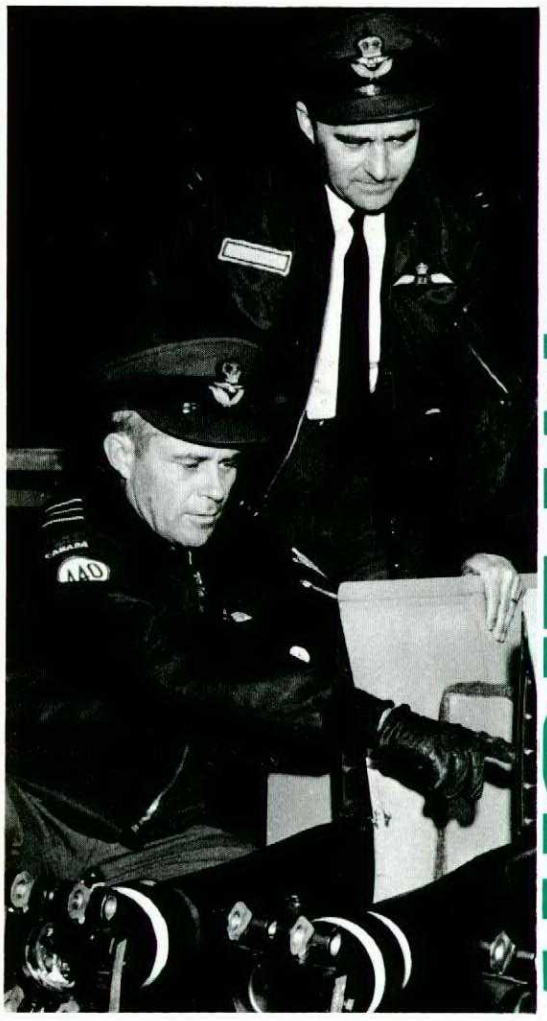
FLIGHT COMMENT

JULY • AUGUST • 1969



THE FLIGHT SAFETY OFFICER

an FSO trains
an FSO acts
an FSO speaks out
an FSO is challenged

AND THE FLIGHT SAFETY

Comments

We urge you to take the time to read the theme articles leading off this issue because - believe it or not - safety is something you must first get the "feel" for. In this modest venture we're particularly indebted to Capt Patrick who despite his upcoming posting to another job took the time to prepare material.

We have learned that a CPI (crash position indicator) is now in use by some civil operators in Canada. If this device is activated it will transmit a characteristic signal on 243.0 mhz. The signal is a distinctive, undulating high-pitched "pew, pew, pew, pew...". Should this signal be heard it should be immediately reported to an ATC agency.

Here's the kind of report that really peps up the ol' morale: "Since the flight safety surveys were completed there has been a marked increase in communications between the CHQ and the bases visited on matters pertaining to flight safety. Surveys and informal visits will continue to be carried out as often as possible by the SOFS staff."

American Airlines is retrofitting its fleet of Boeing 707 and 720 aircraft with two-stage, 3-micron absolute filters. This ultra-fine filtration equipment will remove wear-causing contaminants from hydraulic lines, increasing hydraulic component life. The unit is *stated* to eliminate the need for hydraulic system flushing, as well as precautionary replacement of the surviving pump following a metal-generating failure of a hydraulic pump.

Here's a message with a message. A recent incident report stated "On air test port engine feathered normally but would not unfeather. Second incident in two days. First not reported."

Drugs again. Recently a supervisor under medication from the base hospital, succumbed to his treatment to the extent that his judgement and faculties were impaired. The base suggested that the medical chit in such cases should be stamped "under medication" or something to that effect. It's worth considering.

CANADIAN FORCES HEADQUARTERS
DIRECTORATE OF FLIGHT SAFETY

COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

MAJ W. W. GARNER
FLIGHT SAFETY

LCOL H. E. BJORNESTAD
INVESTIGATION

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THE FLIGHT SAFETY OFFICER

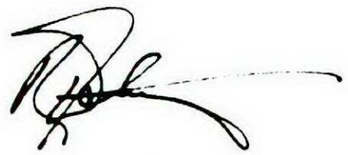
What is an FSO? The answer might come back: "An FSO is an officer appointed to the position of Flight Safety Officer". And, too often the FSO is seen in this light - simply as an appointee. That this is so is partly our fault; perhaps we're so close to our work that we feel no urge to justify our existence. To put you in the picture, the lead-off articles in this issue will give you an idea of who the FSO is, how he trains, how he acts, and how he thinks.

Hopefully, from reading these articles will come a fuller understanding of the FSO's work. And from this, a clearer picture of your involvement in flight safety will emerge.

Whatever your attitude towards flight safety and the FSO, you should know that many of us are alive today because of the progress achieved by devoted and active FSOs. Conversely, many of our accidents reveal the absence of flight safety in the attitude of those involved as well as in the procedures employed.

What I'm really saying is that we're all involved in flight safety; this being the case, our relationship to the FSO is really one of *participation* in his work. He has the facts (or he'll get them), he has the training - and the responsibility - to work toward the efficient, safe operation.

In the aviation business we must all recognize that his capacity to work for us all, derives almost entirely on our willingness to work with him.



COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

an FSO trains...

Capt E.I. Patrick

Change in the Canadian Forces brought about by continually improving resource utilization has resulted in a changing role for the FSO (Flight Safety Officer) and in his training...

The high accident rates of years back meant investigating serious accidents was a major part of the FSO's work. Nowadays, crash investigation is done by DFS investigators who receive special training for the work and another level of investigation is assigned to the FSO: coordinating the responses to minor accidents and incidents. This means that he is occupied with such problems as:

- Why did a part fail?
- What caused the fire-warning system to trigger falsely?
- Did the aircraft hydroplane off the runway or were the brakes not functioning properly?
- Did the pilot misjudge his landing from lack of training, or did he suffer from fatigue, or was there a white-out condition?

It is the answers to these questions that provide the preventive measures which preclude catastrophic accidents.

An understanding of man himself, the machine he operates, and the environment he works in, helps to condition his attitude toward potentially hazardous areas. By becoming familiar with the fundamental causes of accidents (most causes are of a recurring nature), a trained individual can detect trouble in the making. Thus, the training of flight safety officers involves a study of all three aspects: man, machine and environment.

The annual Canadian Forces FSO Course is sponsored by the CFHQ Directorate of Flight Safety and is conducted by Training Command Flight Safety staff. Two weeks of a "total immersion" concept provides the maximum benefit for the minimum time. Candidates are normally pilots of major or captain rank who will be employed as FSOs on course completion.

Because of the scope of flight safety work, the first week of the course is exclusively the familiarization with the many background areas under study. Three major subjects which deal directly with the man/machine/environment complex - accident prevention, aviation psychology, aircraft engineering - are handled by visiting lecturers from the University of Southern California's Aerospace Safety Division.

The accident prevention series deals with the historical buildup of accident data and how the interpretation of this data has led to universal concepts in prevention programming. Because man is the common ingredient in all operations, understanding his makeup and how he reacts to his environment is vital to understanding the mistakes he might make, or in interpreting the response he did make. Unfortunately, this area was overlooked for many years because a pilot, for example, somehow was considered to be superhuman, infallible by normal standards. Consequently, when a pilot erred - as

Flight safety is achieved by the written word!

A "crash kit" is on every base. This kit and its maintenance is an FSO responsibility.

all humans do - his mistakes were considered to be due to stupidity; hence, the causes of many accidents were assessed "pilot error". However, in many of these accidents the pilots were placed in impossible situations beyond their human capabilities. Technology leaps ahead and "The naked ape is in danger of being dazzled by it all and forgetting that beneath the surface gloss he is still very much a primate."[1] It is in this aspect of flight safety that significant gains are possible - thus, the reason for the emphasis on understanding man.

The aircraft engineering phase includes the aircraft structure and its limitations. Design concepts, maintenance practices, non-destructive testing are all touched upon in this broadening of the prospective FSO's knowledge. The medium in which the aircraft operates (referred to as the environment) is another important phase of being able to understand the total picture.

By the end of the first week, the course members have a good working knowledge of the basics required of any flight safety staffer. This leads naturally into the

[1] *Morris, Desmond:* The Naked Ape, *Bantam Books of Canada Ltd; p21.*

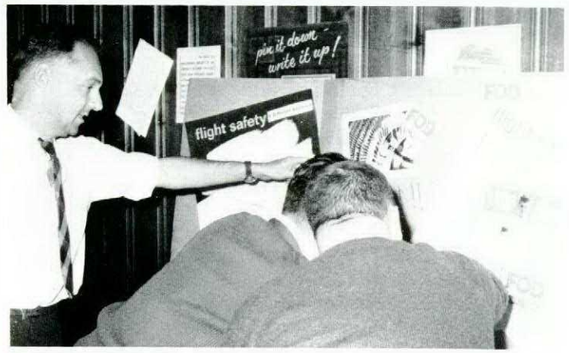
specifics - aviation medicine, life support equipment design and development - and such topics come within the purview of the FSO in one way or another. The effects of heat, cold, fatigue, boredom, drugs and disease all create stress - stress which when compounded with other factors can overwhelm a man and cause an accident. The clothing he wears and the equipment he handles all contribute to (or detract from) his capability to perform his mission successfully; after all, mission accomplishment is the end product.

Throughout the course, civilian and military guest speakers provide a cross-section of backgrounds from commercial aviation and from each of the Canadian Forces air environments. In this way, an appreciation of every type of flying operation is gained; also, the desperate need for greater communications among all flying organizations becomes readily apparent.

The practical aspects of flight safety work are handled through a series of lectures, written exercises, mock occurrences and syndicate discussions. Active participation by the course members is encouraged throughout, for the work of the graduate FSO depends to a great degree on the initiative and interest of the individual, and on his capability to deal effectively with other people. Seminar-type classes encourage a give-and-take atmosphere because the "total immersion" principle requires maximum interchange of ideas and sharing of knowledge.

The course is predicated on the assumption that accidents can be prevented if someone somewhere with the training, the imagination and the foresight to recognize warning signs, comes up with a remedy *before* an accident occurs. That someone is the flight safety officer who has the training and the interest to monitor the whole operation for weaknesses and deficiencies, and who sponsors for his commander a systematic and aggressive program which should have the support of us all.

Much of the training is focused on group discussion. Here, an accident report is carefully appraised and analyzed.



Maintain good bulletin boards and create good posters from local materials - both are required of the FSO.

an FSO acts...

Capt E.I. Patrick

If you leaf through any recent Annual Aircraft Accident Analysis for the Canadian Forces, you will see that the accident rate since 1960 has undergone only minor downward shifts. Is this levelling-off an indication that we have reached an irreducible level? Are further efforts at reduction now in the uneconomical, diminishing returns area? Is flight safety as originally conceived, now dead?

The decimating accident trend prior to 1960 necessitated a vigorous flight safety program; however, most of the FSO's work was investigating and reporting accidents. Little time was left for real prevention efforts beyond discovering the causes of accidents and broadcasting this information. Even these prevention efforts were questionable, for pilot error predominated as a cause factor and the "it can't happen to me" attitude was prevalent. This was the age of *the tiger.*

Greater understanding by supervisors of the human and materiel problems associated with air operations, and a professionalism that is replacing the laissez-faire attitude of the past have resulted in more realistic and effective mission assignments. A more mature approach in every flying environment has brought about better supervision, and attention to even the smallest details

The problems of lodger units require extensive coordination with unit representatives.

