes, even if it means disturbing people on their day off. Thirdly, do not be hurried whatever the circumstances or whatever intimidation you get from other people. Whenever the aircraft is in the hangar back at base, it's my job to pull the circuit breakers — the reason I did not pull them when away from base was that I was being pressured into hurrying and I forgot them. All was well in the end but I went through some agonies. I hope my story will be a lesson to both aircrew and groundcrew, but especially to groundcrew who occasionally fly as crew chief or ground engineer — know your areas of responsibility and read all the orders relevant to your job.

— Courtesy, *Air Clues*, May 85. ■

Winter Flying IN EUROPE

PEGGY E. HODGE
Assistant Editor

■ Crewmembers encounter a very different environment when flying overseas than what they are accustomed to when flying in the states. If you fly with a C-5 crew on a long haul mission across the Atlantic — you face a long and sometimes tedious flight where jet lag can most certainly take its toll. Or, on the other extreme, if you are a member of a C-23 crew making five or six landings in a high traffic environment onloading and offloading cargo, fatigue will definitely play its part.

Even though English is the universal language spoken by ATC people overseas, different pronunciation, accents, and terminology can present a highly dangerous situation should information be criss-crossed.

But, whether you fly the short haul or long haul mission, one of the most serious concerns we face when flying overseas is the weather. Crewmembers need to know what to expect. As we are approaching the winter flying months, it is important we look at what happens in Europe and the United Kingdom (UK) and some of the things we can do in advance to prevent hazardous situations.

Most of the winter air masses over Western Europe come from the North Atlantic. Temperature wise, they are quite moderate, considering the high latitude of the area. However, they are extremely moist. This accounts for the predominantly overcast stratiform clouds which dominate the winter skies. Frontal systems usually pass through Western Europe at the rate of 10 to 12 each month during the winter season.

It is important to remember storms may be hidden in a deck of clouds. You will pick them up on radar, but because of cloud cover, you can't acquire them visually.

Expect a lot more IMC conditions in Europe than in the States. You are definitely more likely to fly an approach in weather.

Winds and fog present a special problem to our crewmembers. Winds over all of Europe are strongest during the winter months. At all levels, westerly winds prevail, but considerable variation exists from day to day. Wind speeds usually average 20 to 30 knots at 5,000 feet and 30 to 40 knots at 10,000 feet, and often exceed 100 knots above 20,000 feet. Strong, low level winds produce moderate to severe turbulence several days each month at most locations. This is especially true of the UK bases. Wind shear and crosswinds usually accompany winter wind conditions.

continued

Winter Flying In Europe continued

Fog reduces visibility three to ten days each month — often for several days in succession under a stagnant high pressure system. The fog ordinarily forms by 2200 local and does not lift until about 1000 local, if at all. Fog and low stratus conditions may occasionally be so widespread that suitable alternates are difficult (if not impossible) to find.

Ice and snow on our aircraft *and* on the runway present a problem. With all the moisture, it is not uncommon for runway conditions to become hazardous, especially at night when below freezing temperatures quickly change a wet runway into an ice-coated runway.

There is no sure-fire method that will remove all combinations of ice and snow from an airplane. In general, light, dry snow will blow off during takeoff. Slush or heavy snow will usually be swept off. However, snow covering the aircraft during preflight can obscure hard-packed snow and ice *underneath*. There have been documented cases of leading edge slats and other controls freezing. Anytime snow is present, be especially careful because snow can obscure frozen control surfaces or other problems. Frozen snow, ice, or heavy frost will normally have to be melted either with heat or de-icing fluid. If a deicing truck appears necessary, make sure one is ordered and planned for.

As a reminder, be sure all ice and snow have been removed from the aircraft before taxiing. Be especially careful to check all static ports and control surfaces during your preflight. Watch for places where melted snow could pool and refreeze before takeoff. Also, ensure the aircraft is free of ice and snow just prior to takeoff, especially if you have been delayed since deicing.

Due to the geographical location of many European and UK bases, we are subject to sudden, unpredictable snowfalls. Unfortunately, an inch of snow (or less) is enough to obscure taxiway centerlines and runway markings. If you can't see where you are going, get a truck to lead you. Let the *truck driver* find the centerline for you.

Get mentally prepared for the appearance of a snow-covered runway. It blends in perfectly with the rest of the countryside, and most pilots have a tendency to flare a bit high on landing when they have little or no contrast to aid their judgment.

