FLIGHT COMMENT

MARCH APRIL 1974

Comments

Air Transport Command have published a procedure by which the SIF is turned to "standby" before changing codes. This is to prevent the triggering of emergency alarms during redialling. For example, if 4700 is changed to 1100, it is possible to momentarily select 7700.

Prior to takeoff from a detachment base a takeoff roll was aborted at approximately 100 kts because of a master caution light coming on. The Voodoo returned to the ramp where the snag was rectified and a new drag chute installed. The ground crew were requested to check for hot brakes and reported "they are a little bit hot but they are OK" – an assessment based on a visual check. The aircraft then taxied out again, took off and returned to home base. On landing the pilot experienced slight directional control problems and when clear of the runway, stopped the aircraft for investigation. Both main tires were found deflated – the thermal screws having melted.

During the previous abort the brakes had overheated and the slow deflation of the tires had not been noticed when the aircraft returned to the ramp. The pilot then elected to take off before the wheels and brake assemblies had been allowed to cool sufficiently. The tires had actually deflated en route. Another example of the "assume" phenomenon.

An article in the Nov-Dec '73 issue of *Flight Comment* mentioned that one of the principal causes of corrosion to aircraft wheels was the use of soap solution in the bead area during tire installation. NDHQ/DAES advise that CFTO C-13-010-001/AM-00Z (EO 110-5-2A) states:

> "Use no liquid lubricant such as soap solution, oil etc., on the tire beads or on the wheel. These types of lubricants will cause in-service slippage between the tire and the wheel. . ."

There is no direction stating that soap solution should or should not be used to detect leaks in aircraft inner tubes, however water tank immersion of the tube should suffice, without resorting to soap solutions.

Subscribers from countries other than Canada should note the new address for subscription orders. Increased postage costs have also resulted in a price increase for the magazine; $2.50 vice $1.50 per year.

Our back cover is taken from an original poster by Maj ME Rose, the BFSO at CFB Summerside.

Front cover: A CH113 Labrador from 413 Sqn, CFB Summerside, in the *very latest* paint scheme.

NATIONAL DEFENCE HEADQUARTERS — DIRECTORATE OF FLIGHT SAFETY

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DIRECTOR OF FLIGHT SAFETY

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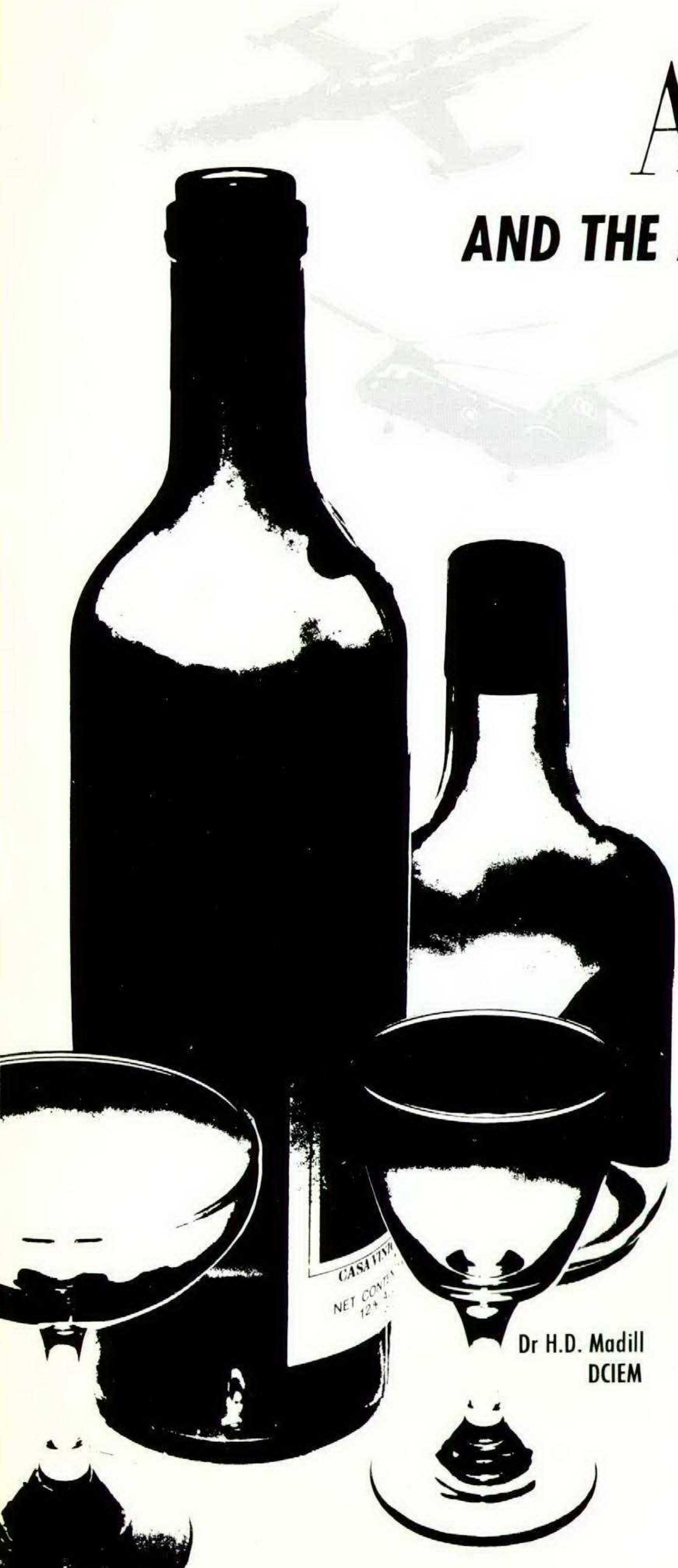
CAUSE FACTORS = PREVENTION

It is almost ten years since we took the somewhat unorthodox step of adopting a multiple cause factor system. This eliminated any suggestion of precedence such as **primary, secondary** or **contributing** and made the definition of a cause factor so broad that it resulted in the identification of hazards that would not even have been considered pertinent under the old rules. The outcome of this significant break with tradition was an immediate increase in the number of cause factors assigned which in turn identified many areas needing attention: some long overdue. This is exactly what was wanted and it gave a new purpose and scope to the aircraft accident prevention programme.

It soon became obvious however that if we were to achieve consistency in reporting and follow-up action, definitions had to be carefully worded and sufficiently detailed to keep interpretation to a minimum. This process looked simple and straightforward but experience proved that a lot of work was needed by everyone directly concerned to make the system consistently effective. This has been done over the past several years with excellent results.

Significant progress yes – but there is no doubt that much more can be accomplished if we critically re-examine how the information concerning cause factors is presented and used. A cause factor is defined as: "any event, condition, or circumstance, the presence or absence of which increases the likelihood of an aircraft occurrence". This definition is so flexible that it can be used to obscure the real issues unless it is remembered that cause factors are not an end in themselves. They are only the means of identifying problems and must be selected realistically to allow the application of practical preventive measures. We have most of our difficulty in dealing with personnel cause factors and this will continue unless we make a special effort to be absolutely candid in this area. Corrective action will seldom be completely effective if attempts are made to rationalize or mitigate the degree of human involvement. More often than not measures to help people do the job better take a lot of effort and a long time to implement but if we do not concentrate our efforts in this area we will have stopped far short of our aim.

COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY



Alcohol

AND THE AVIATION ENVIRONMENT

Abuse of alcohol is a constantly recurring theme in accident prevention literature. Most military aircrew are aware of the pitfalls of over-indulgence and are unlikely to violate the established regulations. But are the regulations alone sufficient? The author discusses recent research which would indicate that the "hangover" effect may be more dangerous than previously suspected.

Dr H.D. Madill
DCIEM

The recommended usage of drugs by flying personnel must be carried out with extra caution and with constant awareness of the responses expected from the drug under the unique stresses imposed by the aviation environment.

Appropriate to this discussion, drugs may be classified on the basis of their usage. First, there is the broad category of medicaments which are used under the direct control of an attending physician. In most cases it is the illness itself rather than the side effects of a prescribed drug which is the factor limiting flight duty.

The second group concerns drugs which may be readily purchased without an order from an attending physician. Here the individual diagnoses his own condition and proceeds to his local drug store to obtain what he believes to be the appropriate medication. Examples are preparations for the relief of symptoms of a cold or mild analgesics such as aspirin. Many of these drugs or drug combinations are incompatible with flight duty as well, thus restraint in their use is dependent upon the knowledgeable judgement of the individual.

The third category of drugs are those which receive social acceptance – such as coffee, tobacco and alcoholic beverages. In spite of the large number of drugs available in the other two categories, the greatest problem of drug usage as related to flying operations arises from drugs in the "social" category. By far the greatest contributor to this problem is ethyl alcohol.

The consumption of alcoholic beverages has become an accepted part of normal life thus it is not the purpose of this article to preach a departure from normality but rather to reiterate some facts regarding alcohol and flying with the hope of assisting pilots to retain the high level of competence which they have developed and grown to have confidence in.

A brief review of air accident statistics readily indicates the importance of alcohol as a possible cause factor. These causal association statistics have been gathered from the toxicological analysis of remains from victims of fatal air crashes. Data gathered from the investigations of general aviation fatalities in the United States over the past decade have indicated the positive presence of ethyl alcohol in 18% to 43% of the fatal accidents. Although studies on the cause of fatal accidents in military aviation in Canada, the United Kingdom and the United States, using similar methods of post mortem analysis, have not shown similar high percentages, it is important to realize what these statistics are actually showing. They only refer to accident victims in which a positive presence of alcohol was actually found in the pilot upon post mortem examination. This is thus related to relatively recent preflight drinking with the accident occurring before the alcohol has had time to be eliminated from the body.

Alcohol also constitutes a major hazard to safety in military aviation because it continues to affect the optimum performance of the human, specifically under the environmental stresses of aviation, for a period of time longer than it may be reliably detected in the body.

Canadian military pilots are protected from their own excesses to some degree by the imposition of an eight hour preflight abstinence regulation which also forbids the consumption of alcohol while on duty. This is an important regulation yet there is reason to believe that it is one which is not too difficult to abuse.

An example of such abuse is presented in the following hypothetical situation. A healthy pilot, weighing approximately 150 lbs, decides to spend a portion of the evening in the company of his friends where alcohol is being consumed. His preference for the evening is bottled beer containing approximately 4% alcohol. He has his first drink at 8 o'clock at night and drinks at an average rate of one bottle every twenty minutes. After finishing his fourth bottle he has consumed sufficient alcohol to bring his blood alcohol up to a level in excess of 0.08%, the level set in the Canadian Criminal Code for the legal definition of being impaired for automobile driving. If he continues this rate of drinking until 10:40, thereby consuming eight beers, he will have a potential blood alcohol level in excess of 0.20%. Now is the time to call it quits and go home to bed as tomorrow is another working day. He will definitely be feeling the effects of booze and is in no shape to safely drive home; however, he still has over nine hours to sleep it off before reporting for duty the next day. If this average man metabolizes his alcohol at the rate of 0.015% per hour, he may find himself reporting for duty the following morning with a blood alcohol level of over 0.065% and may be in the air with a blood alcohol level of 0.030% two hours later. At this point you may ask, so what? He is not legally impaired, at least not at the legal definition of a blood alcohol of 0.08%. It is very important to emphasize that this definition of impairment is based upon road motor vehicle operation and must not be applied to the piloting of an aircraft.