The FSO depends upon engineering officers for technical advice and support.

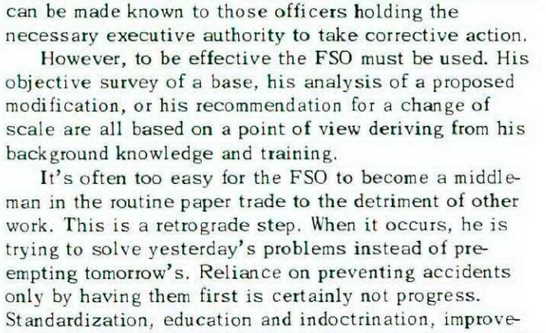
affecting operations. Only by much intensive effort has the Canadian Forces been able to reduce its occurrence rate to the present level.

As accidents are caused, they can be prevented - so long as the causes can be known in advance. Therefore, the acceptance of an irreducible (minimum) rate is admitting defeat. There is no doubt that we are in the region of diminishing returns where much effort is required for very small gains. However, the gains are human lives and very expensive aircraft! Therefore, any effort expended reaps worthwhile benefits.

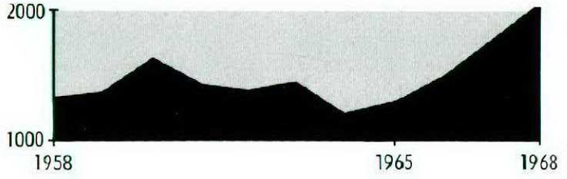
With fewer accidents but the same size flight safety staffs, what do our FSOs do with the "extra" time? When there are no accidents, is there no work? On the contrary, an accident today indicates *a failure in the system* rather than a reason for the FSO's existence. Almost all flight safety efforts and training today are based on the idea of pre-empting accidents at the incident level. By learning what deficiencies exist in the machine, in the training system, in life support equipment, or in the man himself a commander can take corrective action before a mishap occurs. The pinpointing of these deficiencies is often the work of a flight safety representative, for he has the background and training to recognize the warning signs. What might seem an isolated occurrence might be a harbinger of trouble. Consequently, the FSO fully researches every occurrence that arouses his suspicion.

Although not changed in concept, the FSO's work has broadened in scope and a shift in emphasis to the *non-accident* side has occurred. By attacking every minor incident hampering the operation, he has helped to prevent the insidious buildup of overwhelming problems. To do this the FSO is delving into areas previously considered beyond his terms of reference but these are the very areas which are causing the problems and driving up the operating costs. This monitoring function has been instrumental in achieving greater component reliability, better equipment, and more sensible operating procedures.

Indicative of this trend in dealing with minor problems is the tremendous increase in incident reporting (see table). We've always had incidents but no one before had the time or the interest to research them. Our problems are no longer mainly catastrophic accidents; they are those little things that erode our capability to perform assigned tasks. Aptly put and often quoted is: "We are not today being eaten alive by alligators; we are being nibbled to death by ducks".



To prevent recurrence of problems, the FSO must investigate every potential accident carefully.



Thus, today's FSO can be seen researching modifications to aircraft and equipment, sponsoring crash rescue drills, setting up water survival programs and testing new life support items. In any area where aircraft or aircrews are involved, the FSO will be there. As the specialist adviser to a commander on all aspects of aircraft management, he will offer advice and make recommendations. His terms of reference give him direct access to all levels of command so that his observations can be made known to those officers holding the necessary executive authority to take corrective action.

However, to be effective the FSO must be used. His objective survey of a base, his analysis of a proposed modification, or his recommendation for a change of scale are all based on a point of view deriving from his background knowledge and training.

It's often too easy for the FSO to become a middleman in the routine paper trade to the detriment of other work. This is a retrograde step. When it occurs, he is trying to solve yesterday's problems instead of pre-empting tomorrow's. Reliance on preventing accidents only by having them first is certainly not progress. Standardization, education and indoctrination, improvements in materiel, facilities and attitudes - these are the

things which prevent accidents.

Having a strong, hard-hitting flight safety program that doesn't offend anyone is merely paying lip service to a requirement. By dealing in half-measures and compromises, by forgiving and forgetting, we are doomed to repeat history. This is unacceptable with the increase in stresses on those operating within such an environment. Where narrow specialties tend to develop, coordination and overall monitoring becomes extremely difficult for a commander who just hasn't time for the myriad details that plague any operation - ample justification for flight safety staffs.

The FSO, in his determination not just to become involved with the operation *after* an accident occurs, is an ever-present onlooker, a troubleshooter, an expeditor of necessary changes, an ombudsman for any and all problems that afflict the operation - be it false fire-warning indications or flying suit deficiencies or any interference with the flying program.

The FSO has a real and useful function - if he is employed by those who control the operation. He's yours. Use him!

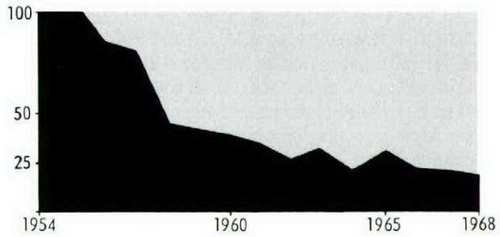
FLIGHT SAFETY AND THE FLIGHT SAFETY OFFICER

an FSO speaks out...

Of the several millstones
around the FSO's neck,
the heaviest is the gross misconception
that flight safety and operational effectiveness
are in conflict...

Like many of his counterparts in the Canadian Forces the Flight Safety Officer lives in a changing world. For him, there's an inheritance of the really tough problems - the ones his predecessors had been unable to make headway against.

More is expected of today's FSO because he moves in a world of increasing competence. Just how competent the Forces are is reflected in this graph showing the number of aircraft lost to accidents. You can't argue with success like that but even today there still persist schools of thought about safety which, like it or not, the FSO must live with.



Of the several millstones around the FSO's neck, the heaviest is the gross misconception that flight safety and operational effectiveness are in conflict. This attitude - a hangover from the Tiger Spirit days - creates an atmosphere in which the flight safety officer is somewhat "apart". The persistent notion that flying is one thing and safety another dies hard but there's increasing and encouraging conviction on the part of management that what we have been calling safety all these years is really a derivative of efficiency. It's hardly surprising then, to see literally hundreds of editorials and articles attesting to the fact that "safety is a management function" and that "the commander is the formation's real safety officer". That it is necessary to reiterate this proposition is itself an illustration of the contrary-minded element within military forces.

To illustrate this point we conducted a fictitious interview with an FSO recently. We put several questions to Maj M. Forthright:

What first made you suspicious of the word safety?
During my early years of service, like most persons I didn't question the concept of safety; after all, as a pilot I feel flying most certainly should be made safe! But while I still have no quarrel with the desireability for safety in all phases of operations, I feel that the service could pursue a larger goal - one of *total* involvement in preserving resources.

You imply that safety is too limited a concept for your liking. How do you feel this to be undesireable?
We have for years treated flight safety as an entity distinct - and unhappily, apart - from the agencies which determine operational procedures. We have inherited the mantle of the kindly humanitarian or custodian of conscience. This, I think, accounts for the "watchdog" image that so often interferes with our effectiveness.

Then you feel that being apart has its drawbacks?
Well, I was given to believe that flight safety was something distinct and separate. This is hardly surprising because we're all acquainted with that image of separa-

teness - the flight safety officer. (As if any one man could really be responsible for flight safety.) The impression this creates - however subtle - is that flight safety is superimposed on, but never part of, the operation. We still hear today expressions such as "... the achievement of operational effectiveness - consistent with flight safety" as if almost by afterthought this consideration were tacked on.

Aren't you overstating this; I mean, isn't this less a problem today than it was in the past?

Certainly. Today there are fewer persons who are angered by flight safety considerations apparently restricting their freedom and slurring their competence. It is this progress which makes me ask if safety is what we are really trying to achieve.

If it isn't safety, then what is it?

The dictionary states that *safety* is freedom from danger or risks; yet there's no acknowledgement in your definition which would indicate a direct concern for this aspect. To illustrate I'll quote the stated aim of flight safety: "The aim of flight safety is the promotion of operational effectiveness by preserving resources". This aim is readily meaningful because the incredibly high cost of military operations compels us to regard any loss as "avoidable". This has strengthened the influence of the flight safety organization because resource losses are of enormous significance to management. History has proven that air power has lost far more from avoidable accidents than from combat during military actions. In this context, terms such as "attrition", "operationally acceptable" have lost or are losing their acceptability. Resource loss prevention is therefore a management tool of increasing potency; it can no longer afford, therefore, to remain separate.

In what way can we "not afford" to remain separate?

At present we acquire and operate aircraft in a manner prescribed by agencies other than flight safety. By this, I don't mean that safety is not a significant feature of operational planning but experience has taught me that priorities are given to a "total" exploitation of a weapons system. Thus, circumstances relegate flight safety to an after-the-fact position of influence. As the grim statistics start arriving, flight safety *then* becomes most influential. We can all think of many occasions when this odd inversion of priorities occurred - and is still occurring.

In what way do you see flight safety extending its influence?

It is entirely understandable that military planners and operators should see safety as having little relevance to warfare. After all, war is a deadly business; you only have to look at the statistics to see that! I said earlier that resource conservation is now a fact of war; there is nothing genteel or humanitarian about it - we simply can no longer afford to ignore it in our basic planning. Each purchase of aircraft is smaller in number yet more costly - and ironically easier to damage. As the margin for error narrows the necessity for resource preservation increases. On the new Jumbo jets, for example, safety must be the *paramount* consideration in their operation.

How can a safety "presence" be achieved?

Well, first let's look at accidents honestly by acknowledging that most of them are repeats of previous ones. Of these repeats most testify to our inability to apply preventive measures with sureness and persistence. If this be the case, then why not give the prominence to preventive measures that we now accord to cause factors? Our preventive measures are the real key to safety yet we cannot resist the temptation to generalize from our experience by creating elaborate statistical summaries of our total experience. This is somewhat like looking at a tree from a distance without discovering that it consists of individual leaves.

How would this concept be applied?

To be specific, why not record, log, and even make statistical returns on proposed preventive measures? We have an efficient set-up for keeping tabs on cause factors but I'm afraid our memory is somewhat shorter when it comes to preventive measures. Therefore, I suggest we create detailed returns on preventive measures - accomplished and (most important) unaccomplished. In this way, we could measure the determination of management to get at the "next" occurrence. And I don't see why we cannot accomplish this under existing reporting and monitoring procedures. Anyway, it would at least be putting into action our words about resource preservation.

What does this mean for flight safety in the future?

If after-the-fact response is no longer acceptable, then resource preservation agencies will surely increase in influence among planning and operation staffs. Thus, the man without, becomes the man within - the adviser becomes the executive. If we don't do it this way is there any real expectation of a zero accident rate?

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Whenever safety is not inherent in the procedures and equipment (and our accident statistics prove to what degree this is a fact), then "safety" will have to be imposed *after* each unhappy occurrence. Flight safety is bound to be regarded as an appendage rather than an inner functioning component of an organization.

True, military management is increasingly aware that safety is a basic ingredient of aviation operations but regrettably there's still a long way to go in this campaign of equating safety with efficiency. If more people would recognize that a lack of safety in any operation ultimately derives from inefficiency somewhere, then we would be well armed to make inroads into the continuing loss of lives and aircraft.