A runway that has been plowed and used will have roughly an hour-glass shape with the first 2,000 feet of either end in better condition than the center.

Once you get the bird in the air, winter flying is sometimes better than summer flying. Aircraft performance is considerably better and you usually don't have to contend with thunderstorms and large cumulus buildups. If you are scheduled

for a winter trip overseas — PCS or TDY — here are some winter flying problems you might think about:

■ Fog will be prevalent at many bases in Europe and the UK.

■ Clear air turbulence is more prevalent.

■ It's dark out most of the time.

■ Jet streams are lower and farther south.

■ You must dress for winter survival.

■ The tropopause is generally lower.

■ Periods of unusable twilight last longer.

Hopefully, winter flying weather won't last more than three or four months. To make sure we are all around to enjoy spring, we offer these suggestions:

■ Take extra time to flight plan carefully.

■ Use extra care in selecting alternates — you may need them. Don't let yourself get boxed into a corner with nowhere to go.

■ Before departing, check the latest pilot report. Make it part of your after-landing routine to debrief the weatherman. (See "Why Pilot Reports," *Flying Safety* magazine, September 1985.)

■ Be sure to give in-flight pilot reports of any significant weather conditions.

■ Watch those RCRs — especially the last few thousand feet.

■ Plan an instrument approach to avoid unpleasant surprises.

■ Be prepared for directional control problems after landing.

■ Expect wind shear and crosswind conditions.

At some time in your flying career — whether you fly the long or short haul overseas, being prepared can prevent you from encountering any unnecessary safety hazards. Be familiar with the appropriate portions of the foreign clearance guide; expect to hear different accents where clarification may be necessary; expect use of different terminology in some areas; and if you will be flying overseas this winter, be aware of the potential winter safety hazards.

To help you prepare for the expected, and sometimes unexpected weather concerns, we offer you the following checklists:

Aircrew Winter Checklist

ON THE GROUND

■ Are you adequately clothed and equipped for the area which you are flying in or to?

■ Is the aircraft free of frost or snow?

■ Are the flight instruments operating properly?

■ Do you know the complete anti-icing and de-icing system of the aircraft?

■ Do you know how to detect and combat engine icing?

■ Do you know the correct technique for landing on snow or ice?

■ Do you know the correct technique for landing roll on snow or ice?

■ Are you physically fit?

■ Do you understand cold weather survival techniques?

■ Do you double check with the forecaster when weather conditions are marginal?

IN THE AIR

■ Do you avoid flying into known or forecast areas of freezing precipitation?

■ Do you obtain frequent en route weather advisories?

■ Do you make pilot reports whenever weather has deteriorated from that forecast?

■ Do you use all available approach aids?

Obtaining as much information as possible is your key to survival! ■

What Is The "Beeper?"

In 1974, the Royal Australian Air Force (RAAF) implemented a simple, inexpensive system to prevent unintentional gear-up landings. The following article explains the approach taken by the RAAF and describes its results.

GROUP CAPTAIN D.N. ROGERS
Base Squadron
RAAF Base
Richmond NSW2755 Australia

■ I was reading the December 1984 edition of your magazine when the article "There I Was" caught my eye. A browse through the story reminded me of a similar incident in the Royal Australian Air Force (RAAF) some 12 years ago. Fortunately, the result was not as bad as could be expected, but the incident provided the catalyst for us to do something about *preventing* unintentional wheels-up landings. If you'll bear with me, I'll tell you the story and how it led to the development of the RAAF's team effort to prevent such accidents.

An F-4E was returning to base on completion of a tactical weapons training mission. The crew rejoined the pattern via initial, pitched out, and called on base leg for a touch and go. The crew performed the checks, flew the approach, landed, and got airborne again. It was then that the pilot discovered that the gear had been up!

The aircraft had landed on the 370-gallon tanks and then gotten airborne without the crew's knowledge (the normal system noises had prevented any unusual sounds reaching the cockpit). Fortuitously, the aircraft was recovered without further damage *after* the gear had been lowered. Cost: Two tanks, two inboard flaps, and one embarrassed crew. You might say it wasn't their day, but it sure was a lucky one.