A recent study conducted in the USA on the effect of alcohol on the ability of experienced pilots to perform the task of flying a single engine aircraft under simulated instrument landing approach conditions indicated that an "endanger limit" was reached at a blood alcohol level of 0.02% in some of the subjects and that none were predictably able to safely perform their task with blood alcohols between 0.04% and 0.05%. It had been stated before, by other investigators in the same field, that the skills necessary for piloting an aircraft are measurably degraded by one quarter the amount of alcohol required to produce a measurable decrement in performance with a road motor vehicle. In reality, there is no acceptable positive blood alcohol compatible with flight.

Unfortunately, it is not sufficient to leave the subject by merely equating pilot performance to measurable blood alcohol levels. This is particularly true in the piloting of high performance aircraft. Alcohol hangover may be looked on as just an annoyance on the ground. In the air, under the stresses of the aviation environment, it becomes a potentially hazardous condition. The most positive measurable effects of the late alcohol consumption period, or hangover, are found in the abnormal responses evoked by the vestibular organs affecting one's sense of balance and orientation in space. Alcohol consumption may continue to influence this sensory organ for several hours after no measurable alcohol is detected in the blood. This effect may appear as a blurring of vision or, in the absence of poor visual references as found under low illumination or cloud, cause the sensation of abnormal motion. Studies carried out on this phenomenon have shown that its intensity and duration bear a direct relationship to the quantity of alcohol consumed. Several investigations have even suggested that it may be provoked for periods as long as 20 to 36 hours after drinking by abnormal rotational or positive gravitational forces. These stresses closely approximate those encountered during flight.

Other deleterious effects upon pilot performance may be inferred from the results of additional research investigations. It is known that repetitive exposure of pilots to the motions of flight can result in an adaptive resistance to the stimuli causing disorientation and motion sickness. Evidence has been presented which indicates that this normal adaptation is compromised by alcohol.

Alcohol is also known to affect sleep quality by reducing the proportion of sleep spent in the dream state. Deprivation of dream sleep has been shown to induce feelings of tiredness and anxiety as well as impairing concentration. It is a common occurrence both in experimental conditions and personal experience for one to express the subjective feeling of tiredness the day after drinking, in spite of the fact that a normal quantitative amount of sleep was obtained.

In summary, I would like to point out the necessity for knowledgeable restraint in the drinking habits of those who fly aircraft. Toxicological investigations performed on the victims of fatal air crashes indicate this to be a very real problem in general aviation. However, the true magnitude of the problem only comes into focus when we consider the hangover period as well.

The importance of the individual and his own responsibility cannot be overemphasized. It is necessary that every pilot understand all the known consequences of alcohol consumption as it may affect the performance of his duty. With such background knowledge an individual will be better able to regulate the times and intensity of his social drinking so that it does not compromise his attained level of ability. Good regulations may assist in achieving this aim but cannot provide an adequate solution without the sound judgement of the pilot himself.

ABOUT THE AUTHOR Dr Madill is a graduate of the University of Alberta (MSc 1959) and also of the University of Western Ontario where he received his Ph D in Pharmacology in 1970. Dr Madill was employed by the Defence Research Board at the Suffield Experimental Station in Alberta from 1960-61, 1963-67 and 1969-73. He also worked for the Canada Department of Agriculture from 1961 to 1963. He is presently with DCIEM in Toronto.

Members of 414 Sqn follow the morning briefing. Note the phone off the hook – used to trigger the briefing and for questions at the end. Answers given over speaker.

Tele-Met

CLOSED CIRCUIT TV FOR WEATHER SUPPORT

D.A.R. Mettam
22 NRWC
CFB North Bay

The briefer pauses and awaits the go-ahead signal while the audience settles down. Eventually all is quiet and the briefer starts. "Good morning, gentlemen. On the surface chart at 0900Z this morning, etc. . . . . ." So, what's new? Everything sounds the same but now the briefer and his audience can be separated by several miles as the briefing is delivered over a closed circuit television link. What has been the impact of this relatively new facility on the aircrew and weather officer personnel who use it? Here's the view of a meteorologist who regularly uses CCTV.

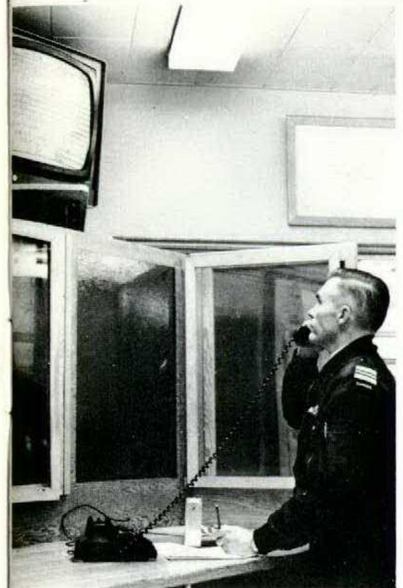
MWO RS Limin, briefing 414 Sqn. The slide over the light table shows up clearly on the monitor.

Photos by Pte Godreau, North Bay Photo Section.

There's no doubt that in spite of all the modern electronic gadgetry and great advances in means of communication, one cannot improve on the personal briefing, the eyeball to eyeball "confrontation" between aircrew and the forecaster. A well prepared, succinctly presented briefing, followed by direct replies to pertinent questions is the ideal way to alert an aircrew audience to weather phenomena that may affect a flight. A "poor man's TV" arrangement using a chart display and telephone, or just a telephone, has been a makeshift substitute in the past for direct professional service. Now, along has come closed circuit television, a very effective briefing tool which is proving to be almost, but not quite, as effective as the personal kind. CCTV also has other benefits which may not be readily apparent.

The telecasting facility located in the weather office is adjacent to all the information pouring in over teletype and facsimile circuits. The briefer does not waste a sizeable amount of time travelling around a base from briefing point to briefing point but is able to stay in this office where he can react to sudden changes and keep his material current. He can even include information given to him after the briefing starts. One CCTV briefing can be given to a number of audiences provided individual missions are not significantly different. This often saves aircrew visiting the weather office. Between briefings, the screen can be used to display current weather, forecasts and weather warnings, or can serve as a training vehicle in the provision of lectures.

One problem associated with CCTV is the lack of personal contact between the weather office staff and aircrew and this tends to inhibit the exchange of information. So, in spite of exhortations from weather office personnel, PIREPS still remain in short supply – although their value is appreciated. Furthermore, personal contact leads to a mutual exchange of ideas and the meteorologist learns to appreciate the importance of certain weather phenomena in relation to the kind of aircraft and type of mission being flown.



Maj WAC Wilson, 414 Sqn, in Flight Planning Centre, CFB North Bay.

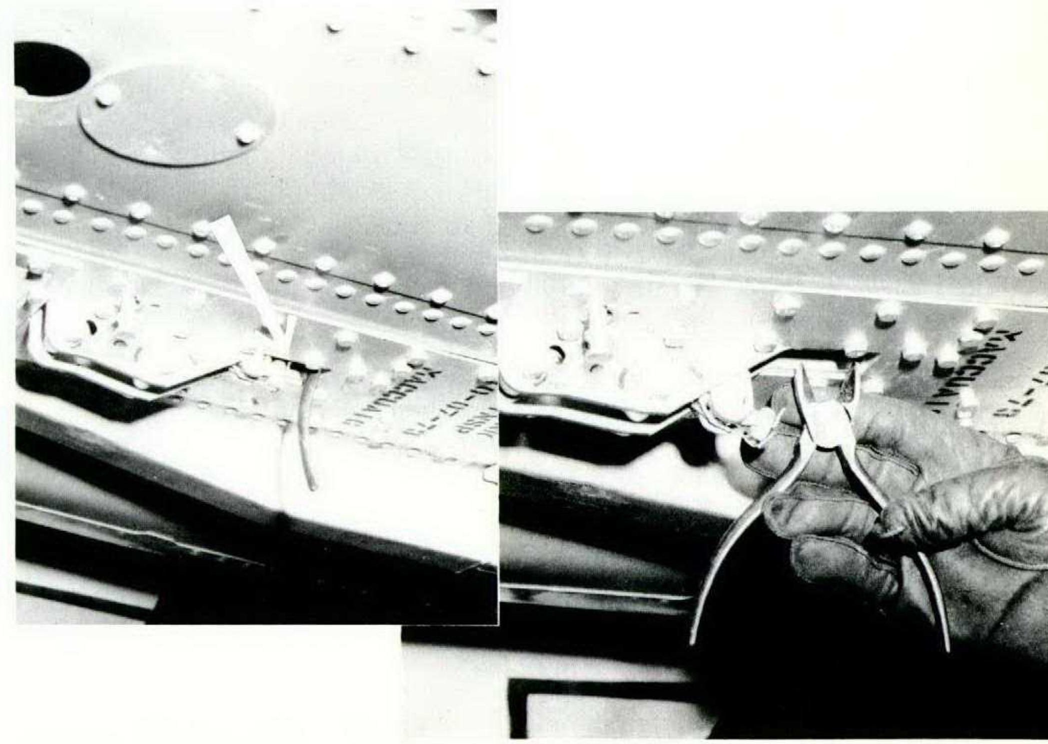
Capt F Holt, USAF exchange officer, uses CCTV facilities.

The new medium has made an impact in the met office in other ways whether in support of squadron activity or for transient crew briefings. As far as possible, existing routines have been adapted with little modification. Coloured slides prepared for other briefings can be transmitted with great clarity in black and white using a light table. Of course, some requirements are specialized and preparations tailored to the individual needs of the consumer have to be made.

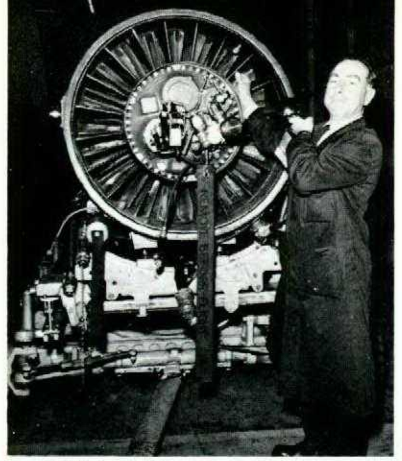
Conducting these briefings calls for different techniques. "A picture is worth a thousand words" – and this must be borne in mind constantly in the telecasting of weather. Weathermen have a habit of talking too much. Verbosity is particularly noticeable on TV, so the briefer must avoid long-winded descriptions of features made perfectly obvious by the pictures. Complete familiarity with the equipment is also essential. The briefer must ensure that a well focused picture covering the required area is transmitted. This means that throughout the briefing he has to be able to cope with the fine focus, the zoom lens and the light switches, and be able to change slides and charts with maximum speed and minimum fuss. He must also keep up a smooth flow of pertinent talk while his eyes are cocked on the monitor – hopefully seeing what the audience sees. Though practice and experience develop telecasting skill, adequate preparation time is the most important single ingredient of a polished briefing, whether CCTV or no. Therefore, it is to the benefit of aircrew planning trips to lay on the briefing requirement ahead of time. It gives the meteorologist a chance to dig out all the relevant facts and to prepare for all possible questions. The result should be a short, snappy but factual presentation.