Cutting cuts birds

BATCO reported that with the increase in grass cutting a reduction in the bird population was noted. Earlier grass cutting may be required.

- Flight Safety Committee

FLIGHT SAFETY AND THE FLIGHT SAFETY officer

an FSO is challenged...

Flight Comment... usually an excellent rag but inconsistent...

In the context of what has gone before in this FSO series - particularly in the previous article - it's appropriate that we should insert here a letter to the editor replying to our strongly-worded dissatisfaction with "... this bloody armament door" (Nov/Dec 1968). You may recall we had quite a go at the old villain (or is he?) so we thank LCOL D.E. Cameron of CFHQ for giving witty eloquence to what we had always regarded as a rather dumb door.

(The point of our earlier article was that the door was more the villain than the pilots who failed to latch it up before taking off. The T33 crashed injuring both men.)

Editor, Flight Comment

Your bleat "... this bloody armament door" illustrates the inadequacies of the adversary system of justice. I went directly to the villain.

"A well-known Canadian says that dialogue can open a door. What say you, door?"

"Oh, I always act in accordance with the forces on me. However, 'a mere disruption to a normal behavioral pattern can cause disastrous results'. Take my Lakehead experience; dialogue kept me open."

"Don't you realize, door, that to err is human?"

"Certainly, but I don't brood about it. Except for about 9 cases in over a million flights I have found that not to err is also very human. In any case, I'm not human. My mother was an aircraft designer, so you might say I was airborne."

"Don't get facetious, door, or I'll throw the book at you."

"AOIs? Wishful thinking. It already has me covered. They can amend it all they want, legislate, change the rules of the game, and I won't know the difference. I'll still behave in accordance with the law - the natural law. You can't just write laws and make them stick - it's against nature. You have to discover laws."

"No, door, I was thinking of Flight Comment."

"Oh, that one. Usually an excellent rag, but inconsistent. Sometimes it gets uptight, or should I say unhinged, or unlatched? Constructively unconstructive. Did you see what it called me - bloody armament door. Demagoguery! It's libel to approach hysteria. Slander is just talk, but to air is human."

"Get serious, door, or you'll be strapped."

"Nonsense. Strap me to cure people, to change the law? As silly as strapping people to cure me. Only I don't need fixing - I have never behaved improperly or broken the law. To err is human. People do behave according to their programming. A varied situation can produce disastrous results. This is also due to programming. Pavlov learned that with his dogs, hence the human saying 'The err of the dog that bit you'."

"The err is getting polluted, door; keep the dogs out of it."

"But that's the problem. Program a precise routine, dogs, people - all the same when it comes to training them. They breathe the same err. You keep the dogs out; I didn't bring them in. I merely mentioned dogs; you produce them."

"Latch up, door, you're looking at people and seeing dogs."

"That's what I'm driving at. People see moose and shoot people. Those bloody armament moose."

"Come off it, door, you're unhinged".

"Not a bit of it. More armament goes through a moose nowadays than through me. You might better call me a bloody pilot luggage compartment door."

"I see, door, the moose isn't bloody when we shoot people. The light is ON."

"Keep the light out of it. Besides skirting the issue and complicating the works, it's a matter of reliability - the same goes for a spring or an aerodynamic tab. Fortunately the necessary wind tunnel trials can't be done in the near future. Can you imagine a tab under every attitude of airflow possible for a T33 to encounter, or in icing conditions, always exerting the desired pressure! Murphy's Law doesn't support a spring - some Pavlovian dog would shut and partially latch me to keep out rain or snow."

"Keep the dogs out, door."

"Yes, dogs too. Dogs are the villains, not I. I'm merely a scapegoat. I've even been lumped with that Hercules door which was a hearse of a different choler. It was errborne."

At this point I decreased the angle of attack and the door clammed. You can appreciate my reasons for stopping the dialogue. Anyhoo, I latched the door properly. I had to pay attention to what I was doing, but it was easy and simple. Maybe too simple.

Any comments?

LCOL D.E. Cameron

PS Being very crafty, I am not responsible for anything controversial in the dialogue. I merely recorded it. Like the Pavlovian dogs, I have my scapegoat - it's that bloody armament door.

As we said in the preamble to this letter, the point of view expressed is one of the contending points of view in the battle (and it is a battle) for achieving avoidable loss of resources. Exposed as we are with daily repetitive aircraft occurrence reports involving

cont'd on page 20

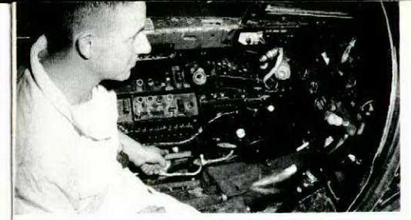
Good Show

Maj J.M. Denard, Jr

Capt W.H. Meaden

Cpl D.A. Robinson

Cpl H.E. Haapala



Cpl R.B. Conley

Cpl L.W. Covyeow

Cpl L.G.W. Brooks

Cpl J.P. Chiasson

Pte R.N. Copeland

MAJ J.M. DENARD, JR (USAF)

Soon after takeoff, a CF104 with an inexperienced pilot at the controls, was hit by a large bird which smashed the canopy. There were strong indications that the engine had been seriously damaged. Maj Denard who was flying as instructor in a chase aircraft immediately began providing assistance. Although both aircraft were considerably above maximum landing weight, Maj Denard planned a precautionary approach talking the student around the pattern and onto the runway for a safe landing.

The calm manner and professional ability demonstrated by Maj Denard in giving his student confidence and precise directions resulted in the safe recovery of a valuable aircraft. Throughout the brief flight Maj Denard's judgement enabled the student to cope with a very critical in-flight emergency.

CAPT W.H. MEADEN

Immediately after takeoff in a Hercules, Capt Meaden experienced a complete failure of all his attitude references. With weather at IFR minimums, control was immediately handed to the first officer but an identical failure occurred within a few seconds. While power supplies were being changed both compasses became useless for primary heading information. Capt Meaden again took control and piloted the aircraft with only needle and ball, the pitot static instruments, and standby compass. Because of the nature of the unserviceability he was required to climb through 25,000 feet of cloud before gyro instruments were returned to operation.

Capt Meaden's superior knowledge of his aircraft and the cool competent manner in which he reacted to this emergency meant the successful completion of a mission which could have ended much differently. Capt Meaden's competence exemplifies professional flying at its best.

CPL D.A. ROBINSON

While packaging time-expired Tutor canopy removers for shipment to the repair and overhaul contractor, Cpl Robinson noticed indentations in the neck of one of the removers. His intimate knowledge of this equipment enabled him to assess the potential hazard of this seemingly insignificant damage. The indentation was caused by faulty design which permitted a pointed retaining screw to be pressed into the thin wall of the tubing which houses the firing mechanism of the canopy remover. Ten removers were found in this condition and considered unlikely to fire.

Cpl Robinson's alertness and competence led to detecting a condition of serious proportions. His timely Urgent UCR was a commendable contribution to flight safety.

CPL H.E. HAAPALA

While on an inspection of a CHSS-2 helicopter, Cpl Haapala was alerted by the presence of oil on the main transmission upper housing. He cleaned the area and in a spot partially hidden by another component, discovered a crack in the transmission housing.

Cpl Haapala's alertness and initiative led to the discovery of damage which could have resulted in a transmission failure in flight. Cpl Haapala demonstrated that a large contribution to flight safety can sometimes be made by attention to very small details.

CPL R.B. CONLEY

While working in the front cockpit of a T33 during a periodic inspection, Cpl Conley discovered a metal stud firmly lodged in the rudder cable pulley groove. The stud was positioned so that it could have fouled the rudder cable creating a serious inflight emergency.

By his keen observation and professional thoroughness, Cpl Conley discovered a foreign object in a region which is difficult to visually inspect. This discovery exemplifies the contributions made to flight safety by conscientious and alert technicians.

CPL L.W. COVYEOW

On coastdown after termination of the flight, Cpl Covyeow, a crewman of a CUH-1H, heard an unusual noise and noted that the power turbine came to an abrupt halt. His report led to an investigation which disclosed a washer jamming the power turbine rotor. This discovery prompted a dismantling of the engine. A stud holding a bearing housing had sheared allowing the washer to fall and pass through the engine; fortunately the broken stud was held in place by its locking wire. Another stud was ready to fail; later, a stud was found sheared in another aircraft.

Had the engine been started it could have been damaged beyond repair. Cpl Covyeow's alertness and initiative resulted in the timely detection of a serious flight hazard.

CPL J.P. CHIASSON

While inspecting a CF101, Cpl Chiasson observed that the pin holding a component of the nosewheel oleo was out of position by 1/8". Investigating this apparent minor discrepancy he found that the retaining bolt for this pin was missing. In this condition the pin would have worked loose causing severe nosewheel shimmy on landing. This shimmy has in the past resulted in extensive damage to the nose section and the radar.

The detection of such a small discrepancy as this indicates a commendable integrity and attention to detail. Cpl Chiasson's alertness averted a costly accident.

CPL L.G.W. BROOKS

During a routine inspection of a T33 engine, Cpl Brooks noticed a turbine blade very slightly out of position but otherwise perfectly normal in appearance. A person of lesser integrity could have passed this off as too small for concern but Cpl Brooks persisted in his investigation. By finger pressure alone he was able to remove the blade from the turbine wheel; this led to the discovery of 22 unserviceable blades on the turbine wheel. Further investigation uncovered a failed seal bolt, the head of which was touching the blade retaining lugs causing severe wearing and peening. Other components were badly scored and peened. In this condition the engine could have failed in flight.

Cpl Brook's professional attitude brought to light a seemingly small but serious deficiency, averting the possible loss of an aircraft.

PTE R.N. COPELAND

While performing an airframe primary inspection on a Tracker, Pte Copeland heard a small clicking emanating from the port elevator control area. Judging this sound as having possible significance he reported the finding to his supervisor. The resulting extensive inspection of the elevator control system revealed an excessively worn centre bearing. Several more aircraft inspected were found to have the same defect.

Pte Copeland's alertness and initiative brought to light an aircraft condition which could have developed into a very serious inflight emergency - demonstrating the vital role played by technicians in the achievement of flight safety.

On a recent trip to Maritime Command, Col RD Schultz, Director of Flight Safety, personally honoured two corporals by presenting them with Good Show scrolls. The photos show Cpls Galbraith and Smith receiving their awards.

Trim charge

Beneath that innocent looking plastic trim button is a shock hazard of considerable proportions. No, it's not a serious problem these days (it is in other services) but it's worth keeping in mind that technicians and pilots should pay continuing close attention to this fragile item. Remember, most of the problems result from buttons broken by being struck with hard objects.

CBs
- don't tangle with these!

Not alerted to the possibility of hail by the forecaster, the pilot flew into cloud and sustained hailstrikes, damaging both landing lights, pilot's windscreen, radio antenna and starboard elevator.

The pilot, on a low-level nav mission flew into a rainshower at the base of a heavy CB. He saw a bright flash and felt a tingling sensation in his hand. He lost the generator, TACAN, UHF and pitot heat. A ruptured pitot static line caused incorrect airspeed indications and he landed with the assistance of a pacer aircraft.

At 33,000 feet in cirrus the aircraft sustained hail damage in which the nose section, vertical stabilizer, air intake duct and leading edge of wing was damaged. The pilot, knowing of possible CBs should not have remained in the cirrus level where no lookout was possible.

Using radar vectors to dodge a CB, the pilot flew into cloud for approximately 10 to 15 seconds and emerged out the other side with extensive aircraft damage from hail.