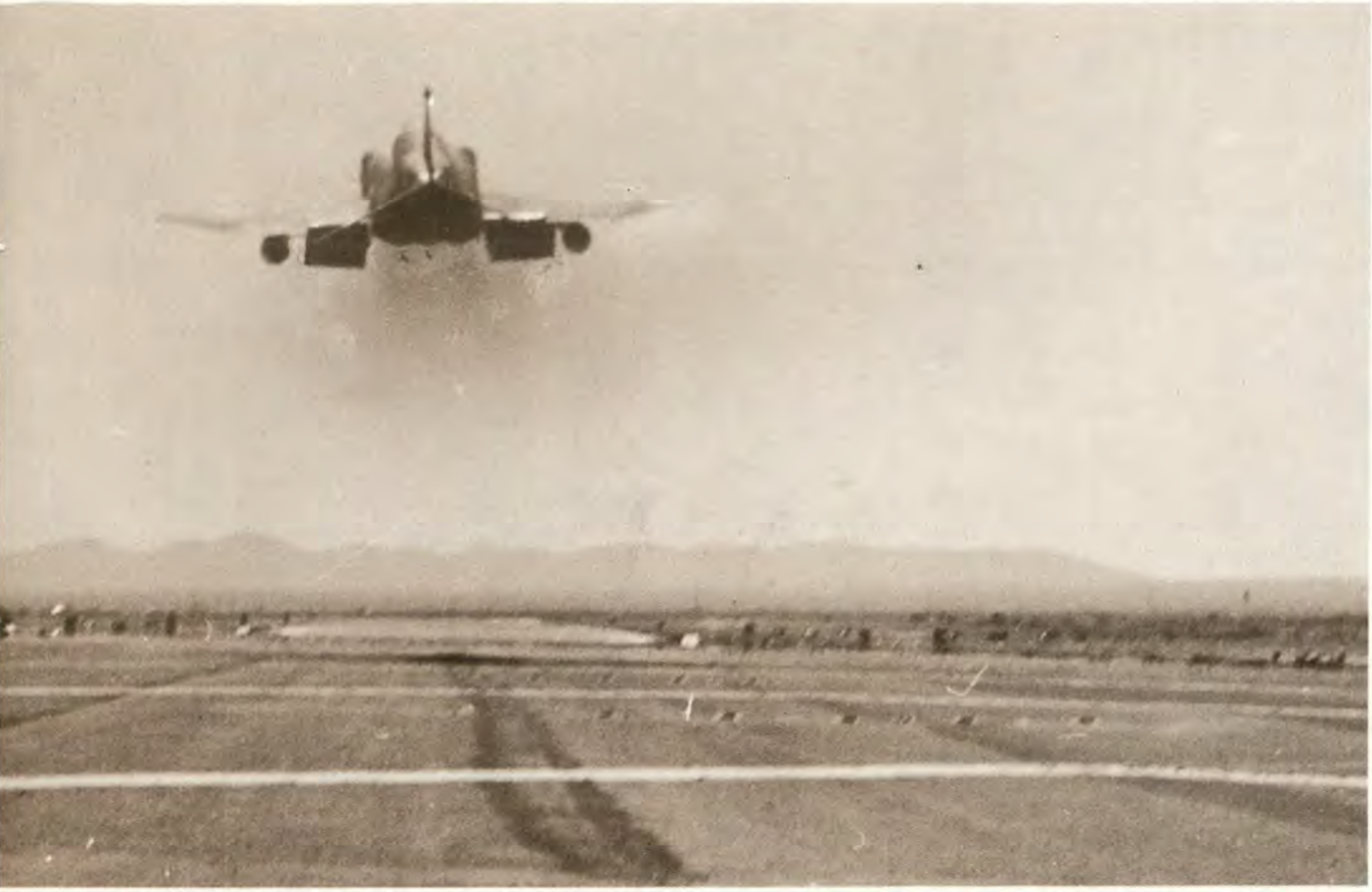
Investigation of the accident proved that the primary cause was the failure of the crew to follow published procedures and lower the gear. Simple? Yes. End of story? No.

Much analysis was undertaken to ascertain how:

- the pilot failed to check and correctly interpret the indicators;
- the navigator failed to interpret the indicators;
- the challenge/response check system failed; and
- the air traffic controllers did not notice the wheels were up during approach.