With an escalating need to cut costs and make maximum use of personnel resources it is envisaged that increasing use will be made of CCTV systems for the dissemination of weather information. It is up to weathermen to make best use of this equipment but they need the help of fliers to provide PIREPS and to schedule briefings. The two working together will ensure that the full capabilities of the equipment are exploited and that the service provided is as effective as the personal type of briefing.

To receive FOD— pull handle!



Good Show



Sgt B Makosiej

Capt J.A.B. Willett

CAPT J.C. PELLOW

During the latter stages of a student conducted reconnaissance for a pinnacle approach and landing, the Kiowa helicopter suddenly lost power. There was a series of loud "pops" and a violent swing to the left. Capt Pellow took control as the helicopter was sinking towards the trees and entered autorotation. The standard emergency checks were completed while the helicopter was being nursed down the tree-lined slope, across a creek at the bottom to a successful forced landing in a swamp. No damage occurred, other than that to the failed engine, during the landing.

Capt Pellow, by his skilful handling of this serious problem at a critical stage of flight not only saved the helicopter from further damage but probably saved the crew from serious injury.

SGT B MAKOSIEJ

Sgt Makosiej returned to the hangar after duty hours to verify the serviceability of a component on a J57 engine. Although his task was completed, he continued to inspect the rest of the engine and found what he suspected to be a crack on a first stage stator blade. He thoroughly cleaned the stator and inspected it in more detail, confirming the existence of a crack. Not stopping there he persisted in his inspection and found other blades in the assembly in the same condition.

Realizing the seriousness of the situation Sgt Makosiej immediately reported the condition to his supervisor. The information was quickly disseminated to the entire CF101 fleet in the form of a Vital Special Inspection on all J57 engines. Cracks were subsequently found in numerous other engines at CF101 bases throughout the country. The results of this SI also prompted a Special Inspection in the USAF – with similar findings.

Sgt Makosiej's outstanding display of initiative and technical professionalism averted possible stator blade failures which could have resulted in serious aircraft incidents or accidents.

CAPT J.A.B. WILLETT

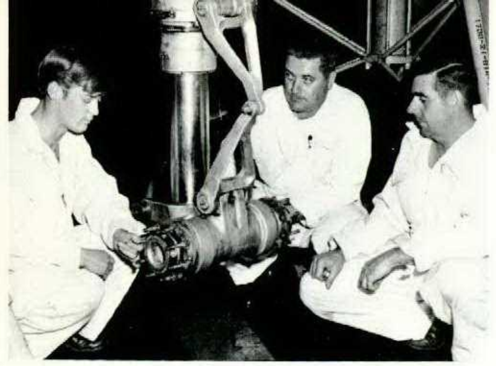
Capt Willett, the pilot of a Kiowa, was flying a training mission with two passengers on board. The aircraft was in level flight at 500 ft AGL and 98 kts IAS when Capt Willett heard the engine start to wind down. After checking the N_2 and rotor RPM he immediately entered autorotation and transmitted a Mayday call. Remembering that he had just passed over a small clearing Capt Willett started a right hand 180° turn and also attempted an engine relight. The engine refused to respond and Capt Willett, by skilful airspeed and rotor control was able to hold the aircraft off the tops of the trees and make a successful landing in the clearing. Minor damage was caused to the aircraft due to the poor condition of the landing area.

Capt Willett is commended for his quick reactions and display of first class flying ability in this emergency situation.

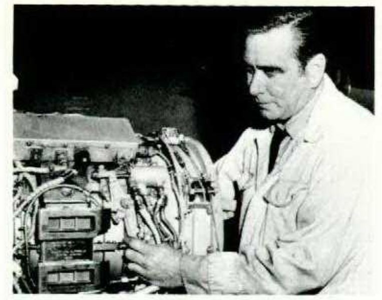
MCPL B.W. PARKER, CPL W. MELNICK AND CPL W.R. PENNY

Working at 0100 hours local, MCpl Parker, Cpl Melnick and Cpl Penny were carrying out an "A" check on an Argus at NAS Bermuda. They first determined that the nose wheel tires were badly worn and while removing the wheels to make the replacement, they felt that something was amiss with the "feel" of the nose wheel assembly. Further checking confirmed their suspicions: The nose wheel axle retaining collar had sheared both retaining shear pins and had backed off three full turns. This allowed the nose wheels to move laterally in the strut and presented a very dangerous situation – especially as the shear pin heads remained in place, giving the appearance that all was well.

After making repairs Cpl Penny decided that there was a need for some form of witness line across the axle and collar to facilitate checking for this problem during "A" checks. As a result of his suggestion a recommendation that two witness lines be painted at 180° spacing was passed to home base. These recommendations are now under consideration.



MCpl B.W. Parker, Cpl W. Melnick and Cpl W.R. Penny



MCpl T.D. Southworth

Cpl J Karockai

Cpl R.J. Kjilaas and Cpl M.J. Middleton

These three Argus technicians put themselves to a great deal of extra work following a suspicion that something was wrong. Their diligence helped uncover a dangerous defect and prevented a possible aircraft accident.

MCPL T.D. SOUTHWORTH

MCpl Southworth, an aero engine technician, was removing an engine from a CF5 so that an airframe snag could be corrected. Whilst inspecting the engine components MCpl Southworth found that he was unable to close the bleed valve by hand. Further investigation revealed that the bleed valve actuator was binding – a fault which could cause engine operating malfunctions and possible compressor stall during flight. Although there was no requirement in this case for an engine inspection MCpl Southworth displayed a conscientious approach to duty and is commended for his discovery of a discrepancy which could have caused an engine malfunction.

On a recent visit to Training Command, Col RD Schultz, Director of Flight Safety, personally presented Good Show scrolls to Capt JF Mann and Capt RL Johnson at CFB Portage la Prairie. Capt Mann (below) is an instructor at the Musketeer FIS and Capt Johnson is a USAF exchange officer instructing on the CH136 Kiowa.

CPL J KAROCKAI

Cpl Karockai was the front man assigned to start a CF104. On completion of engine wind-up, pooled fuel ignited underneath the aircraft fuel vent. Cpl Karockai immediately went for the fire extinguisher, put out the fire and then saturated the area with chemical before signalling the pilot to shut down.

If Cpl Karockai had signalled the pilot to shut down earlier, fuel from the aircraft drain vent would have added to the fire and the incident could have been much more serious. Cpl Karockai's quick assessment of the situation and his knowledge of emergency equipment prevented the possible loss of a valuable aircraft.

CPL R.J. KJILAAS AND CPL M.J. MIDDLETON

During the post start sequence on a CF104 Cpl Kjilaas and Cpl Middleton discovered a stray bolt underneath the aircraft hydraulic bay door. They ordered the aircraft shut down and then began a systematic search of the hydraulic compartment to determine the bolt's origin. Their diligence was rewarded when they discovered that the bolt had broken off one of the aircraft's hydraulic components.

The alertness and dedication of Cpl Kjilaas and Cpl Middleton exemplifies the desired attitude necessary for a safe flying operation.

CPL R.G. HALFYARD

Cpl Halfyard was detailed to carry out the number four engine inspection on an Argus as part of a number two supplementary inspection. Although the engine scavenge filter showed no signs of contamination, Cpl Halfyard carried out a check of the front sump magnetic plug (a precautionary measure which is required only during periodic inspections). A visual inspection of the magnetic plug revealed a broken gear tooth. When the engine was subsequently dismantled to check for further damage, two more gear teeth were found. The damaged gears necessitated the replacement of both the front balance weight gear and the intermediate drive balance weight gear by the engine manufacturers.

By conducting a precautionary check not required in the performance of his assigned task Cpl Halfyard discovered an engine malfunction which, if uncorrected, would undoubtedly have caused more extensive damage. Cpl Halfyard's attention to detail reflects the professionalism which he displays in the performance of his duties.


Cpl S.M. Marquette


Cpl R.J. Speirs


Cpl W.J. Sadaway


Cpl R.G. Halfyard

CPL W.J. SADAWAY

During the pre-start checks on a CC129 Dakota, detailed for a mission to Churchill with ten passengers, the crewman, Cpl Sadaway, noticed that the starboard rudder balance cable had frayed to half its normal thickness.

Checking the tail cone compartment during this phase of the start is not part of the normal duty of a Dakota crewman. Cpl Sadaway is commended for his alertness and extra attention to detail which prevented the development of a serious flight safety hazard.

CPL S.M. MARQUETTE

While carrying out a daily inspection on a CC129 Dakota Cpl Marquette noticed an unusual mark in the vicinity of the outboard aileron attachment point. With the aid of a stand he investigated further, cleaned the area and confirmed that there was a crack in the aileron spar. This check was then carried out on the remaining aircraft and one more was discovered with the same type of crack.

This part of the airframe is not normally checked on a daily inspection: Cpl Marquette's professionalism and dedication eliminated a potentially hazardous situation from developing any further.

CPL R.J. SPEIRS

Cpl Speirs was removing the adapter ring on the tailpipe assembly of a T33 aircraft when he noticed a minute mark on the inside of the exhaust cone beside the lower vertical fairing assembly. To carry out a closer examination, he removed the insulation blanket from the exhaust cone, revealing a two inch crack on the outside of the exhaust cone assembly.

Cpl Speirs' alert and professional approach to his duty undoubtedly prevented a potentially serious inflight hazard which would have been caused by excessive leakage of exhaust gases into the aft section.

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ASTROLOG

aries

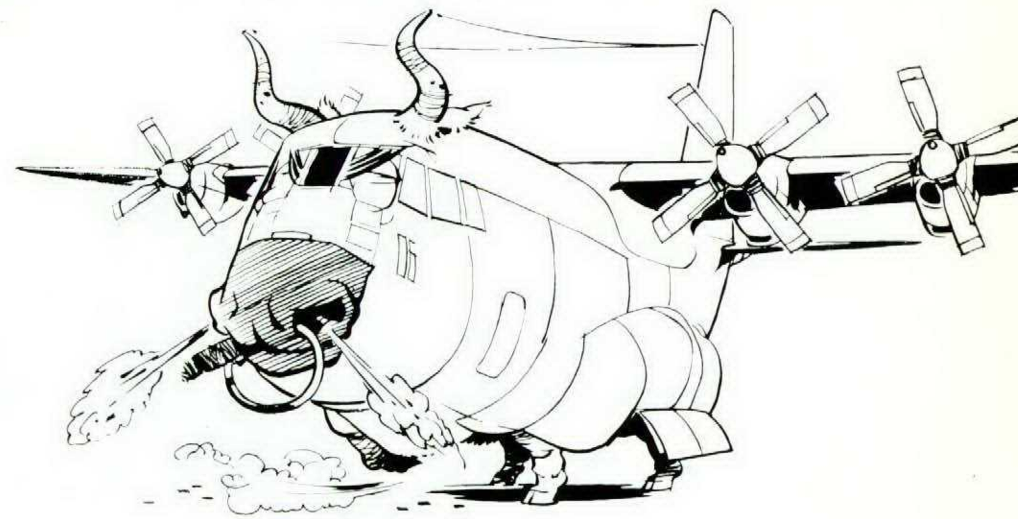
Mar 21 to Apr 20

Do you know someone who thinks that a 20 plane formation on Friday afternoon is the best way to end the week – provided he's the lead. Well that aggressive "leader of the pack" is probably the Aries on your squadron. The energetic Aries pilot is typified by an assertive, go-getting approach and his desire for quick results tempts him to spend little time in planning. Just like the ram, he is continually butting and thrusting himself actively into life; leaping forward, always ready to accept a challenge.