Pilot saw two CBs ahead with a layer of cirrus joining them and elected to pass between the two. While flying through this layer the aircraft ran into icing and the canopy frosted up. After losing contact with ATC he was forced to change flight plan altitude to escape the icing. The aircraft was damaged by hail and lightning.

Thunderstorms increase with the seasonal rise in temperature during spring and summer months . . .

Thunderstorms are usually classified as:

- local or air-mass
- squall line or prefrontal
- frontal or cold-front.

This classification associates them with specific features of a synoptic chart, establishes the extent and intensity expected as the storm reaches maturity, and also the rate and direction of movement.

High surface temperatures are required for the development of thunderstorms. It is equally essential to have an unstable lapse rate and a high relative humidity in the lower layers to provide the moisture from which the subsequent release of latent heat supports development of the cumulonimbus cloud.

An essential process in the formation of a cumulonimbus cloud is glaciation that occurs around the cloud dome and forms the cirrus anvil that characterizes thunderstorms. In this process, the moisture in the air surrounding the dome forms directly into ice crystals. These crystals provide the nuclei of raindrops. It is a general postulation that rain from a cumulus cloud will not occur until the dome becomes glaciated.

Local or air-mass thunderstorms

In the middle latitudes this type of thunderstorm most frequently occurs during spring and early summer, developing from cumulus clouds during the early afternoon and rapidly reaching maturity. These storms are usually isolated within an unstable air mass, and an individual storm will usually dissipate within an hour after the first rainfall. However, other storms can develop in the general area, and this sequence of developing and dissipating storms may continue after dark until midnight or later.

Isolated and consisting usually of a single cell, local thunderstorms can be circumnavigated with ease. To avoid encountering hail falling from the anvil top, *a flight path at least 20 miles from the main cloud* should be selected, particularly in passing under the overhanging cirrus or mammatus decks. There is no positive way of determining whether or not hail will be associated with a particular storm, nor can the time of occurrence or location of fallout be gauged. However, there are certain characteristics usually associated with hail-producing storms which can be readily observed, particularly from the air, that will alert a pilot.

A hail-producing storm must penetrate to extremely high levels where the temperature is less than -20°C, and have a well developed anvil top with the characteristic mammato base. This cloud form indicates the presence of a strong outflow from the central cell that carries supercooled and frozen water drops away from the core.

A second characteristic of a hail-producing storm is its downwind slant produced by a steady increase in windspeed with altitude. If this shear is too large or variable the cloud mass will be distorted. Sometimes the upper portion of a cloud separates from the lower section, producing a local area of cirrus. This will distort the vertical flow of unstable air, and the cloud mass disintegrates or becomes cumulus congestus, producing occasional showers.

With a fairly constant vertical windshear maintaining a downwind slope of the towering cloud mass, the hail and supercooled water are carried outward from the core and fall either through the clear air or in the fringe of cloud surrounding the cell.

All well-developed thunderstorms should be cleared at a safe distance, at least by 20 miles at jet levels above 25,000 feet whenever possible.

Squall-Line and Pre-frontal Thunderstorms

When the air mass in the warm sector of an active cyclonic system is unstable, thunderstorms can generally be expected to develop during the afternoon in the area 50 to 150 miles in advance of the cold front. It is characteristic of these storms to form along a line approximately parallel to the cold front. These storms develop as individual towering cumulus during the morning. Surface winds will be light but puffy, with the air having an oppressive effect during periods of calm in the eastern area of the warm sector. In the western portion cumulus may develop but gradually diminish, with scattered patches of altocumulus clouds and some cirrus remaining. Air in this sector, while quite warm, is not normally oppressive.

Thunderstorms develop along the line dividing these two regions of the warm sector. While the line is composed of a number of individual cells, the lower congested cloud masses and the cirrus anvils merge. An approaching squall line presents a solid, ominous picture.

The individual cells are usually separated at levels between the altostratus deck and the cirrus anvil, which may offer clear passageways for jet aircraft. However, individual cells dissipate and new cells develop as the squall line moves east, so there is no assurance that such a path will remain open.

Airborne radar will reveal the presence of liquid water; ice crystals and hail cannot be successfully detected. When crossing a line of thunderstorms maintain adequate clearance to avoid possible hail fallout from the cirrus canopy.

Surrounding the base of a well-developed thunderstorm there is usually a mass of cumulus congestus cloud, most frequently concentrated south-to-southwest of the main cell, extending between 12,000 to 18,000 feet vertically and 10 to 15 miles laterally. Towering cumulus erupt from this mass but seldom reach the glaciation stage, dropping back into the pack to be followed by another eruption in an adjacent area.

Near the main cell, these towering cumulus will "lean" toward the main cumulonimbus cloud and merge with it. From a distance the whole storm appears to have a sloping outline from south-to-north.

adapted from
Flight Safety Foundation bulletin

BMO(Air): Did you get a sample from that fuel tender?
AFSO: Which fuel tender?

1

BMO(Air): The one that refuelled the aircraft that crashed yesterday.
AFSO: DID WE LOSE AN AIRCRAFT YESTERDAY?

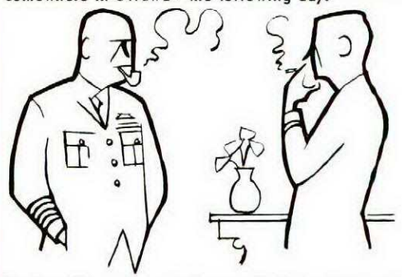
Pilot: Why'd that x?!!x engine quit? That's two aircraft lost in two days!

protection of evidence...

(a tragedy in five acts)

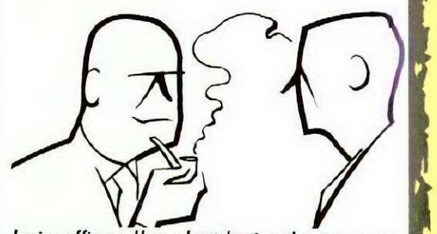
— with comic overtones by Capt D.W. Rumbold

Somewhere in Ottawa - the following day.

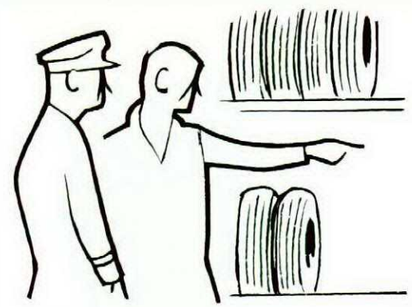


Senior officer: I've had enough! We're just not getting the message across; we've got to ensure they protect this sort of evidence. It's okay to rush out and fix aircraft, but we musn't forget the evidence in the process.
Junior officer: Having just come from the field myself I know it's basically a lack of a system. If every base adopted some method of control, these points wouldn't be overlooked.

4

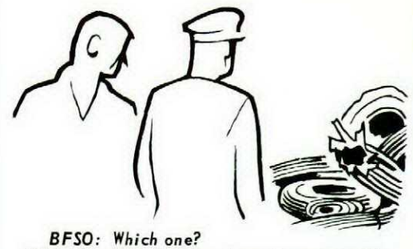


Junior officer: How about having the tower contact maintenance control every time an aircraft comes in with a problem? Or a special "Flight Safety" stamp for logbook entries?
Senior officer: Something like that, yes. Of course, it will vary to suit each base's operation. It's getting pretty obvious that we have to stop the boys rushing in too quickly and casually. Let's start communicating...



BFSO: I'd like to look at the good tire from that incident on Wednesday.
NCO i/c: Help yourself, sir; it's one of those wheels in the corner over there.

2



BFSO: Which one?
NCO i/c: Gee, I dunno. I put it to one side but it looks like they're all mixed up now, doesn't it?
BFSO: (mutters) Well, how the ____ will we ever know if it was an under-inflated tire that caused the other one to fail?

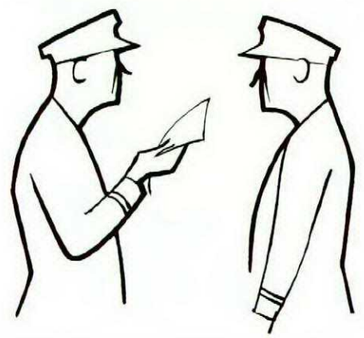
Six weeks later...

Sgt: Here's those four relays from the aircraft that had the trim problem this morning.
ASO: Excellent! Which one is which?
Sgt: Aren't they marked, sir?
ASO: No, they're all the same part number.
Sgt: Sorry, sir - I guess we'll never be sure now which one was at fault.

3

BFSO: Where's that muck you found in the filter?
NCO: I threw it in the garbage - it was only dirt!

Pte: For some reason or other, the sarge wants this bottle of dirty old fluid sent right away!
Pte: What for? Well, if he really wants it rushed, he'll be back!



BFSO: I've got a CFHQ message here which might interest you...

5

How about that?

Maj. A. G. Carswell
CFB Toronto

Those pilots —
next thing you know,
they'll want music with their meals!

"What's Flight Safety to me? All this flight safety jazz is great stuff for pilots and flight engineers and all those wild blue yonder guys who go charging around the sky. Sure, it's probably dangerous to be careless - if you're working around aircraft and forget something important."

"What do you do?"

"I'm a Food Services tech. You know, the guy who does all the work around the kitchen and the dining hall - used to call us cooks. I can't see what flight safety has to do with me. About the only time I see these flying types is when they come in here to complain! Why, I don't get to see the inside of an aeroplane from one year to another. Flight safety! That's not in my line."

" 'you ever prepared a batch of flight lunches? Or made an early breakfast, or a late meal for these flying types?"

"Yeah, sure. So what? - I never got any complaints."

"Do you put the date and time of preparation on each flight lunch?"

"Yup - another one of those dumb regulations. And you know what? We actually have a different menu for the captain. Some job! - you even get a special menu! I can tell who made those rules. Pilots get their choice; everybody else gets what's going! There's even a different menu for flight lunches than for ordinary box lunches. Those pilots must have sensitive stomachs. Two menus! - next thing you know, they'll want music with their meals!"

We actually have a different menu for the captain.

"Did you go overseas?"

"I did two years over at 3 Wing. Terrific! Even learned some German. Took my whole family over and back on a Yukon. Great airplane. Just like the airlines. Even the food was good - if I may say so. Just proves what I said, though; I noticed that the captain and first officer had different menus. Pretty soft. The rest of us passengers just ate what we got."

"How long was the trip?"

"Oh, about ten hours. The weather was really rough; we came down in weather so thick you could hardly see the other end of the airfield. I will admit though, even if those pilots are spoiled rotten, they sure know their jobs."

"What do you know about food poisoning?"

"Enough to know you can get real sick in a hurry if you get some bad chicken or fish, or almost anything for that matter. I remember a church picnic in our neighborhood once where about a dozen people ate something bad in a sandwich or potato salad and had to be rushed to hospital. It all happened in a couple of hours. They were all doubled up in pain and almost passed out. Nearly died. Boy, it only takes a couple of hours to be knocked right out by a bit of grub that's been standing around awhile."

"It happened in two hours?"

"Yeah, about that".

"And these people were put right out of action?"

"Couldn't even walk, or hardly talk or anything. Real sad cases."

"How long did you say that Yukon flight was?"