The answers showed that all the procedures, with the exception of the gear selection, *had* been performed by the crew. They *had* used the challenge/response system, they *had* checked the indicators on the base turn, and ATC *had* looked at the aircraft *but*, as has happened before, *they all saw what they expected to see*. Many theories were proffered by aviation psychologists as to complacency, repetitious tasks, and of the ability of the brain to process information under high workload conditions. We will never know the real answers, but we saw a need to prevent any recurrence.

We decided to develop a team approach to solve the problem, using the aircrew, ATC, and a "beeper" system that was in the RAAF's Mirage aircraft. This latter system is of unknown origin, and we in the RAAF lay no claim to its development; however, it is the "guts" of what we have found to be a very simple, yet effective, way of prevent-



ing the inadvertent wheels-up accident.

The pilot is, ultimately, responsible for the safety of his aircraft and crew at all times, and from this principle we did not retreat. The air traffic authorities are responsible for the safe and expeditious flow of air traffic in the circuit pattern. Put these two elements together, add a *simple* aircraft modification, develop a procedure which is neither complex or time-consuming, and we had *an* answer to the problem. We did not seek to apportion responsibility (e.g., 90% pilot, 10% ATC), but to seek agreement between aircrew and ATC *that a team effort was the key to success*.

Now to the modification. The now RAAF-wide specification involves the wiring of the lock-down micros on all retractable gear legs through either a separate tone generator or the tone generator in the UHF or VHF set, through the radio to a button located somewhere in the cockpit. With the gear down and locked, if the button is pressed, a tone is transmitted over the selected frequency (e.g., Tower, GCA). Thus the pilot, crew, ATC (other formation members, if applicable) all have an aural indication of the gear being down and locked. I'm sure ATC or mobile can see the advantage of this at night or in weather when visual observation of some aircraft landing gear is not possible.

The procedure used is very simple. When the pilot calls base, finals or on GCA/ILS, he uses his call sign and position and calls gear down and locked. The Tower controller replies with the appropriate clearance and calls "check wheels." The pilot replies with his call sign acknowledging the clearance, visually checks the indicators again but, more importantly, must make another conscious physical action and press the button. If the gear is down and locked, the tone (or beep) is transmitted, and the pilot and ATC controller hear the tone which confirms the gear is down. If ATC does not hear the tone, he either calls for the crew to check wheels again or *directs* the aircraft to go round, depending on the circumstances.

The point of the pilot making another conscious physical action to press the button is most important. This act overcomes the problem of "seeing what we expect to see" by introducing another two senses, touching and hearing, in addition to a remote checking device — the air traffic controller.

The concept has a few other advantages in that it provides another method of confirming the gear is down if the indicators fail and obviates a need for a "mobile" or runway caravan controller to check configuration of landing aircraft. (I might add the RAAF has not used such controllers for over 30 years except at primary training bases, but I am aware some Air Forces do, for their own good reasons.)

My research into unintentional wheels-up landings showed that the majority involved multicrew aircraft, and normally some form of distraction (e.g., an actual or simulated emergency) where the pilot

continued

What Is The "Beeper?" continued

was under considerable pressure. In such circumstances, aviation psychologists, who I consulted, indicated that the brain has an in-built priority allocation system. They explained that where a pilot is confronted with a high workload situation (e.g., on finals) which is compounded by other major problems (fire, engine failure), the brain applies a logical priority system and deals with the most critical item first. Thus a fire, combined with aircraft control and approach judgment would take precedence over, say, a flashing gear light or warning buzzer. The warning would register, but the brain, acting on knowledge gleaned in training, would allocate a priority to the body's response which could be very low in the pecking order. This, they say, suggests how some pilots who have landed wheels up, have later said "they didn't hear the Tower calling for the bells ringing in the cockpit!" I can only suggest this may have been a reason for the incident involving the KC-135 reported in your December issue.

An answer to this problem is to have someone else assist with the check, preferably one who is not subjected to the same psychological pressures as in the cockpit. This is where the air traffic controller fits in. He is part of the operating team, and if he doesn't hear the beep or gear down tone, he reacts and plays his part in accident prevention.

The system is officially known as the "Undercarriage Warning System," or more colloquially "the beeper," and is a standard specification for all RAAF aircraft including our new F/A-18. As many of our aircraft operate in and out of civil-controlled airfields, we sought the cooperation of the controllers in the Australian Department of Aviation. They agreed to our request, and it is mandatory in Australia that all military aircraft receive a "check-wheels" call prior to landing.