Unfortunately, the self-expressive Aries can be too impulsive – even to the point of foolhardiness; he is the greatest risk taker of all the sun signs. Don't ask *him* to wait five minutes for the next weather sequence. He'll tell you – not too diplomatically – that he can't "wait forever". The Aries helicopter driver who just missed a wire-strike while low flying will be back at the same game tomorrow, caring nothing for yesterday's lessons. His natural love of speed and danger should be tempered with restraint (which he hates) if he is to avoid disaster. Aries people can quickly conceive the start and finish of an enterprise but often overlook the details in between. If you're a ram you should double check your flight planning. You've probably forgotten to calculate the fuel!

taurus

Apr 21 to May 21



Risk-taking Aries contrasts sharply with the essentially restrained character of the typical Taurus. The bull embodies all the solid traits of loyalty, reliability and patience and works on the principle that if a job is worth doing then it's worth doing well. The Taurus flier has a well-developed sense of self-preservation and refuses to be rushed into anything. He seldom worries but his cautious nature never allows him to take risks. His key phrase is "common sense" and his methods are deliberate and methodical. He's the pilot who flies instruments so well – right by the book. And, being impressed by bigness, he's at home in transport aircraft.

The persistence of a Taurus may sometimes work against him. He is often extremely stubborn – though he calls it "patience". Taurus is very fixed in his ways and this lack of flexibility is combined with a slavish adherence to routine: the bull should try and light that spark of imagination which aviators often rely on. If your aircraft captain is a Taurus don't impose on his good nature if he appears meek and understanding – he'll give you a chance to prove yourself. Prone to ear-ache and problems of over-weight, Taurus should take comfort in the fact that he is considered the most handsome of the Zodiac signs.

The more things change....

by Capt J.D. Williams

"Plus ça change, plus c'est la même chose".
(Alphonse Karr 1801 – 1890)

I began to learn about flying at the age of three. That may seem unusual, but only until you consider that a whole generation of us had Air Force fathers even though we didn't grow up as service brats. We were born and lived our early years to the somewhat musical accompaniment of the throaty roar of the Harvard and the crackle of the Rolls Royce Merlin. Who among us will ever forget the scream of the first Vampire he ever heard? Who will forget the airshows where what seemed like a hundred T33s (and was probably fifty) flew in formation and spelled out RCAF? Who among us didn't sunburn his tonsils watching the Golden Hawks and the Red Knight slip the surly bonds? Let's be frank – we never had a chance. We were hooked, maybe even genetically, while we were still recent graduates from the three cornered pant set.

So what about this three year old kid learning about flying? Well, by the time I was three "the War" was over (in those far off days you didn't have to specify which war) and my father was busy building up a medical practice. I didn't get to see him much, but one time I knew I had him cornered was when he was shaving in the morning. I knew he wasn't going anywhere with all that lather on his face and would therefore be available for questioning. Probably a lot of questions were pretty stupid, but the answers weren't – as a matter of fact, I bet I remember them all today. There were lots of stories too.

One story I remember concerned the origin of the name "Daisy Cutter", a family nickname for the Tiger Moth. As the story went, a young student took off from the flying school at Prince Albert and flew to a convenient field on his ladyfriend's father's farm. After a brief stop prompted by reasons which I certainly wouldn't have understood then, he took off again, completed his mission and RTB'd. All would have been well had it not been for the presence of numerous daisies snagged in the undercarriage. Presumably our erring pilot carried out some packdrill and proceeded suitably chastened to bigger and better things. Even a child could understand the concept of crime (minor) and punishment (minor).

Another story involved the pilot of a Bolingbroke who took a group of his friends up for a little flip. Five or six guys, I believe – I am not sure – but more than the plane was built for at any rate. The flight "just happened" to pass over the country home of the pilot's girlfriend (sound familiar?). At least, it passed over the first time. On the second pass, either through pilot inattention or because the aircraft's performance was adversely affected by the overload, the wing of the plane hit the chimney of the house. The Bolingbroke cartwheeled, crashed and burned. No doubt the girl was impressed. For me as a young boy it was a point well taken.

I remember the story of one very senior instructor who just loved doing rolls in the Harvard. It was said that he would happily roll all the way from Moose Jaw to Regina. Apparently he was a great big guy, and one day he was asked to take a Harvard, which had just landed, to Regina for some reason. The pilot, who got out of the cockpit just before this chap got in was very small. The hero of this story apparently was in too big a rush to get airborne to even adjust the harness. He just closed the coupe top, taxied out and took off. Within sight of the airport he began his famous rolling act – but this time he only rolled once. The accident investigators felt that he fell out of his seat and onto the coupe top when he got inverted and that as the roll continued he fell back jamming the stick and thereby crashed.

Of course the stories weren't always grizzly. There was one about two Australian gunnery students at the Bombing and Gunnery School at Mossbank. They went up in a Fairey Battle to fire at a drogue which was towed by another aircraft out over Johnson Lake. Apparently the mission briefing left something to be desired or the Australian terminology differed from the Canadian, because when the drogue came within range the Canadian pilot yelled "Fire" into the intercom and was met by complete silence. A quick look over the shoulder revealed an utterly empty rear cockpit. The two Aussies had bailed out. Maybe the correct term was "Open Fire", or maybe it was one hell of a wild practical joke.

So I heard all these things and lots more as I sat on the edge of the bathtub and my father shaved. I heard about the dangers of trying a "180" after engine failure on takeoff: I heard about the values of a careful walkaround. I heard about the requirement to know and use "The Book" and I learned what some people consider to be an "old saw" that has to do with there being old pilots and bold pilots, but no bold, old pilots – in fact I heard that one until it was coming out of my ears.

My father was so convinced that the Air Force way was the only way to fly that as a civilian teenager I had to sneak out to our local airport to take lessons. I though that if I had told him I was learning to fly he would have had my hide (in fact he knew all along as I found out years later – and approved – but very grudgingly). Naturally I figured I was a combination of Buzz Buerling, Billy Bishop and Johnny Johnson all rolled into one and as a direct consequence of this delusion, came closer at least twice to writing myself off than I'd now care to think about.

Dad told me a few times what he thought of some of my aviation exploits, but I guess I was a classic case of the Mark Twain syndrome (i.e., when I was sixteen I knew my father was an idiot and when I was twenty one I was amazed at how much he had learned in just five years).

Then I joined the Air Force and entered the "jet age". You know what amazed me? Not the *differences* between the Tutor and the Tiger Moth; not the *differences* between the Hurricane and the CF5; the Spitfire and the CF104; the Bolingbroke and the CF100 – but the *similarities.*

I don't know of anyone who has landed in a farmer's field to visit his girl, but I know guys who have flown Voodoos and Sabres while not strapped in, and guys who ejected from perfectly serviceable aircraft through failures to communicate. I know guys who tried "180s" after low level engine failures and paid the price. Do you want to know the saddest part? I have friends who were bold pilots and as a consequence they will never qualify as old pilots.

When I was three years old my father told me that not one of his friends was ever killed (in six years of wartime service) in a legitimate accident. Lots were killed in combat, and lots screwed up in training – but none "legitimately" through wings coming off, engines exploding or what have you. That was the sad truth then and it is the sad truth now almost thirty years later. I am a Flight Safety Officer because I think it *is* sad that every year we lose fine young men who don't have to be lost. I try in every conceivable way to convince pilots that the basic truths don't change and aren't likely to. Maybe some listen, but it sure hurts every time I read or hear of one who was unreachable. This year I took one of my best buddies home for the last time and I can tell you it wasn't fun. It wasn't necessary either, or so it looks at this point in time. Who among us hasn't lost at least one friend or acquaintance this year? I suspect no one.

Recently I was talking to my father, telling him about some of the troubles of those Flight Safety Officer's job – problems like some of those I've just mentioned. He sort of grinned and then he reminded me of our early morning conversations of yesteryear.

"John" he said, "the machinery you guys fly has improved radically since I joined in September 1939 – but it looks to me like the human brain hasn't caught up even after all these years".

He's right you know – but then, old pilots usually are.

...the more they remain the same

Capt Williams writes regularly for *Flight Comment.* He is presently the Group FSO at 1 CAG, Baden, CFE.

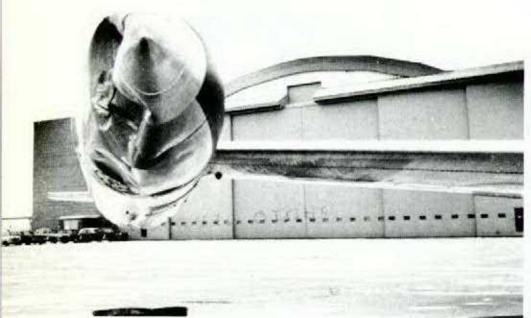
Would you believe......?

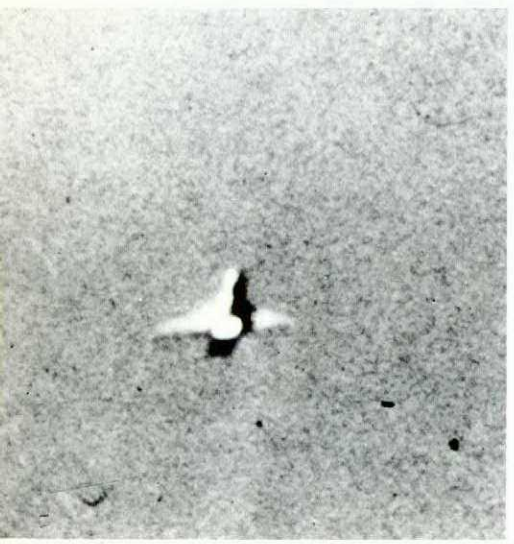
"ON BETWEEN FLIGHT INSPECTION, PANEL ON RIGHT WING WAS DISCOVERED TO BE ATTACHED BY ONLY THREE SCREWS. THE OTHER THIRTY-TWO SCREWS WERE IN A PLASTIC BAG INSIDE THE PANEL".

–from a recent incident message

the '73 story

The highlights of our 1973 accident and incident record are presented here. A detailed analysis has been completed and appears in the 1973 Annual Aircraft Accident Analysis.





Milestones

- The 1973 accident rate was the second lowest since 1 Jan 1949.
- There were 14 ejections of which 13 were successful. The success rate for ejections attempted within the ejection envelope has remained at 100 per cent since 1969.
- Helicopter flying hours continue to increase whilst fixed wing hours decline. Helicopters flew 26 per cent more hours than in 1972.

Air Accidents

The chart shows a total of 32 accidents – the second lowest number of accidents since 1949. Our accident rate was 0.96 per 10,000 hours and although this is up from the all time low of 0.80 set in 1972, it also stands as the second lowest rate since 1949.

Aircraft Destroyed

Sixteen accidents resulted in seventeen writeoffs – up from seven aircraft destroyed in 1972.

Fatal Accidents and Fatalities

Six air accidents caused ten fatalities in 1973 as opposed to four fatalities in four accidents the previous year.