"Uh, ten hours. Yeah, how about that? Now I see what you're driving at. Two separate menus! - that's really using the old bean. Wouldn't want my wife and kids to be flown into the deck by two poisoned pilots. Come to think of it, a small piece of rotten food could actually wreck one of those eight million dollar aeroplanes! Not to mention a hundred and twenty five people. Cheeze! I guess you'd call that Flight Safety. I never thought of my job as being important in the flight safety program. Looks like any job on an aircraft base is really connected with flight safety."

• • • • • • • • •

"Sure, I heard you talking to that cook. It's easy to understand. If you feed pilots rotten food, you could crumple up the whole airplane - just like that! Yeah, I see the connection. They make the food that the crew eats. But me, I'm a supply basher. Nothing I do could ever have any effect on airplanes. I don't get anywhere near an airplane. I don't even work on tools, or issue them, or anything. I'm not even near a hangar."

"What do you do?"

"Clerical work in the depot pubs section. We send out amendments and that sort of thing. Nothing to do with Flight Safety."

"What kind of pubs do you handle?"

"All kinds. You name it; we've got it. And all the amendments too. There's a million of them. There must be whole buildings somewhere full of guys who've got nothing better to do than make up new amendments for pubs! Like how to put a nut on a bolt some new way. Or how to use a new kind of washer. Or changes in some kind of procedure. You know, there's always someone around who'll sit up all night figuring out a harder way of doing something. Why, just the other day some guy down at maintenance was making a big fuss over some little amendment that was late

. . . some guy down at maintenance was making a big fuss over some little amendment that was late . . .

or something. Some guys have got nothing better to do, I suppose."

"Have you ever flown in a Hercules?"

"Sure have. Went out to Edmonton on a Herc with the wife last Christmas. Not real luxury but fast, safe - and free! Real nice aircraft. I was talking to the crewman and he told me that the pilots really swear by them. Smooth, safe, easy to handle, really sensitive on the controls."

"Did you know that they lost one like that in Alaska a few years ago?"

"No! What happened?"

"Engine failure - engines just quit. Complete write-off."

"What would cause a thing like that?"

"Wrong fuel filters."

"Some stupid mechanic didn't follow instructions, eh?"

"No. Wrong instructions. Didn't get the amendment at the unit. The amendment covered a modification to fuel filters. No one knew anything was wrong because the amendment had not been issued."

"You mean - an amendment . . . ?"

"That's right, an amendment to a pub."

"Phew!"

"What do you think about flight safety now?"

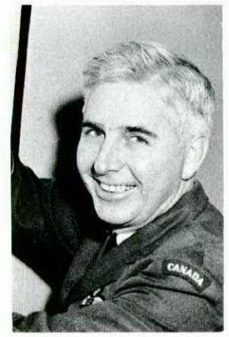
"Hm - I see what you mean. Looks like all of us, whether we know it or not, can be a real hazard if the job isn't done right. How about that?"

"Well, how about that?" No matter what your job is, you could cause an aircraft accident. By the way, here's some of the "little" things that could cause a serious accident:

- a little bit of dirt in oil, gas, or aircraft fluids
- a stone on the runway
- a screwdriver left in the wrong place
- unamended pubs or orders
- an order or procedure misread, or not read
- bad food
- careless driving of vehicles on runways or tarmacs
- a loose screw
- filter caps not tightened
- wrong fuel
- improper snow ploughing
- cigarette lighters or transistor radios in personal luggage.

"How about it? Does your job have anything to do with flight safety?"

Major Carswell joined the RCAF in 1941; while piloting a Lancaster he was shot down over Berlin in 1943. Re-enlisting in 1949 he flew Cansos in the arctic with 408 Sqn, was on Search and Rescue from 1951 to 57 and ran the Flying Boat School for two years. Maj Carswell was awarded the AFC for his SAR work. Tours at recruiting, COpsO, Staff College, AFHQ, and El Arish, followed. After two years at Staff School he returned to Downsview where he wears two hats - BOpsO and BFSO. Maj Carswell states, "As BOpsO, he keeps the BFSO on his toes and claims they work very well together."



DFS staff change

The Mar/Apr issue reported on Maj W. Garner's arrival at the Directorate. A rapid re-shuffle occurred the other day when Maj Garner was promoted to LCOL, and moved into the second-storey corner office of the head of the Investigation and Prevention section, replacing LCOL H.E. Bjornestad.

Replacing LCOL Garner will be Maj G. Joy who was Staff Officer Flight Safety at Mobile Command. Maj Joy, too, brings a wealth of flight safety experience to this position having served at several flight safety posts.

Ode to a wet wheel

Skiing and sliding on water and slush
Is an enjoyable part of one's leisure;
But your little plane, can hydroplane
At nine times the square root of tire pressure.

- GHS

a progress report

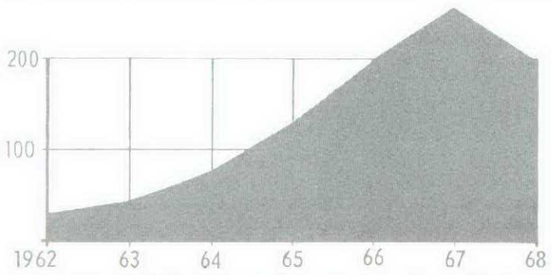
birds vs aircraft

Capt. B.R. Arnott
DFS

The CO's 24-hour report on a recent 104 crash reads in part: "Pilot reports that following recce in Siegen area (central Germany) he returned high-level to Karlsruhe area where VMC descent carried out. While circumnavigating a rainshower 800 feet AGL, IAS 400 kts, a large bird observed ahead for fraction of a second prior to bird impact centre windscreen. Pilot blinded following impact but aware of roaring noise and flying debris. Engine power added and control column pulled back till shaker encountered. Pilot recalls a feeling of nausea and approaching blackout at which point pilot ejected... Pilot's injuries consist of facial abrasions and lacerations, and a compression fracture of the spine."

Although we have yet to suffer a fatality from a birdstrike, the danger is quite obvious. The score at the end of 7-1/2 innings is: Birds 9 - Canadian Forces 0.

Of course, A category crashes represent only a small fraction of the total number of airspace disputes between birds and aerodynes. A quick look at the graph shows how many more encounters have actually involved a victory for the flying machine. Not that aircraft necessarily come



away unscathed from these less spectacular collisions; roughly three birdstrikes in ten involve aircraft damage - damage that can vary from a slight dent to a ruined engine.

As you've undoubtedly realized by now, we have a problem. An unsettling feature of this problem has been the almost unbroken increase since 1962 in the number of birdstrikes reported annually: 198 strikes in 1966 climbed to 254 in 1967. Two reasons have been advanced for this overall increase. In the first place, Canadian Forces aircraft have assumed numerous low-level missions in place of high-altitude roles since 1962, and have thus been exposed to birds with increasing frequency. Then, as birdstrikes began to mount, the Canadian Forces placed increasing emphasis on birdstrike reports; as a result, fewer strikes go unreported.

In spite of these conditions however, the 1968 record shows a decrease to 197 strikes. The most encouraging feature of this record is that Air Div strikes were down to 53 - from a 1967 high of 100. Air Div, being a low-level outfit, is one of our most vulnerable units. In 1968 only one CF104 was lost to a birdstrike, compared to two per year for each other year the 'cent four' has been in service. It would appear that research and preventive measures may finally be starting to produce results - although the situation is obviously not under control.

Bird research and control techniques apply to two fairly distinct areas:

- the hazard at airports to aircraft taking off and landing
- the hazard presented to aircraft while low-level enroute.

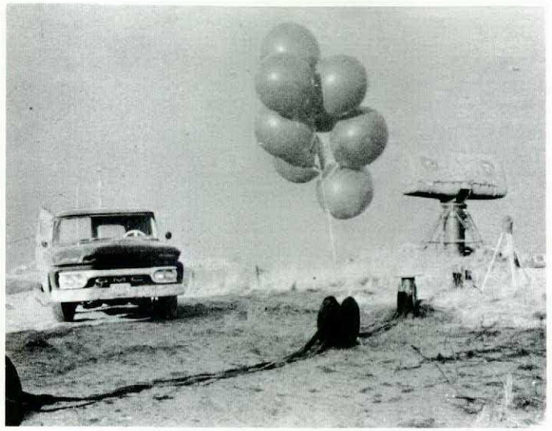
Civil operators are concerned almost exclusively with the former since nearly all their strikes occur at or near airports; naturally, a great deal of energy is being expended to solve this problem.

Airfield bird control has become a science in itself. Shell "crackers" explode, flashing lights frighten birds, earthworms will hopefully be controlled - all to create as inhospitable an environment as possible. The National Research Council, through its Associate Committee on Bird Hazards to Aircraft, has become one of the world's leading authorities in this field; through its findings and programs, the bird hazard at Canadian airports is being reduced.

The Canadian Wildlife Service (CWS), the Department of Transport and the Canadian Armed Forces are among the agencies represented on the Bird Hazard Committee; in this way, sharing of resources and responsibilities is possible. For instance, CWS biologists have done excellent work in conducting bird surveys of Canadian Forces Bases - 1 Wing Lahr is a prime example. In exchange, the facilities of the Canadian Forces have been made available to other committee members whenever possible, eg, shell cracker research, and committee transportation.

One of the current projects of the committee is hosting the World Conference on Bird Hazards to Aircraft, being held in Kingston this September, to which as many as 500 delegates are expected. This exchange of ideas should benefit everyone - especially in the control of birds at airports.

"Ve-ddy intah-resting" you may say, "but what about the enroute problem?" After all, more than half of the Canadian Forces birdstrikes occur beyond five miles from the nearest airport - and at appreciably higher speeds than those at takeoff and landing. This is the environment where we lose 104s, for example. Since it is clearly impossible to apply airport control techniques to an entire country, a different approach must be applied.



Bird carcasses are carried aloft to determine the radar reflectivity of various species.

Either we remove birds from the paths of aircraft, or we remove aircraft from the paths of birds. In pursuit of the first goal, work is being done on the immobilization of birds with microwaves. The theory is that an aircraft projecting a beam forward can sweep birds from its path; this work is still on the drawing boards. The second plan - removing aircraft from the path of birds - is proving much more feasible. Its nomme de guerre is Operation Birdtrack (described in detail in the May/Jun 1968 Flight Comment).

Birdtrack is a project being conducted at CFB Cold Lake to measure the known correlation of bird migration to weather, so that heavy bird migrations may be forecast with useful accuracy. Equally important is the research into the recognition of bird echoes on radar, using time-lapse photography. Employing both techniques simultaneously will enable low-level operators to avoid areas of high bird concentration. As Cold Lake is a low-level training base it is an ideal site for such a project.

Mr. Hans Blokpoel of the CWS, the project biologist, thinks the work may be completed within three to five years. He has already achieved a 70% success in forecasting bird movement. Radar operators at Cold Lake have been trained to spot, in a limited sense, local bird movements. Understandably, the Cool Pool airframe drivers are enthusiastic supporters of the project.

Eventually, the knowledge gained at Cold Lake will be applied to other bases, and when combined with our present bird avoidance techniques, should make it safer to share the air and cut down on the FOD - Feathered Object Damage.

T-bird pin hazard

The discovery of a defective safety pin (removed before the flight) led to the further discovery of a portion of the pin having done its job throughout the flight! Good idea to give them a quick inspection on removal.

Uplands, the pace setter

Their centennial project of zero towing accidents having escaped them by one (dammit!) occurrence, the boys proved it could be done during 1968.