No system is perfect, and there are flaws in ours (e.g., radio failure). However, since the decision was taken in 1974 to implement the system, we have not experienced an unintentional wheels-up landing. In fact, there have been two or three incidents where we can confidently say that it prevented an accident which, in dollar terms alone, has more than justified the cost of modification (which, incidentally, was comparatively cheap).

When our system was being developed, some critics said that it would place a greater load on ATC personnel; it would increase chatter on the R/T, etc. However, these predictions have not come true. The simplicity of the system, both in technical and operative terms, has been the key to success.

My aim in writing this letter is merely to highlight the point that prevention of this type of accident is much more than briefing crews and publishing articles. Publicity is a *very* important factor in accident prevention, but analysis and a team approach can usually improve the status quo.

I'll bet the squadron engineering officer who was told by his CO to move the gear-up C-5A from the runway would agree with me. ■

Prevention of this type of accident is much more than briefing crews and publishing articles — analysis and a team approach can usually improve the status quo.

OPS TOPICS

Watch the Luggage

■ An F-16D was being ferried from Wright Patterson AFB to General Dynamics at Fort Worth. Prior to departure, the crew chief strapped the pilot's flight bag and other equipment into the rear cockpit seat, and the pilot checked it prior to engine start. After takeoff, the pilot retarded the throttle to below military, but when he released pressure on the throttle, it returned to military. After burning off fuel, the pilot attempted two SFO approaches using steep turns and S-turns to keep his airspeed down. Unable to keep the airspeed down, he was forced to shut off the engine with the fuel master switch and fly a flameout pattern to a successful landing. Postflight inspection revealed the flight bag had shifted and prevented the throttle from being retarded below military power. A travel pod was installed for the next flight.

Gear Check . . . Up?

It had been more than a year since I had flown this small retractable gear airplane. After completing a third touch and go, my concentration was broken. Gear was never retracted. I flew down wind and around the pattern. On final, I "lowered" the gear by manual movement of the mechanically operated gear handle. Aircraft speed picked up and I couldn't get it slowed down. Close in, I checked the gear handle. It was locked in place. Something didn't seem right but I couldn't figure out what. Speed was still about 20 miles per hour above normal for this point in approach. I thought to myself, "I'll just land hot and get it slowed up on the runway with a nose-up attitude on this tricycle-configured aircraft." Another aircraft was just clearing the runway when I was about 200 feet in the air. I had already been cleared to land. As I pressed on, fast and about 10 feet off the deck, the tower told me to take it around. Puzzled, I added power, rogered the tower, and reached to raise the gear. As I was trying to figure out why the wave-off — the other aircraft had already cleared the runway — I realized the gear was already up. As I turned downwind, I called the tower, "I owe someone something . . ." . . . If things don't seem right, go over your procedures to make sure they are.

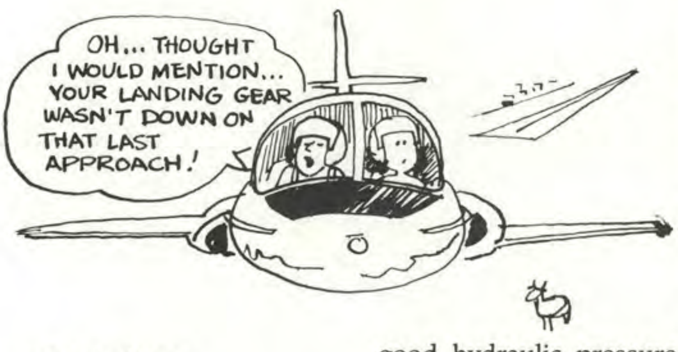
— Courtesy ASRS *Callback*, May 85.

Starter Breech Cannister Failure

During the generation phase of an ORI, all the wing F-4s had starter breech cannisters installed. After one F-4D took off during the employment phase, the pilot was unable to retard the right throttle from the afterburner. He shut down the right engine with the engine master switch, dumped fuel, and flew a straight-in approach. When he lowered the landing gear at 8 NM on final, the wingman saw the right starter breech cannister fall out of the aux air door. After an uneventful landing, postflight inspection revealed the cannister had vibrated loose and jammed the right throttle in afterburner.