Ground Accidents and Incidents

The Canadian Forces sustained three ground accidents in 1973. This figure is the lowest on record since 1959. Of the reported ground occurrences, which numbered 254, 138 resulted in damage to aircraft. There were no major injuries and 15 personnel received minor injuries. (There were a total of 42 minor injuries associated with air and ground occurrences).

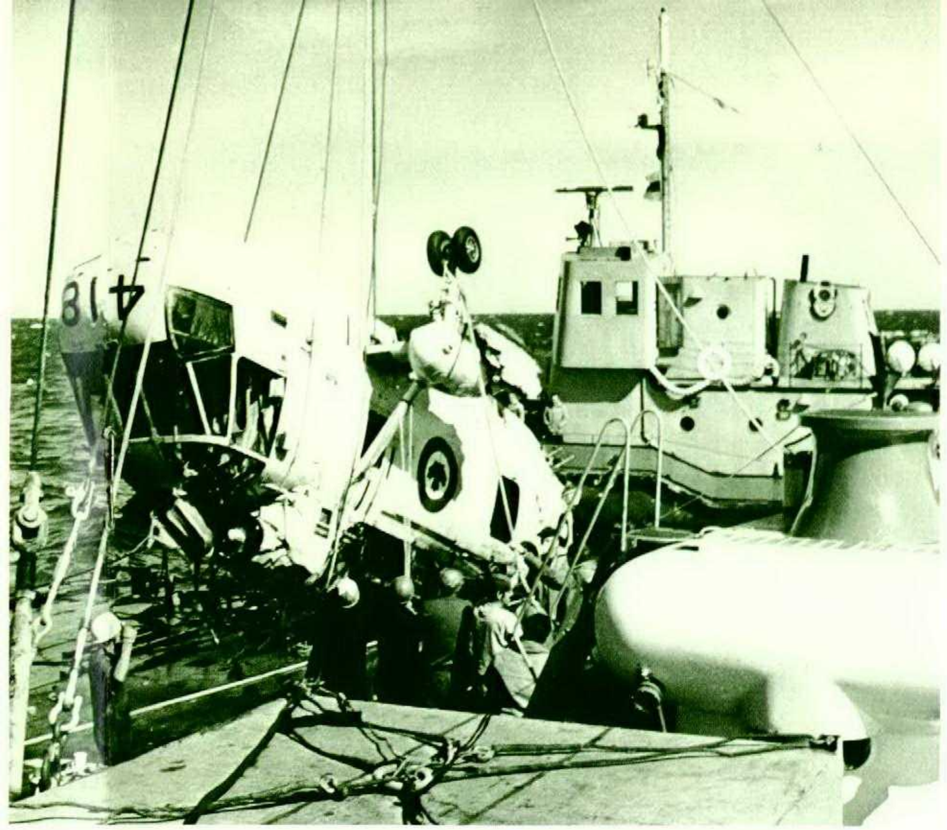
Air Incidents

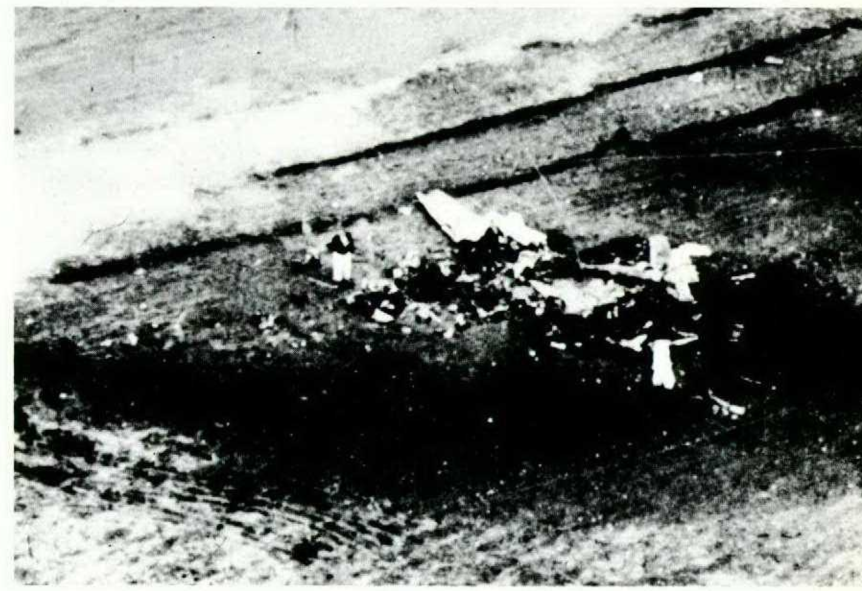
Although there was a decrease in the number of fixed wing flying hours, increased helicopter activity produced an overall rise in the number of total hours flown. Air incidents decreased from 2567 to 2353. Since 1971 there has been a gradual decrease in the number of reported incidents for all aircraft.

Air Accident Causes

The 32 air accidents in 1973 were assigned 80 cause factors. PERSONNEL ranked highest with 67. MATERIEL was assigned five, followed by ENVIRONMENT with three. The remaining five cause factors were listed as UNDETERMINED.

This year the PERSONNEL cause factors constituted 84 per cent of the total – nine per cent higher than last year. It appears that the increased accident rate this year parallels the increase in PERSONNEL causes.





	T33	CF104	CF101	CF100	TUTOR	CH135	CH113A	CH136	SEA KING	TRACKER	HERCULES	BUFFALO	TOTAL
Destroyed	2	5	3	1	3	1			1	1			17
B Cat						1		2	1				4
C Cat	3	1	2				1	1		1	2	1	12
All Acc	4	6	5	1	3	2	1	3	2	2	2	1	32
Fatalities		3		2	1					4			10

Reports and Feedback

"report an incident — prevent an accident"

"The prime purpose of flight safety reporting is to promptly bring to the attention of all concerned those circumstances which could lead to, or have resulted in, aircraft accidents or injuries to personnel . . . . analysis of this information is vital to the development of accident prevention measures at all levels. Only in this way can proven accident causes be eliminated."
CFP 135.

The material graphically displayed here represents the "input" from the field and the "feedback" which is essential to a dynamic accident prevention program. Are you making full use of what is available?

Minutes of Flight Safety Meetings

Minutes are a valuable means of warning other formations of potential difficulties by indicating to higher authorities areas which warrant attention. A copy of FS minutes is sent to NDHQ/DFS after staffing by the CHQ in concern. Units using similar equipment often benefit from an exchange of FS meeting minutes.

Unsatisfactory Condition Report (UCR) CF777

The UCR may be submitted as *Urgent, Routine* or *Information* on conditions affecting flight safety. All copies are to be prominently marked "Flight Safety" to indicate that FS personnel are aware of the UCR submission. Using the CF777 is one of the most effective ways of bringing problems to the attention of higher authorities.

Safety Comment – CF212

This form is for submissions, which may be anonymous, related to ideas and hazardous conditions. A stock of *Safety Comments* should be kept readily available–and visible–for use by all personnel in the aviation environment. The *Safety Comment* provides a quick and direct method of advising your UFSO or BFSO of potential problems.

Birdstrike and Bird Sighting Report – CF218

This form is used to record all birdstrikes and significant bird sightings. Birdstrikes are a continuing problem in aircraft operations. Use of this form aids in early identification of nesting areas or unusual migrating patterns.

Aircraft Occurrence Report (Initial and Supplementary)

This is the most commonly used report and DFS reviews an average of 2600 initial reports per annum. Together with the Supplementary Occurrence Report the CF215 is the most effective technique for detecting trends and potential danger areas. Occurrence information from the field also gives commanders at all levels a day-by-day appreciation of the problems and hazards affecting their aviation resources.

FSO "Info" Kit

A pot-pourri of topical material issued monthly to SOsFS, BFSOs and UFSOs (via the BFSO) to support their accident prevention programs. *From the Director* and *Info from the Investigator* bulletins are contained in this kit. This information should receive wide distribution.

Monthly Accident/Incident Digest (MAID)

An outline of all aircraft occurrences in the previous month, together with an assessment of their causes and necessary corrective measures as far as has been determined. MAID helps you to keep up-to-date on the occurrences involving your particular type of aircraft throughout the service. It allows you to come to terms with problems that others have faced in the past–problems that you may have to face in the future. MAID arrives with the Info Kit.

Flight Comment

This magazine, published once every two months and devoted to the prevention of aircraft accidents, receives international distribution. There is a continual requirement for articles on all aspects of fixed wing and helicopter operations. *Flight Comment* also publishes accounts of recent aircraft accidents in *Gen from 210* as well as the narratives of *Good Show* awards. Flight safety periodicals are also obtained from other countries and are generally available on request through SOsFS.

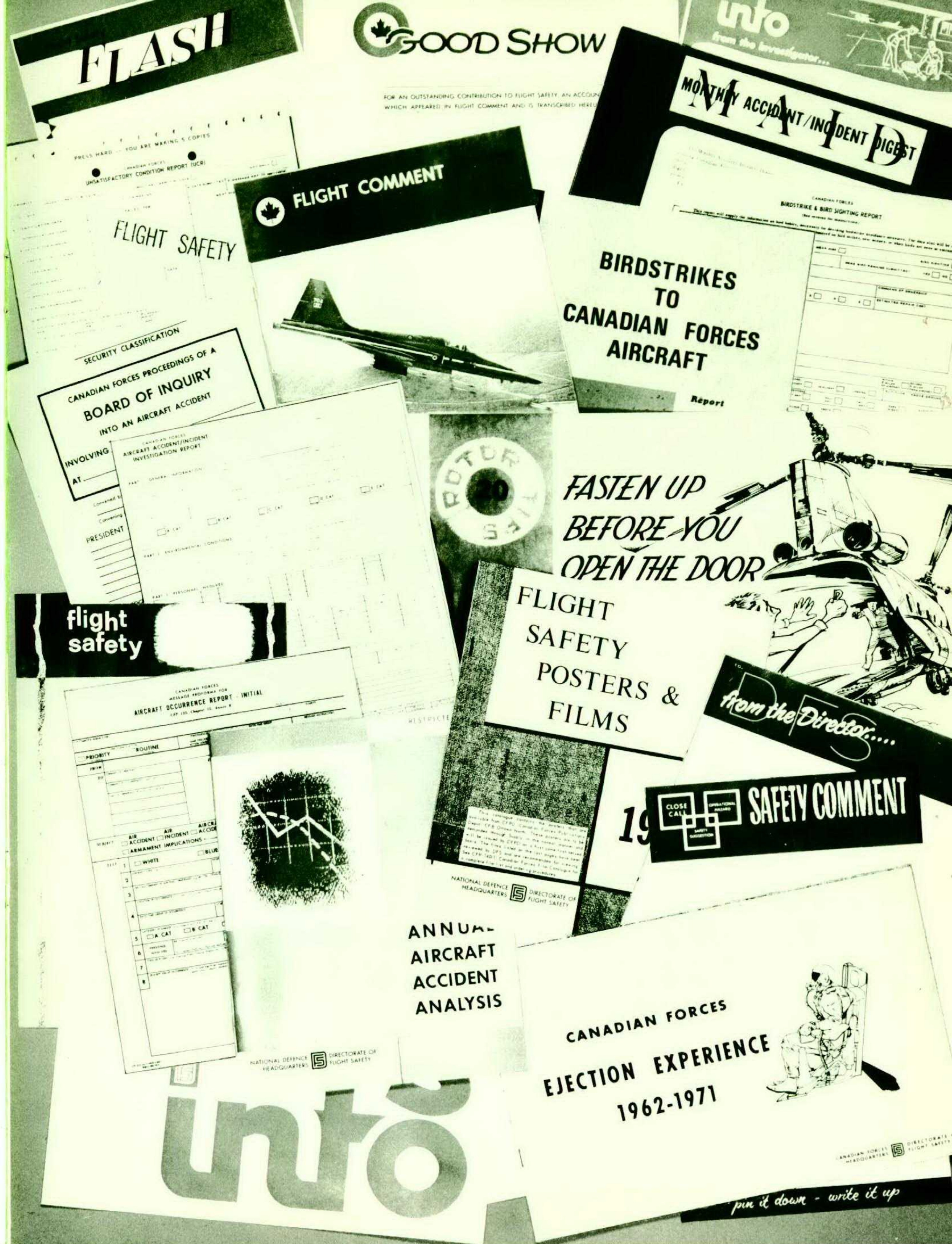
Posters and Films Catalogue

This is issued annually to all FSOs and shows all current flight safety posters. Various poster blanks are also available to assist FSOs in producing topical information oriented to their formation. The film listing summarizes those films which have been reviewed, considered suitable, and are available for flight safety purposes. The catalogue also indicates how films and posters can be obtained.