Uplands is a busy place averaging nearly 10,000 tows per year of a great variety of aircraft. 1968's average was the equivalent of one tow per hour night and day throughout the year. In addition to towing, ramping, parking and starting all Uplands aircraft (excluding AETE and 414 Sqn), the section services an average of 235 transient aircraft per month. We join with BGEN C. Allison, Acting Commander ATC, in sending our congratulations to the Uplands Line Servicing section for their continuing contribution to flight safety. It can be done; any man on the staff can tell you how.

Let's take a walk...

MWO A.G. Morran

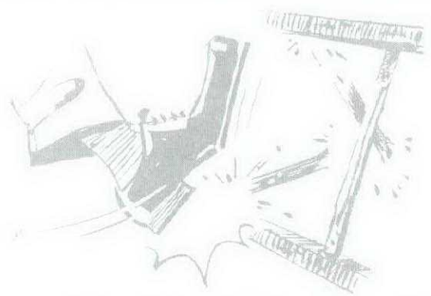
... the latest ground accident was assessed as Maintenance — that means us!

Lt Fixit looked up from reading the monthly accident summary as WO Earbanger walked into his office. "Good morning sir", Earbanger greeted his OC. "Good morning, Warrant" replied Fixit, "I have just been reading the summary on our latest ground accident; they assessed it as Maintenance - that means us." "Yes, we slipped up on that one" remarked Earbanger. Lt Fixit rose from his chair and walked toward the door. "C'mon, Warrant, I haven't had a chance since I arrived to get into all the corners of the hangar; let's see if we have any other potential accidents waiting to happen."

Earbanger followed into the hangar. Fixit remarked as he looked along the fire lane "Your fire lane paint is in good shape but apparently some people still can't see it. There's a maintenance platform ladder and a power unit protruding over the line on this side of the hangar." He walked down the fire lane commenting to Earbanger "It's unfortunate that hangars were designed so that extension cords and air lines have to cross fire lanes, would you see if there is some way that we can cut down on the number that have to cross by using extension boards or some other method?" Earbanger made a note of it as they walked to the centre of the hangar.

Fixit remarked as he passed an aircraft on the inspection line "I see your campaign on workstand guardrails is starting to take effect but I'm afraid the condition of those FOD bags may be creating another situation." "We have demands in for new ones but as of yesterday the work orders hadn't come back to workshops yet" replied Earbanger. "Did you see that?" said Fixit, "That man carefully checked to see that the elevators were clear before he moved the controls but didn't bother to check to see if the ailerons were clear. Either he has poor coordination or he needs a refresher on safe working practices." As he made a note on his pad Earbanger also made a mental note: "I sure will see that character; anyway, a telecom man shouldn't be fiddling around with controls that don't concern him." Intent on writing while slowly following the OC, Earbanger approached the next aircraft. Fixit shouted "Watch it!" Earbanger looked up to see the Lt picking up a screwdriver lying on the floor in his path. "Thanks sir" remarked Earbanger "I'll just add that to my collection. If the owner claims it he'll get a word or two on tool counting; otherwise, he'll have to buy a new one on the next toolbox check. Either way, the next time he'll make sure that he keeps his screwdrivers in the right place."

Fixit moved on to the ground handling equipment in its storage area. Checking the ladders on the maintenance platform, he turned to Earbanger "How often do the ground handling section check our equipment?" "On non-powered equipment only when we send it in. It's the responsibility of the user to inspect the equipment before use" replied Earbanger. "Have the men do a better check, then, and start a program of sending them in for repair. The steps on a couple of these ladders are



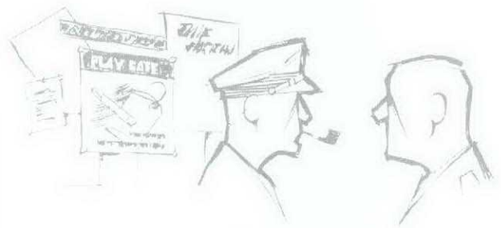
dangerous". A well-aimed kick from Fixit made the point.

As they proceeded across the hangar toward the engine bay a refinisher started to spray-paint the search markings on a wingtip. Fixit stopped and waited until the refinisher noticed him and stopped spraying. Fixit asked the refinisher if he had no place for refinishing other than in the hangar. "No sir, we have a spray booth for small parts in the section but for aircraft touch-ups we have no place large enough." Fixit thanked the refinisher and queried the WO as they walked on "Has anyone tried to get an area for aircraft painting?" "Capt Oldman submitted work orders and plans for having a corner of the hangar partitioned off and all the necessary ventilation, fireproofing and fire fighting equipment. Somehow or other, it always wound up at the bottom of the priority list and the money ran out before the work order was processed" replied Earbanger. "Make a note of it and let's look into ways and means of strengthening our case. It seems money can always be found to show the flag at country fairs but it's always scarce when we have any improvements to make in our facilities." They stepped into the engine bay.

The two were examining the chain of one of the engine hoists when Sgt Mekanik came over. After the usual courtesies, Fixit asked "When was the last stretch check carried out on your hoists?" Mekanik walked over to the control desk, reached into a pigeonhole and brought out a log book. "Three weeks ago, sir,

so it isn't due for a week yet." After a few more pertinent questions on the workload in the shop, Fixit and Earbanger walked out and started towards the airframe component shop.

Fixit walked over and looked into the filter cleaning machine. He turned to Sgt Tyreman "What type of fluid do you use in this machine?" "Tri-chlorethylene" replied Tyreman. "Do all your operators know the precautions when working with this type of fluid?" "Yessir" Tyreman answered. Fixit turned to Earbanger and remarked "I think our smokeroom is far enough away to avoid fumes from here, but let's check." Fixit and Earbanger proceeded to the airmen's smokeroom. After checking for fumes Fixit walked over to the noticeboard



and read some of the bulletins. He turned to Earbanger, "A very well organized noticeboard but I think the safety posters should be weeded out a bit. Would you start a program of rotating the posters amongst all your display areas so that they don't become just another wall ornament. That way, maybe they will be less familiar and do the job they're intended for." Earbanger made another note on his pad. They continued toward the NCO's smokeroom discussing work plans on the way...

• • •

Nit-picking? Maybe, but fellow supervisors: When was the last time you checked your work areas from the purely safety standpoint? There are a couple of items Fixit checked that have conditions laid down in EOs. For example, paint touch-up work can be done in hangar areas under certain specifications, but no provision is made in the majority of hangars for the extensive refinishing that is usually needed for today's larger and higher-speed aircraft. The points Fixit touched on in his tour are only a scraping off the top of all the safety hazards and precautions that are encountered in the operation of an aircraft maintenance hangar. Are you, Mr Supervisor, aware of them *all* so you can in turn, check and guide your supervisors and technicians toward the SAFE operation - the one where there's no damage, either to man or machine.

MWO Morran works in CFB Cold Lake's Aircraft Technical Research and Investigations section. Here, he prepares and processes UCRs, TFRs, UMIs, and Supplementary Reports to aircraft incidents. This activity means that he spends much of his time investigating aircraft accidents/incidents; consequently, he is in a good position to keep his eye on trend developments in aircraft snags.

RUSTLICK hazard

After a couple of unexplained compressor stalls in a Sea King engine, it was sent to contractor for strip. There, it was found that the front stages of the compressor section were coated with a heavy oil film. Also, the last 4 stages were coated with a baked-on substance - sufficient to alter the blade shape. That explained the compressor stalls but what had gummed-up the engine?

Rustlick (sprayed into the engine to prevent corrosion), was suspected. Below 45°F one of the several compounds in the mixture settles to the bottom of the dispenser tank. Unless warmed and agitated the pressure dispenser with its outlet tube at the *base* of the container, would dispense this unmixed portion first.

Users are warned to ensure that rustlick is warmed to room temperature and stirred well before using.

Had yours yet?

The Base Commander proposed periodical flight safety briefings encompassing all aspects - both ground and air. It was decided after considerable discussion that semi-annual briefings would be a very beneficial event...

- Flight Safety Committee

cont'd from page 7

death and destruction, one is compelled to select a point of view from two alternatives:

Humans err - so let's aim the fix at the human
Humans err - so let's give him less opportunity to err in the future.

The latter - crudely called "idiot-proofing" - is the natural consequence of regarding the human as another failure-prone component in an aircraft system. And since we can't change or redesign Man, we have no choice but to modify systems to *fail safe*.

There's nothing new in this; MIL SPEC 38130A lays down safety requirements for aircraft systems, and sub-systems. That T33 armament door misses acceptability by a country mile - and for good reason - it's demonstrably dangerous. As such it merits the totally-unacceptable "CLASS IV" designation:

CLASS IV - CATASTROPHIC - Conditions(s) such that personnel error, deficiency/inadequacy of design, or sub-system/component malfunction will severely degrade system performance and cause subsequent system loss or death or multiple injuries to personnel.

We needn't labour the point but the adoption of a device to prevent a wheels-up landing, for example, will no doubt evoke the "What next?" response in many people. Typically, flight safety management has no sentiments - one way or the other - on such a device except where life or injury are in question. We say if this device can economically contribute to a reduction of resource losses then we're for it, too.

At least, that's the way the FSO sees it... how do *you* feel? Let's hear from you.

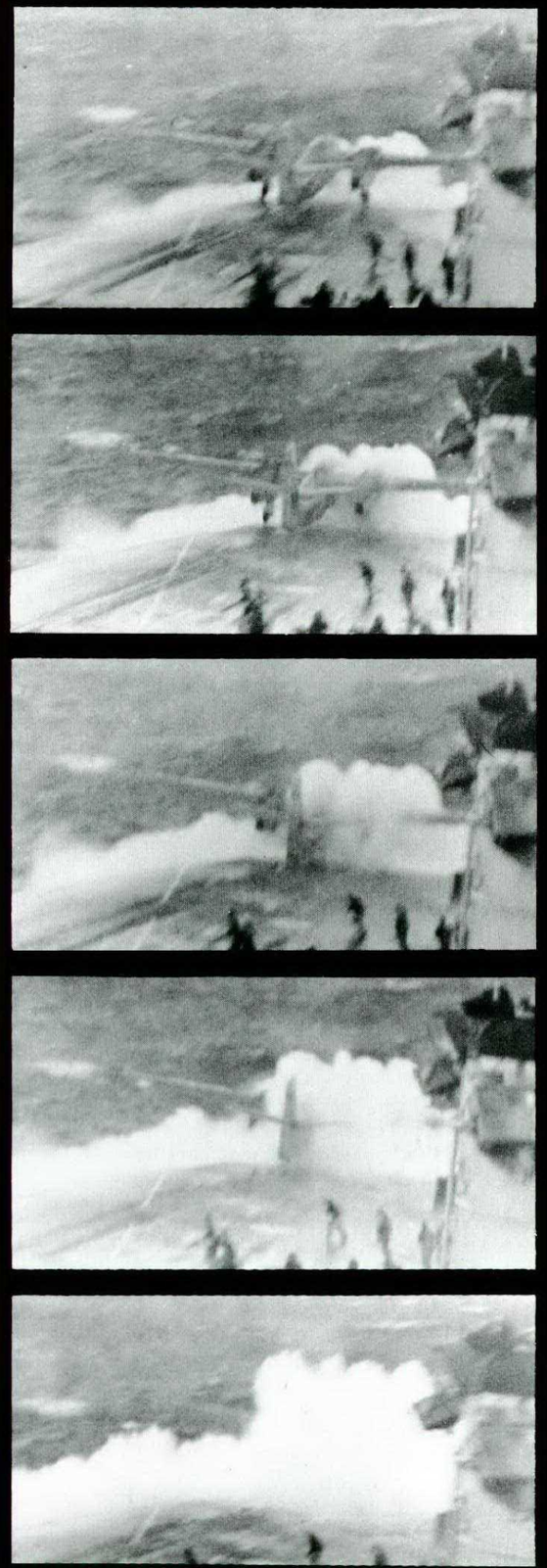
Hear, hear!