Watch Those Lap Belts

During a night range mission, the OV-10A pilot twisted in his seat to observe a flare drop and noticed his lap belt had released. The pilot refastened his lap belt and continued the mission. The URC-64 survival radio in the left lower pocket of his survival vest apparently contacted the lap belt release mechanism and opened the belt. Three other squadron pilots have experienced the same problem.



Three Green

The T-37 mission began with a pattern delay. The IP flew a normal pattern to a low approach. The student pilot then flew a practice, no flap, low approach because the RSU crew had not assumed control of the runway. On both patterns, the cockpit gear indications were three green lights and good hydraulic pressure with no gear warning horn and no red light in the handle. The crew were climbing out for departure to the area when the tower notified them their gear had not extended on the last approach. The RSU controller had noticed the configuration for the second approach was both main gear up, right inboard gear door down, and nose gear down. The controller was unable to contact the T-37 on guard frequency so he had called the tower to relay the information. By the time tower called the aircraft, the student had already raised the gear.

The IP assumed control of the aircraft and requested an immediate closed pattern. On inside downwind, he configured the aircraft and once again received good cockpit indications. He flew a low approach, and the RSU crew confirmed all three gear down. They departed the pattern and were joined by a chase ship for a closer look at the gear. The chase pilot confirmed the gear down and locked and all indications normal. The IP then flew an uneventful ILS full stop.

Postflight inspection revealed the mechanical linkage from the landing gear handle to the selector valve was out of rig. This made it necessary for the handle to be placed all the way to the bottom of the handle slot before the main gear would extend. The IP remembered the student caught the fingertip of his glove underneath the gear handle when he lowered the gear. Maintenance also found the right main gear sequence valve was out of rig and both main gear down lock switches had high electrical resistance. Additionally, they found corrosion on one connecting bus to the gear handle red light. The aircraft has experienced no further gear problems.

St. Elmo's Fire

A B-52G was flying a night low level when it became necessary to climb to the en route IFR altitude due to loss of VFR references. They could see lightning and thunderstorms in the distance and confirmed by radar that all weather was 25 NM or greater from the aircraft. The copilot saw St. Elmo's fire on the right wing. A few seconds later, there was a large static discharge on the radome. The bright flash momen-

TOPICS

tarily blinded the copilot and safety observer. The pilot initiated a climb, turned all cockpit lights full bright, and declared an emergency with ATC. All aircraft systems were working normally, but the pilot suspected the radome had been damaged and terminated the mission. Following an uneventful landing, a rectangular hole, two inches by three inches, was found in the radome. No other damage was found.

Now Sits Expectation in the Air

Shakespeare (Henry V)

. . . I observed an aircraft low in my windshield. As there was no apparent movement, I determined that we were on a collision course. At this point, I banked my aircraft to the right, kept the oncoming aircraft in sight, and watched the widebody pass on the left at co-altitude. Most important point of this occurrence: Ground equipment that predicts collision paths apparently did not do its job. . . .

Couldn't do that job! The Conflict Alert System can only work for aircraft that are in the computer. If you're flying VFR, you aren't in the computer. Ergo: If you want IFR protection, then file an instrument flight plan. And since we're on the subject of disappointed expectations — we continue to hear frequently from pilots who expect to be given vectors around called traffic. ATC no can do unless you request it. As we have often said, "Ask and ye shall be given." — Courtesy ASRS *Callback*, Sep 84.

Flag Burning

Following a routine transport flight, the crew chief exited the aircraft and inserted the landing gear pins. He returned to the cockpit and turned on all the exterior lights for a visual inspection as required by procedures. He then proceeded from the cockpit down the forward ladder to complete his post-flight inspection. As he approached the nose of the aircraft, he noticed smoke in the nosewheel area. Closer inspection revealed that the nosegear pin warning flag was hanging across the front of one of the nosegear landing lights. He immediately instructed the maintenance personnel in the cockpit to extinguish the lights. The lights were turned off without delay; however, the flag spontaneously burst into flames. The crew chief quickly removed the burning flag from the nosewheel area.

Conclusions: The fire alone could cause major damage to the aircraft; also, the proximity of fire to highly volatile fluid systems is a matter of extreme concern.

Corrective action: Replace landing gear warning flags at regular intervals to prevent unnecessary hazards associated with oil and fuel absorption. Ensure that the warning flag is positioned behind the landing light when the nosegear landing lights are operated on the ground. Recommended change to the manual is in progress warning about the potential problems of spontaneous combustion when warning flags are exposed to the high heat of the nosegear landing lights.