FS Flash and Bulletin

"Flashes" are reserved for items of urgent information, usually required before next flight. The Flight Safety Bulletin issued locally or in the Info Kit serves as a medium for less immediate or advisory information.

Detailed information on occurrence reporting and flight safety publications is contained in CFP 135.



Battery Temperature Indicators

detecting and preventing thermal runaway

Capt L.W. Elderkin
NDHQ/DAEM

In January of this year the Permanent Modification Review Board (PMRB) approved an Engineering Change Proposal (ECP) to install a Battery Temperature Indicator (BTI) in the following Nicad battery equipped aircraft: Buffalo, Falcon, Twin Otter, Tutor, CH135, CHSS2, CH118, Kiowa, Labrador and CF 5. This article discusses the more recent activity on Nicad batteries and details just what this new Battery Indicator is going to do – for all of us.

Much has been said about the problem of thermal runaway; what causes it, how to detect it and what to do after it occurs. Basically thermal runaway occurs on a battery that has had the cellophane plate separator damaged, usually due to excessive heat. Cellophane will be quite seriously affected from about 140°F and higher although damage does occur at temperatures below that and the results are cumulative. A small crack will gradually get worse until it and other damage cause the barrier to become ineffective. It can be safely said that if the temperature is kept below the 120°F level the life of the battery is greatly extended and the chances of thermal runaway are very remote. Of course there will always be failures due to other reasons and one should not get the idea that the BTI is the total answer.

Since the basic course of thermal runaway is excessive heat due to the limitations of cellophane, it follows that the aircraft should have a Battery Temperature Sensing and Indicating System. I will first describe the system and then discuss how to manage a rise in battery temperature and avoid thermal runaway and its associated hazards.

The system consists of an indicator, an amplifier, a test switch and a transducer that senses the change in battery temperatures. The indicator has an amber light that comes on at 120°F and a red light at 140°F. The scale doesn't start indicating until 100°F since the battery temperature is of little significance below that point. If it should be necessary to read down to 50°F an additional switch can be installed which when pushed would subtract 50°F from the indicated temperature and thus read actual battery temperature. This switch is spring-loaded to the off position for obvious reasons. The system test switch when depressed will cause the needle to move off the 100°F position up through the scale and the lights will illuminate at the 120°F and 140°F marks. The needle should rise to the top of the scale and when the switch is released return to the 100°F mark at the bottom. If the needle does not follow this pattern then the system must be checked by a technician. Although the warning lights are part of the instrument an additional hook-up can be made to the master caution system if considered necessary.

The transducer is mounted on a battery cell interconnecting strap and forms part of the solid state electronic circuit that controls the temperature indicator. Because it senses strap temperature rather than internal cell temperature there may be times when the indicator will read higher than the actual cell temperature. This will happen during a battery/engine start where the starting current will raise the strap temperature above that of the cell by approximately 10°F. This error will only last for 2-3 minutes due to the rapid heat dissipation qualities of the interconnecting strap material.

To date we have six different aircraft types prototyped and although none of them have had thermal runaway, an equally significant factor is that there has not been an unserviceability in any of the systems. In addition to the prototype aircraft the three "UN" Buffalo were equipped prior to departure.

Now, I would like to discuss the operational aspects and what you can and should do to avoid thermal runaway. First of all, since the BTI doesn't start to indicate until 100°F, you will rarely see the needle. When power is applied to the aircraft the indicator will read ambient battery temperature. If the ambient reading is above the 100° mark, that is your first caution. Normally you should not do an engine start using the battery under these conditions. If you must, for operational reasons, then it is quite likely that the amber light will be on during or right after the start. It is imperative that you turn the battery switch off until the temperature is on the decline and certainly below the 120° amber light point. The important thing is that you have started the aircraft and at this point have not allowed the battery to enter thermal runaway, (even though it could be on the threshold) and you still have an emergency source of power should your main electrical system fail. There can be no thermal runaway with the battery disconnected from its source of energy i.e., the aircraft generator system. In addition to this, if you are airborne and the battery enters thermal runaway, it will cease if you turn the battery switch off. It will be a rare situation if a battery enters thermal runaway without the BTI system alerting you, first with an amber light and then with the red light. Should you want to further verify a thermal runaway, check your loadmeter. It will read high and will decrease when you turn the battery switch off. The real hazard with thermal runaway is that if it goes undetected, the generator system keeps supplying energy, thus creating a greater rate of temperature increase. This produces excessive gassing which would result in an explosion if arcing should occur. As the cells short out the situation gets extremely dangerous if the battery is still connected to the main generating system.

Single Battery Temperature Indicator

Dual Battery Temperature Indicator

To avoid battery problems on later flights it is most important that you declare an unserviceability each time the BTI red light illuminates. The technicians must remove the battery and carry out a deep cycle check prior to returning it to service. By following this procedure you may well save problems on the next flight and also save a $1000.00 battery that a technician can fix by replacing a $25.00 cell.

The battery maintenance policy, since Apr 73, is that Base battery shops will conduct complete battery repairs down to the cell replacement level. In other words only cells, as opposed to complete batteries, are returned for overhaul. The contractor rebuilds the cells that have been ruined due to thermal runaway. Since Apr 73 he has rebuilt 5000 and has a backlog of 2500. This constitutes 263 complete batteries that would otherwise have been written off. It is anticipated that the cost of the BTI system will amortize itself in a very few years due to a large reduction in battery failures. This will depend on how effectively we can institute the operational and maintenance concepts outlined in this article. The 1973 warm weather season saw 49 reported thermal runaways. The incidents this year will be closely monitored.

It is anticipated that a contract for the installation kits will be let prior to Apr 74 and partial delivery made in time to get several aircraft modified before the summer months. It is hoped that Base BAMEOs will react accordingly and press for priority fleet fitment. You won't have to wait for the formal CF green leaflet to start the modification program.

Finally, there is one glaring question remaining to be answered. Why don't we use a cell plate separating material other than cellophane? The answer is obvious – there isn't one. If there was, the battery manufacturers would use it and wouldn't spend thousands of dollars researching for new materials. The Defence Research Establishment (DREO) in Ottawa has been conducting tests and doing research on the overall problems since day one. Many of our maintenance policies have been implemented as a direct result of this research – otherwise we would be experiencing many other serious problems. The results of research and development programs to date do not indicate a resolution of the temperature problem within the next few years, therefore it is imperative that we learn to manage what we now have, to meet operational requirements. This requires the full support of all operational and maintenance personnel. In my view we have just taken a giant step forward by obtaining approval of the BTI system for all nicad battery equipped aircraft. ■

"The Dead Man's Curve"

As described in previous articles on rotor flow states, rotor energy is characterized as being either high rotational energy where rotor rpm decays relatively slowly or as low rotational energy where rotor rpm is lost rapidly following engine failure. Regardless of the rotational characteristics of the particular rotor system, with the collective in the low pitch limit and low rotor rpm state, the only method of regaining rotor rpm is to either sacrifice altitude by diving or airspeed by flaring. If insufficient altitude is available in exchange for rotor speed, then a hard landing is inevitable. Sufficient rotor energy must be available to permit a reduction in the helicopter's rate of descent by the application of collective pitch before final ground contact.

Thus a chart, usually referred to as "the dead man's curve", but more correctly the height/velocity diagram, is published in Aircraft Operating Instructions showing the combinations of airspeed and altitude above ground level where a successful autorotative landing would be difficult if not impossible.

For small helicopters, i.e., CH136 Kiowa, at least 300 feet of altitude is necessary for the average pilot to set up a steady state autorotation and land safely without damage. This minimum increases with helicopter size/all-up weight.

On a typical "dead man's curve" (Figure 1), the most critical combinations are low airspeed and low altitude as shown in Area A. Less critical conditions exist at higher airspeeds because of the greater energy available to set up a steady state autorotation. The lower limit of Area A is a definite altitude because the helicopter can be landed successfully if collective pitch is held rather than reduced. In this instance, a steady state autorotation is not possible and the rotor energy available is used to cushion the landing. The maximum altitude from which a safe autorotation can be carried out from the hover ranges between three and ten feet depending on the type of helicopter.

Area B on the dead man's curve is critical because of ground contact speed or rate of descent which is based on the strength of the landing gear.

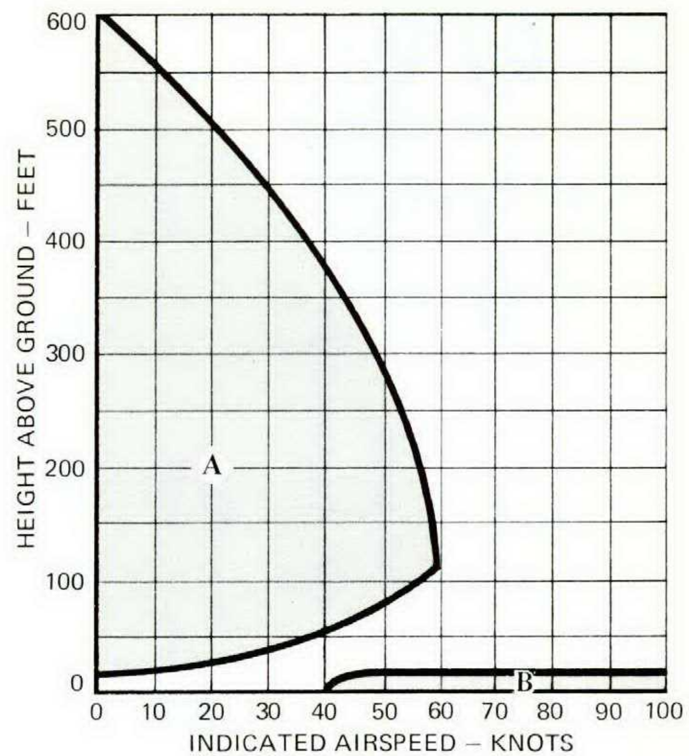
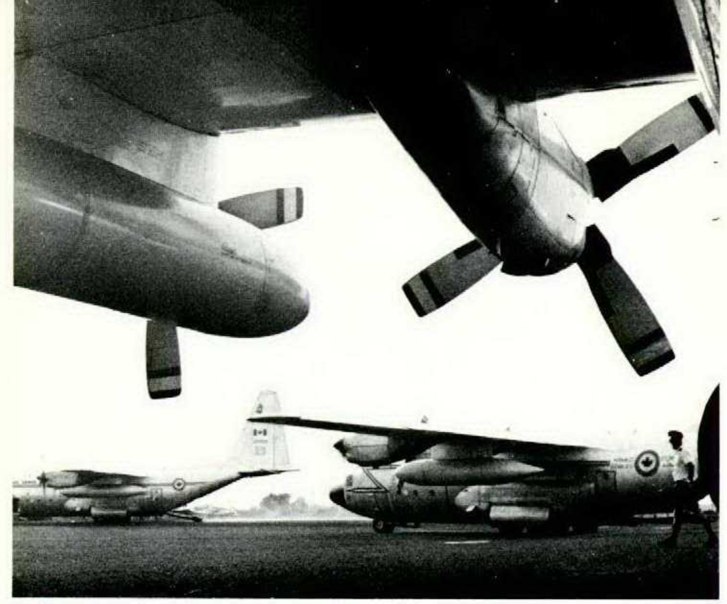


Figure 1. Height Velocity diagram

The average pilot may have difficulty in successfully flaring the helicopter from high speed flight without hitting the ground at an excessive airspeed or allowing the tail rotor to strike the ground.