Since the beginning of the hearing conservation program there has been considerable improvement in aircrew hearing as recorded in the annual B2 medicals.

- Base Aeromedical Support Team
CFB Chatham

*LOW oil pressure is always a good indication of trouble with any engine. When you are starting or running-up an engine and you note the oil pressure is low, would you shut the engine down **before** the grinding noises start?*

Going . . . going . . . GONE!



On the Dials

In our travels we're often faced with "Hey you're an ICP, what about such-and-such?" "Usually, these questions cannot be answered out of hand; if it were that easy the question wouldn't have been asked in the first place. Questions, suggestions, or rebuttals will be happily entertained and if not answered in print we shall attempt to give a personal answer. Please direct any communication to: Commandant, CFFTSU, CFB Winnipeg, Westwin, Man. Attn: ICPS.

Surveillance Radar Approaches — USA

Canforce pilots who have recently carried out surveillance radar approaches with an American unit will have noticed quite a change in their operating procedures...

The Americans define airport surveillance radar as "a radar installation with a display of azimuth and range which provides a radar vectoring capability for final approach to an airport." And they have apparently concluded that the controller should devote his full attention to the information which the scope gives him - azimuth and range. As for the business of calling out suggested altitudes for an imaginary glidepath based upon pure mathematical calculations - forget it!

The controller still provides guidance by issuing heading changes and ranges, but he now informs the pilot when it is permissible to start descent, and specifies the minimum altitude. The actual descent profile is left entirely to the discretion of the pilot - as in any other type of instrument approach procedure without a glidepath.

During this procedure the phrase Minimum Descent Altitude (MDA) may be used. It's described as: "The lowest altitude to which descent shall be authorized in procedures not using an electronic glidepath. Aircraft are not authorized to descend below the MDA until the runway environment is in sight, and the aircraft is in a position to descend for a normal landing. The MDA is determined by adding the required obstruction clearance to the MSL height of the controlling obstruction in the final approach area."

To carry on a step further, the runway environment is "The runway threshold or approved lighting aids or other markings identifiable with the runway".

Their MDA or minimum altitude for a surveillance approach provides a minimum of 250 feet clearance over any obstruction in the final approach area. This final approach area may extend outwards for 6 nm from the threshold, and is 1.7 nm wide on either side of the final approach track.

In case you didn't already know it, the Americans really stress the importance of aerodrome lighting in their concept of runway environment. The following MDAs and visibilities are the lowest which they will authorize for surveillance radar plus various lighting:

- ASR plus high intensity centreline approach lighting - 250 and 1/2.
- ASR plus medium intensity approach lighting or runway end identifier lights or high intensity runway lights - 250 and 3/4.
- ASR alone - 250 and 1.

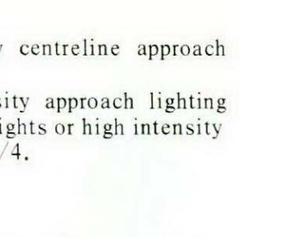
Radar Vectoring

A DOT Class II NOTAM has pointed out that when an IFR flight is being radar vectored to an instrument approach, air traffic control will ensure that the appropriate obstacle clearance is provided by using minimum radar transition altitudes.

Then they state "If a communication failure occurs while a flight is being radar vectored at an altitude below the minimum IFR altitudes shown on the instrument approach chart, the flight should climb immediately to the appropriate published minimum altitude, unless able to continue in VFR weather conditions".

This would seem to make sense when working under radar vectors anywhere.

Self-inflicted wounds... of a sort



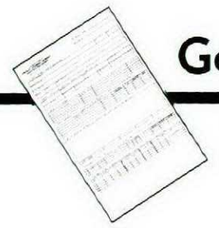
Some people seem to go out of their way to make things hazardous for either themselves or others. The chap who drives home at 60 through a 30 mph speed zone each night has his counterpart among aircrew. A crash or the cops will eliminate the speedster but being eliminated in the air is somewhat more permanent.

Here's two recent examples from our files.

A canopy was inadvertently jettisoned leaving the navigator in a rather cool place. But just when he needed protection for his hands he was caught without his gloves on, and sustained minor frost injuries to his hands. He was fortunate; that sort of thing has cost fingers before.

A gum-chewing pilot recently experienced hypoxia or hyperventilation - diagnosed by the medical people as having been cumulative for ***two hours*** while airborne. An abnormally high cabin altitude and the intermittent mask leakage induced by jaw movement significantly lowered this man's alertness.

Flying isn't ***that*** hazardous - it's just that some people like to help along the odds.



Gen from Two-Ten

LEARN FROM OTHERS' MISTAKES—you'll not live long enough to make them all yourself!

CF104, MAN INJURED During a PI the technician was using a power supply unit plugged into a 550-volts line. He noticed that the aircraft was electrically alive and carrying more than 400 volts. While checking the power unit he touched it and received a severe electrical shock.

Fortunately he was able to leave hospital the next day. The power unit plug doesn't match the power supply so a local fix had substituted an adaptable plug. The porcelain section of this plug was chipped, and the electrical cable to the unit was pulled out of position. The ground lead of the three-wire system contacted the positive terminal, energizing the ground with 550 volts.

Instead of grasping the plug by the collar, some technician(s) had been disconnecting the power supply by pulling on the cable; this gradually pulled the leads through the retaining clamps.

A few seconds and a few steps saved had finally caused injury and came close to killing a man.

CH112, MAN INJURED The helicopter was being pushed backwards out of the hangar by a crew of three, one of whom was on the end of the tail rotor boom both guiding and bearing down to keep the front of the skids from dragging. As they passed over the doorsill, the aircraft came to a sudden halt, the tailboom swung violently to the left hurling the man to the floor. Both man and helicopter were injured.

A section of bent grating was protruding above the floor; this had caught the aft end of the left skid, causing the violent swing.

Traffic over these grates had bent many down in the center, forcing the ends to stick up. This was a known hazard; repairs were made only after this occurrence. Too often, full recognition and priority to its correction is only given to this type of hazard after the event.

Any "known hazards" around your hangar?

TRACKER, GEAR-UP LANDING After takeoff, the port undercarriage did not completely retract but after reselecting down it indicated safe, so the pilot decided to continue the trip gear down (a condition making single-engine flight dicey). At destination, the pilot realized the technicians were unqualified on his type so he elected to make the return flight with the gear down.

But on takeoff what did he do? Yup, he selected gear up. Quickly, he selected gear down before they were fully retracted. The port gear had already made its full travel and would not extend. All attempts enroute and on arrival at home base to extend the gear were unsuccessful; in-flight inspection of the gear gave no clue other than that it appeared to be uplock trouble.

A gear-up landing on foam was obviously in order. The following 3 hours of airborne inspection, communicating, advising, etc, were brought to a grinding halt as the pilot carried out a perfect touchdown on the foam strip. Fuel, electrical power and ignition were turned off before sliding to a stop just beyond the end of the 3" thick 1200 x 30 foam strip. Both men got out uninjured through the overhead emergency exits.

A part of the port landing gear uplock truss assembly had fractured, allowing the uplock to shift past the locked position. This prevented the uplock clearing the uplock roller and unlocking on either normal or emergency systems. The area had been inspected before the flight.

This was a classic case of pressing-on with a known unserviceability. In the Jul/Aug 1968 issue was an item "Go, No-go" in which the consequences of flying in a u/s bird were documented. The pilot is to be commended for his open acknowledgement of the details; this made possible a complete and valid investigation.

L19, LOST After promising to fly a compassionate leave passenger flight the following morning, the pilot spent most of the night on an exercise alert. Nevertheless, he took off the next morning with his passenger - his flightplan based on the *previous* day's favourable route forecast. (The weather report had not arrived.) The passenger was delivered uneventfully at his destination, cloud base enroute being 3500-4000 feet, with a little light rain in the vicinity of the destination.

After refuelling, the pilot requested takeoff clearance to return to his home base and was informed that the weather was now 1000 and 1 in rain-

showers. He requested and was granted special VFR out of the control zone; he expected he would soon encounter the better weather which had prevailed on his outbound flight.

About 20 miles after takeoff he ran into snowshowers. Because he was having trouble maintaining visual contact in the hilly terrain, he decided on his own to climb and proceed on instruments at 4000 and navigate by radio compass. If he didn't break out into VFR conditions, he planned to reach his base by a combination of radio compass homings and a timed heading after establishing FM radio contact, enabling a letdown at base.

Conditions didn't improve; enroute attempts to make radio contact with two stations for weather information were unsuccessful on the one VHF frequency he tried. After station passage on the first beacon he was not only unable to tune in the next beacon but lost contact entirely on his radio compass.

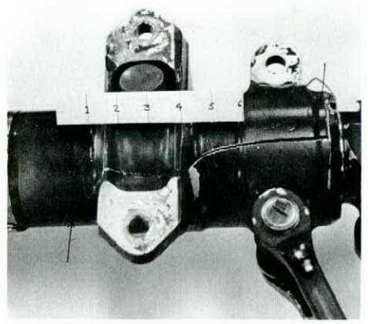
Without navaids, he decided to regain visual contact by descending blind in heavy snow. At 2000 indicated he sighted a hill which he cleared and found himself in slightly improved conditions in a valley. "I was concerned about flying blind into the hills on either side of me", so he decided to land and wait out the weather; through the snow, he selected what appeared the best area - a pasture close to a small village.

He touched down in a full-flap minimum speed precautionary landing as planned but the brakes were ineffective on the wet turf. Overrunning into the ploughed field off the end of the pasture "the wheels settled into the soft earth and the aircraft slowly nosed over onto its back". The pilot was uninjured - the aircraft was not so fortunate.

The radio compass ground checked serviceable giving undistorted tone and steady homing indication, leading one to conclude that the snow conditions had caused the interference - a fairly common occurrence on the low frequency bands.

The pilot put himself behind the eightball. The poor facilities for obtaining rapid weather information and forecasts were well known. Fatigue, and a desire to get it over with, accounts for his haste in departing without the latest weather - indeed, in passing up a further opportunity to obtain weather prior to the return flight.

Instructions issued after the event only emphasize what had already been stated in orders: on encountering below-minimum weather conditions, don't press on. His final decision to land was the only correct one. In the circumstances, his decision to go into "the unknown" could well have been his last.



CH113A, BEHIND THE CURVE On a student check ride the instructor simulated failure of #1 engine while on a short final at 50 feet with speed 40 kts. The student completed his low-level SE procedure continuing the approach to the selected landing area (a snow-covered firing range with raised areas about 2 feet high).

At 10 feet the helicopter began to settle short of the selected touchdown point - the student further reduced rotor rpm to 90% to stretch the approach and avoid hitting the sharp slope of a raised area. He didn't make it; the helicopter touched with forward speed and bounced. The main gear then struck the face of the slope, and settled with zero speed in a right yaw. No damage was suspected.

Another approach was flown to the same area which was now spattered with hydraulic fluid. After a careful landing the left main oleo was found flat. Later at base, an 8-inch crack in the outer casing of the oleo revealed the impact force.