Comments: The disaster potential of this incident is frightening. Had not the crew chief been so alert, the community might have sustained its first casualty for this aircraft type. Fortunately, the incident has been an inexpensive but vivid learning experience. — Courtesy ASRS *Callback*, Aug 84. ■

UNITED STATES AIR FORCE

Well Done Award

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Accident Prevention Program.

CAPTAIN

Michael R. Cook

51st Tactical Fighter Wing

■ On 23 October 1984, Captain Cook was leading a two-ship A-10A theater indoctrination sortie for another pilot's first mission. While passing over an air base to familiarize his wingman with one of the several divert bases in the local area, he increased the cockpit temperature setting for his personal comfort. The temperature began rising rapidly, soon becoming noticeably uncomfortable. Terminating the mission and turning toward home base, he accomplished the applicable bold face procedures for cockpit overtemp, but could not stop the airflow. None of the other environmental controls had any noticeable affect on the cabin temperature, and the temperature inside the cockpit was approaching an intolerable level. Feeling that personal injury or incapacitation was a distinct possibility if he did not either jettison the canopy or land immediately, Captain Cook decided to land at a military field short of home station. During the descent, he found the hot air flow could be reduced by retarding both throttles to idle. Captain Cook ensured his wingman was prepared for his first landing in-country at a strange field, coordinated with personnel at the divert base for emergency response, and maneuvered his aircraft to a safe approach and touchdown. During the emergency, the cabin temperature had increased to such a level that when the canopy was raised during landing roll, steam rose from the instrument panel and consoles. In the short time between the initial onset of the overtemp and the full-stop landing, Captain Cook suffered first degree burns on various parts of his body from an airflow that was estimated to be 500 degrees at the cabin air outlets. Examination of the aircraft revealed a loose air duct in the environmental control system had allowed engine bleed air to enter the cockpit directly. Captain Cook's exemplary airmanship and ability to act decisively and correctly under extreme physiological stress prevented a potential loss of life and saved a valuable aircraft. WELL DONE! ■

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UNITED STATES AIR FORCE

Well Done Award

Presented for outstanding airmanship and professional performance during a hazardous situation and for a significant contribution to the United States Air Force Accident Prevention Program.

MAJOR
John H. Taylor, Jr.
901st Tactical Airlift Group (AFRES)
Peterson Air Force Base, Colorado

■ On 26 September 1984, Major Taylor made a normal takeoff in a C-130B aircraft in VFR conditions. Acceleration to climb speed was normal, but when a left turn out of traffic was initiated, very little roll response resulted. Major Taylor manipulated the yoke to decrease and increase aileron deflection. The aircraft did not respond, but began an uncommanded left roll. Full right yoke deflection had no effect. Major Taylor, quickly analyzing the situation, used rudder, differential power, and aileron trim to level the aircraft. He directed his copilot to declare an emergency and his loadmasters to look for the point of disconnect between yoke and ailerons. He began turning back toward the aerodrome and determined the best maneuvering technique was the use of aileron trim. When he reduced the airspeed to 150 knots on final approach, the trim became ineffective, so rudder and power were the primary roll controls. A right quartering tailwind made runway centerline acquisition a real challenge. Just prior to touchdown, Major Taylor skillfully applied a sideslip making a landing on the runway centerline that resulted in no damage to the aircraft and no injury to those on board from a nearly out-of-control C-130. Major Taylor's quick and accurate response to a unique mechanical failure in the C-130B averted the loss of an aircraft and the possible loss of six lives. WELL DONE! ■

FLIGHT SAFETY

A SERIOUS MATTER

F or all of you whose job it is to tend or fly a plane,
L est carelessness infect you, here's a message to retain.
I gnoring safety never pays, in any circumstance.
G o gamble at the racetrack, please. At work, don't take a chance.
H umanum est errare, and a fault you hide can kill.
T he lives of friends (and maybe yours) are riding on your skill.

S obriety, devotion, and attention to the task
A re what you need to do your job. It's not too much to ask.
F orgetting once to do what's right, or doing it too late,
E ndangers more than property, so do it now — don't wait!
T ake care to keep abreast of news, and use your ears and eyes.
Y our first concern and worry is the safety of the skies.

Courtesy Flight Comment Magazine No. 2 1985