The areas A and B contained in Figure 1 are published in AOIs. However, as a reminder, the determination of these curves is done by the aircraft manufacturer. It may be natural to speculate that the better these "curves" look, the more likely a favourable reaction from potential purchasers. This is not to state that the curves are not true; however, compare your performance with that of any company test pilot, and think about the published curves with your ability in mind.

As stated in most AOIs, operation in the critical areas of "the dead man's curve" should be avoided unless such operation is a specific mission requirement.



DANGEROUS CARGO

*should **you** be concerned?*

Maj D.A. Davidson

"Gasoline is flowing out the filler neck of the truck", the loadmaster called on the intercom. "Going off intercom for two to check the problem".

The aircraft commander scanned the cockpit of the Hercules for a moment. Both the flight engineer and the co-pilot were operating switches on the aircraft systems. He was just about to caution the crew to wait until the danger of gasoline fumes was checked out when an explosion blasted forth from the cargo compartment.......

Could this happen? The answer is *Yes* – very easily. It could happen to a Hercules, a 707, a Falcon, a Buffalo, a Voyageur or a Twin Huey. Any aircraft that is involved in airlift in any role faces the possibility of damage or destruction from dangerous cargo or from dangerous items carried on board by crew or passengers. Hijacking gets all the headlines but to military aircraft there is probably a greater hazard from dangerous cargo. However, notwithstanding the intrinsic risk, dangerous materials can be transported by air if the proper precautions are taken. Avoidance of the hazard rests in the proper care with which such materials are handled and shipped.

What is dangerous cargo? Well, for example, that Econoline van with gasoline in its tank; that wet battery you need on deployment; aircraft GSE with fuel; those cans of paint or solvent; jerry cans of fuel – the list is long. Ammunition and explosives are obvious candidates for dangerous cargo classification.

What are the dangerous articles you may have in your baggage? Reservoir lighters, "strike anywhere" matches, aerosol cans and photoflash bulbs are among the objects that qualify. AMU signs tell passengers what must not be packed in baggage or carried aboard an aircraft: the "Cricket" lighter that you purchased at the Canex outlet in the AMU is a distinct danger in the air.

Although all modes of transport require special care for dangerous materials, air transport demands extra special attention. Because the physics of the entire operation are different, the resulting precautions and rules are different and ignorance of these could be disastrous.

Where do you find out about dangerous materials and how to transport them by air? For crew and passenger baggage CFAO 20-19 Annex A answers the question. For personnel on posting overseas CFAO 20-20 Annex D has the details. For all other dangerous cargo (including vehicles), CFP 117 entitled "The Transportation of Explosives and Other Dangerous Materials by Military Aircraft" has the details, precautions and regulations. Don't let the title mislead you. The explosives are generally well cared for. It's the other "Dangerous Materials" that cause the trouble – that are overlooked – that are the "I didn't know" problem.

Stop and think about the times you go by air or send articles by air. Do you or your family travel by aircraft? Does your unit or squadron deploy by air or use air transport? Does a Herc drop in occasionally to pick up a load? Do you move into the field or to sea by helicopter? If you have any occasion to move by air do your people who prepare the loads know and check CFP 117? *It is the shipper's responsibility to prepare loads correctly for travel by air and to see that dangerous items are left out of baggage.* It is also his responsibility to obtain proper authorization (an absolute must) to ship dangerous materials and this authorization must be requested prior to shipment. If you have no transportation section then the onus is upon the responsible staff of the unit. An aircraft crew cannot see what is buried in a load without tearing it apart.

Remember that CFP 117, CFAO 20-19 and CFAO 20-20 are readily available. It is your responsibility to follow these regulations when taking or sending dangerous items by air. If you have a problem appeal to higher authority for interpretation and resolution if necessary – but don't hide dangerous items away in a load. Shipping dangerous materials improperly is comparable to hiding a bomb in an aircraft.

Think about it and take care – proper care for dangerous materials.

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: Base Commander CFB Winnipeg, Westwin, Man. Attn: ICPS.

Lowest Acceptable Altitude

It is apparent from class discussion here at the ICP school and from the many discussions the staff have had at various flying units that some confusion still exists as to the proper use of the LAA and the method of computing it.

The Procedures For Cross-Country Instrument Training Flights ("Round Robins") contained in GPH 204 are a concession to military training requirements by MOT. As you are aware, these procedures allow the military pilot to conduct approaches and overshoots at intermediate locations en route during IFR training flights in civilian controlled airspace. These flights operate under special IFR rules but once airborne, have the same priority as normal IFR flights.

Because of these special procedures, there are occasions when a greater work load is imposed on the individual air traffic control units co-ordinating IFR traffic – especially in the proximity of the intermediate approach points. Add to this the problem of protecting airspace for the flight in the event of communications failure and the requirement for an LAA comes into focus.

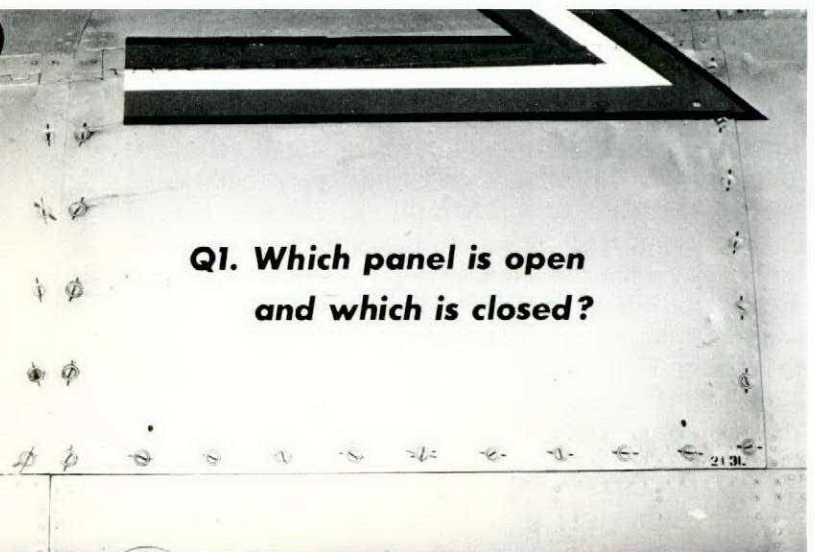
Once filed, this LAA gives the controller both flexibility and a safety valve. Should congestion occur en route, the controller can immediately assign the "Round Robin" aircraft any available altitude above the filed LAA knowing full well that the aircraft can complete the planned exercise and still have the required minimum IFR fuel at destination. By utilizing the filed LAA, the controller can alter the clearance limit for specific route segments. This, in conjunction with the communications failure procedures, (GPH 204 arts., 520 4a, 4b) allows for the safe completion of the flight in the event of communications failure regardless of where the failure might occur.

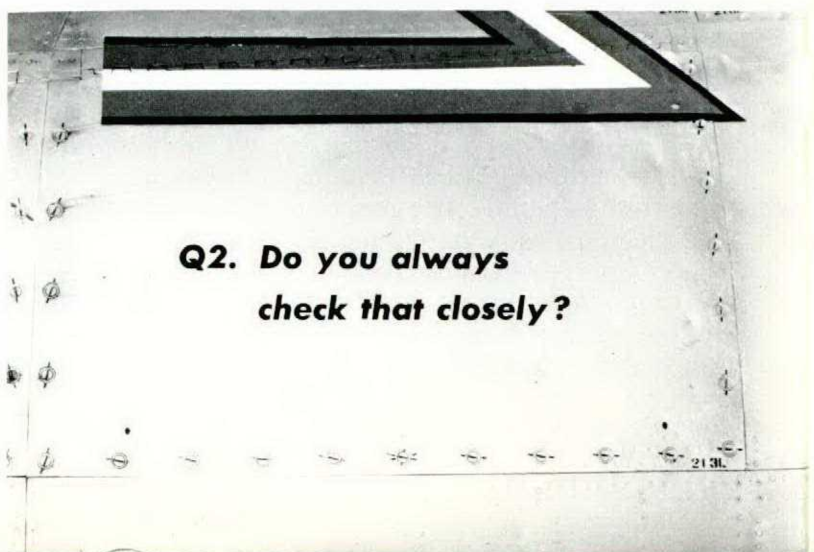
Now that the "why for" has been answered here is one way to complete the "how to". After completing the log card for your planned "Round Robin", subtract the total fuel required, including fuel to alternate +15 min from the total fuel carried. We'll call this fuel "A". Now compute the fuel required to do the same trip at the same altitudes but with no letdowns. We'll call this fuel "B". The total of fuels "A" + "B" is the available fuel for the en route portion of the trip. Using the total route distance from your log card, the total of fuel "A" + "B" and the aircraft performance fuel consumption charts, it is a simple matter to find the lowest altitude over the planned distance with the fuel available.

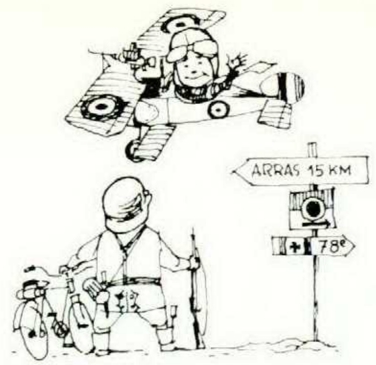
You now have the LAA computed for the worst possible condition; i.e., a clearance on takeoff to destination at the LAA. If traffic does not permit higher en route you can still do all the planned approaches (perhaps not from the published initial penetration altitude) and arrive back at destination with the required fuel to go to your alternate if necessary. You also have the peace of mind of knowing that you will have sufficient fuel to complete the trip should communications failure occur at any point.