The large, open firing ranges were considered ideal; the raised firing points had not been considered a hazard as there were clear 100-yd flat areas between each firing point.

Actually, the engine failure had been simulated within a hazardous altitude/speed portion of the flight envelope such that the student could not have obtained safe single-engine speed in the approach.

All pilots were then given a SE procedures review. AOIs are being amended to cross-refer between sections to the altitude/speed diagram.

Practising for a hazard is hazardous - there's lots of statistical proof for this. This being the case, neither the instructor or student's judgement should ever be compromised by a lack of the facts of critical flight regions.

H04S, CHOPS OWN TAIL on two previous shutdowns, a droop-stop had to be assisted into position as the rotor continued turning. (Except in very light winds, droop-stops must engage by 100 rpm on shutdown to prevent blades flapping and causing damage.) Adjustments were made and a third startup and shutdown was done to check if the fault was rectified. Again the droop-stop did not go in normally and a technician tapped it in as before - with a broom. But the man lost his balance; the broom was whipped out of his hands by the turning rotor head. cont'd on next page

The broom jammed the rotor head, forcing the blades into a negative angle of attack making them droop so much that the droop-stops themselves failed. One blade struck the deck and then sliced off the tail. The technician was injured in the mouth by the broom handle as it was whipped away.

The technician had used the bristle end of the broom on the droop-stop in preference to the stiffer end...

New (more explicit) orders are now in effect.

Comments to the editor

Your Mar/Apr issue touched on a subject which has been a cause of concern for many years in accident prevention - the pilot's Pre-flight Inspection.

Your centre page and Bird Watchers' Corner both refer to the "Walk-around". In my opinion, the very term "Walkaround" leads to just that - a walk around the aircraft rather than pre-flight inspection. A levity of terms will lead to a levity of action.

My personal opinion is that the term "Walkaround" should be banished from the airman's language.

Maj C.H. Reid
CFHQ

Good point. You realize, of course, this makes further inroads into our cherished journalists' license! We were knuckle-rapped the other day for calling a rotary-wing aircraft a "chopper".

From the editor's point of view, readability and comprehension suffer in jargon and officialese. Anyway, we'll go for "Pilot's Pre-flight Inspection" but we won't like it!

SURVIVAL status...

The declining attendance at survival training schools prompted a review aimed at satisfying the requirements of operational crews. Everyone got into the act (democracy at last!) and a new training directive was created.

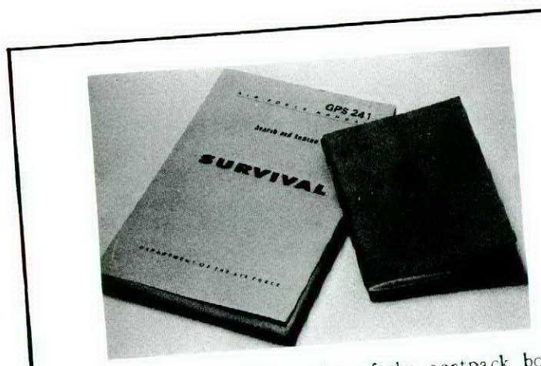
The scope of training was broadened to expose trainees to global environments. The standard bush, sea and arctic training - a responsibility of Training Command - is supplemented by desert and jungle training which is now the responsibility of the operational command. As well, the commands were directed to provide continuation training in basic/sea survival techniques.

The outcome of this 1967 decision was the creation of a sea survival training base at CFB Comox. At the same time training manuals were reviewed; from this, it was evident that our training manuals (RCAF pamphlet 181 "Down but Not Out", and CAP 361 "Land and Sea Emergencies") did not provide the global coverage required. To meet this deficiency CAP 361 was rewritten and re-issued as CFP 222 for inclusion in seatpacks.

CFP 222 aims at having the survivor recall previous formal training; it is not a training manual in itself.

While RCAF pamphlet 181 was second-to-none for Canadian environments it was lacking in sea, jungle, and desert information. For this, the USAF manual "Survival" was acquired and designated GPS 241. This book provides some coverage of the bush and arctic environments, so the multi-place aircraft survival kit contains only the USAF manual. Meanwhile, Pamphlet 181 is being revised to provide global coverage of survival situations and will eventually replace the USAF training manuals.

Pamphlet 181 is distributed to all survival training candidates, to operational units conducting survival training, to flying unit crewrooms, and ground search parties, etc. For those units likely to be engaged in desert, jungle, or sea environments, the USAF manual is available.



A "new improved" version of the seatpack booklet **Land and Sea Emergencies** is presently replacing the old CAP 361.

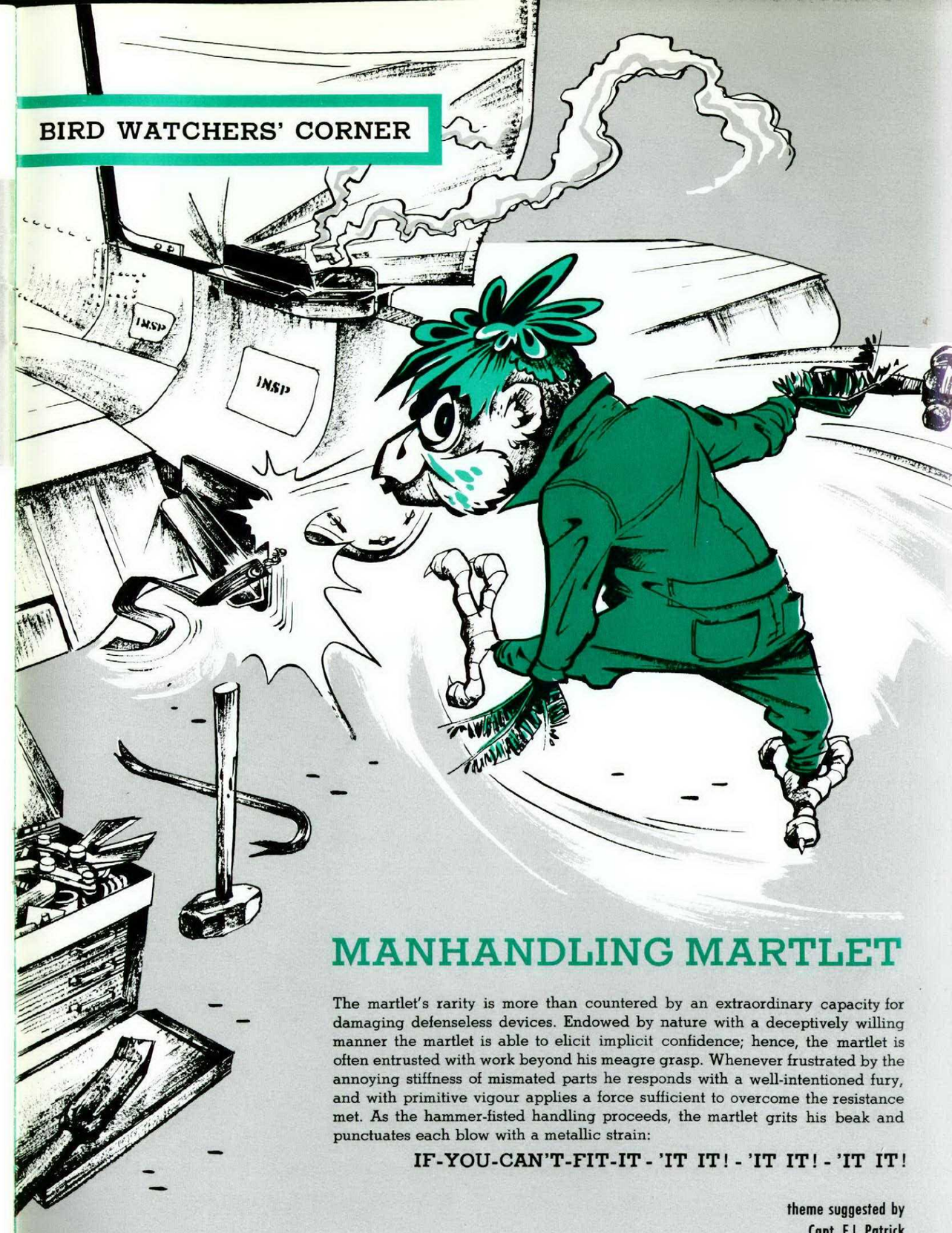
This do-it-yourself survival manual is worth careful study because the information is better learned ahead of time. Sounds like a good subject for a rainy-day training program.

By the way, the unsettling implications of the prayer on the last page has been dispensed with - a significant gesture...

The sea survival training capability is "well in hand" and should be underway before the end of this year. The basic bush course will be extended by one week and all aircrew trainees will receive their training before posting to operational units.

All in all, there's evidence of renewed vigour in this vital area of training.

BIRD WATCHERS' CORNER

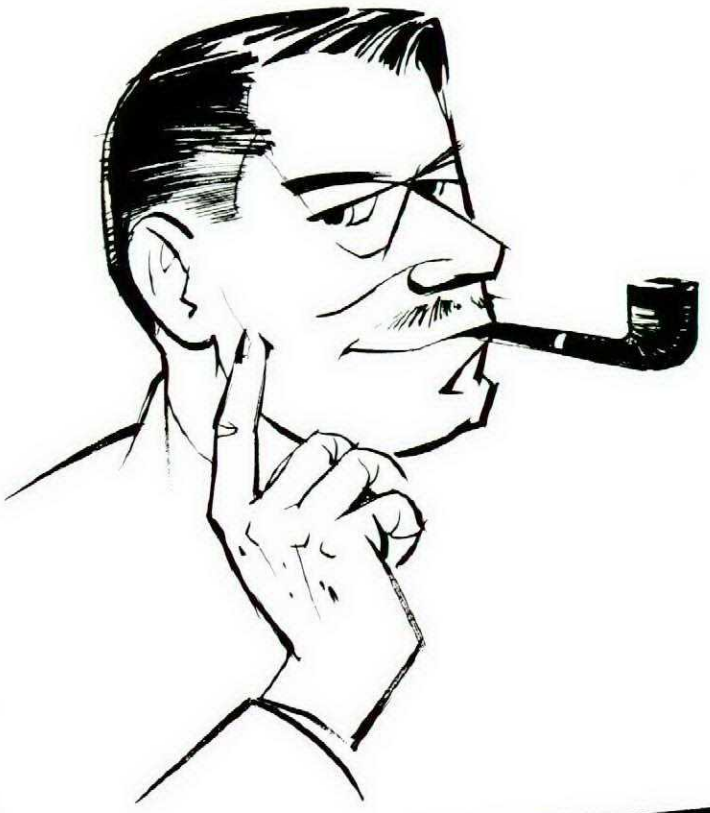


MANHANDLING MARTLET

The martlet's rarity is more than countered by an extraordinary capacity for damaging defenseless devices. Endowed by nature with a deceptively willing manner the martlet is able to elicit implicit confidence; hence, the martlet is often entrusted with work beyond his meagre grasp. Whenever frustrated by the annoying stiffness of mismated parts he responds with a well-intentioned fury, and with primitive vigour applies a force sufficient to overcome the resistance met. As the hammer-fisted handling proceeds, the martlet grits his beak and punctuates each blow with a metallic strain:

IF-YOU-CAN'T-FIT-IT - 'IT IT! - 'IT IT! - 'IT IT!

theme suggested by
Capt. E.I. Patrick



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