Regardless of how you compute the LAA remember that it is used by the controller for more than just a safe altitude in the event of communications failure. Therefore you must allow for fuel for approaches and climb outs at each planned letdown point.

Loose Dzus







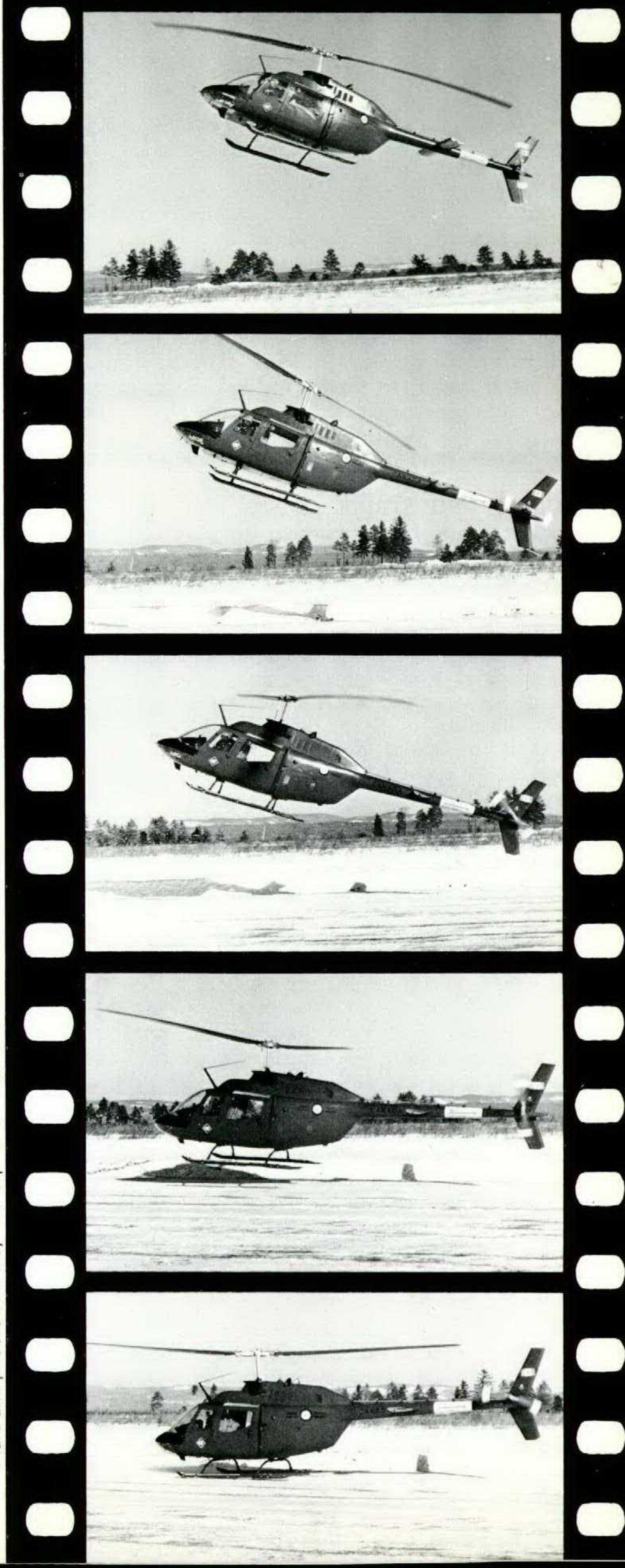
Technical Knowledge

Following are some questions and answers collected by an instructor of RAF Cadets:

- How is a machine supported in flight? – By flying wires.
- What is the object of a tail plane? – It is fitted for stabling purposes.
- What is propeller torque? – When the propeller is loose on its boss and rattles.
- How does a machine get into a glide? – By gravity acting through the propeller boss.
- How is rotary motion obtained in a rotary engine? – By means of two eccentric circles.
- What is the construction of the crankcase of a mono? – It is made of clamped iron filings.
- What are the chief points of an RAF engine? – It has crinkly cylinders.
- How would you find the direction of the wind? – By holding out my handkerchief.
- You lose your way over the enemy lines. How would you find your way back? – I would come down and wait for someone to approach. I would then talk to him in English, and if he answered in German, I would turn around and fly back in the opposite direction.
- What is the right bank of a river? – That bank on your right when you are speaking from the mouth of the river.
- What are iso-bars? – Hot air rises from the ground, and where it meets cold air coming down from the sky, it freezes and forms iso-bars.
- What are the chief duties of an Equipment Officer? – He acts as adviser to his CO, looks after stores, etc., and sees that all rubber articles are wrapped in French chalk.

from *Flight* magazine c.1917

Anyone for Autos?



Flare and photos courtesy 427 Sqn CFB Petawawa

Gen from Two-Ten

TRACKER, WHEELS UP On completion of a test flight the pilot carried out two radar approaches to touchdown and two circuit touch and go landings. The co-pilot's seat was occupied by a non-pilot. On his third approach, which was flapless, the pilot failed to lower his landing gear, touched down on the fuselage of the aircraft and travelled 1200 ft before coming to rest on the fuselage and port engine nacelle. The pilot secured the engines, activated the fire bottles and both aircrew vacated the aircraft without injury through the overhead emergency hatches. The aircraft sustained "C" category damage.

This accident reinforces the proven concept of "challenge and reply" check lists as a prevention tool. Assigned cause factors were related to pilot inattention and unit supervision in that supervisory personnel did not ensure that check lists were being used by all pilots.

KIOWA, WIRE STRIKE The pilot was making his first approach to a semi-confined landing area in the new squadron field location. The day was dull, overcast with intermittent light rain and the wind from the west gusting to approximately 25 kts. The pilot set up his approach in a WSW direction to avoid flying over a village where there was a high intensity of wires: the approach path to the landing site was crossed by two sets of wires. The pilot successfully crossed the first set of wires but when he glanced forward at the marshaller on the ground, the aircraft skids contacted the second set. The pilot immediately landed the aircraft and shut down. Holes were found burnt under the tail boom and in the leading edge of the lower half of the vertical stabilizer.

Although the Kiowa sustained "C" category damage, striking the power line could have resulted in a catastrophe. The low level helicopter environment is a constant source of hazard for the unwary. Careful recce and sound judgement is essential in the selection of landing areas.

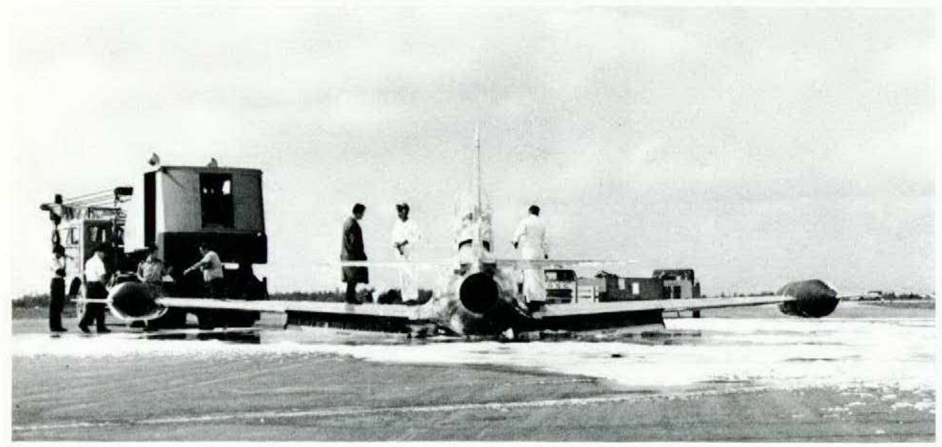
VOODOO, PITCH UP The two Voodoos were at FL 310 under GCI control and had just been cleared to FL 200. Number two was one half to three quarters of a mile behind the lead on his right side and slowly closing up when the lead initiated his descent by rolling inverted and allowing his nose drop below the horizon.

Number two tried to follow the lead's rate of roll but after 180 degrees found he was falling behind. After 270 degrees he heard the RLS horn and released back pressure – but the aircraft yawed to the right and the nose pitched down. On two occasions, as the aircraft descended, the yawing ceased but the pilot was unable to recover from the gyrations. Both crewmembers ejected safely at 7000 ft and received only minor injuries.

The investigating board determined that the aircraft had entered a low-energy pitch-up situation not recognized by the pilot and from which he failed to recover. The aircraft was being flown at the time with the RLS in the *off* position and the published procedures for pitch-up and spin recovery were not correctly applied.

CF100, FATAL CRASH On final approach, at approximately two to three miles from touchdown, the pilot was informed by radar that he was low on the glide slope. The answering transmission from the aircraft was garbled and shortly thereafter radar contact was lost. The aircraft was later found to have crashed into a lake and both occupants had sustained fatal injuries.

An extensive salvage operation succeeded in recovering almost 100 per cent of the aircraft from the bottom of the lake. A detailed technical investigation failed to reveal any airframe or engine malfunction that could have caused the accident. The case has been closed as "Undetermined". From the evidence available it has been concluded that the most probable cause was that the pilot became distracted while flying in a snow shower, either due to visual illusions created by external aircraft lights and lights on the ground, or by an unusual situation in the cockpit. This distraction resulted in the pilot allowing the aircraft to descend below the glide path until it impacted trees and crashed into the lake.



T33, WHEELS UP Following several normal extensions of the landing gear, a closed pattern was carried out during which the landing gear was again selected down. This resulted in an unsafe port gear indication. Despite two reselections, use of the emergency hydraulic system and slight "G" application, the gear remained unsafe. Tower confirmed that the left gear was still up and the pilot therefore carried out a wheels-up landing.

The technical investigation revealed that the left main gear malfunction was caused by an out-of-adjustment left uplock mechanism. The emergency landing gear extension procedure failed because the emergency hydraulic pump circuit breaker was in the *out* position. The tripped circuit breaker was not detected – probably because of poor colour contrast.

The T33 AOIs and check list have subsequently been amended to reflect the fact that the pump system is protected by *two* circuit breakers. Again, the aircraft cockpit markings have been revised to ensure that the circuit breakers are adequately labelled.

Comments to the editor

COLOUR CONFUSION

While halfway through reading the beautiful purple pages of an article entitled *The Image* (pages 10-11 in the Nov-Dec '73 issue of Flight Comment), I was distracted from my concentration by an external noise (my Boss). Upon looking up, I was immediately overcome by a profound, and frankly frightening, sense of seeing green. Everything I looked at was a light shade of green. While the subject of this article suggested to me that I might be suffering from some after-effect of a recent over-indulgence, I began to realize – as my eyes slowly returned to Ops Normal – that a perfectly natural phenomenon was occurring. While I do not know the proper terminology for the effect, I believe that after staring at a colour for a certain period of time, and then glancing away, the eye (or the brain) produces the complementary colour.

Being an ex-aviator I can attest to numerous occasions when some member of the crew would grab the latest issue of Flight Comment to read during long trips. It is not hard to conceive of situations – say 5 hours at 10,000 feet, tired, in cloud, etc., – when an unexpected occurrence of this nature would be most disturbing, especially to the boys in the front end. Pretty colours catch ones attention all right, but in view of the possible consequences, I would suggest that either Flight Comment be banned from use on aircraft – or you make the pages of the conventional white background.

I agree with the contents of *The Image* but not with "the image" of *The Image. . . ? !*

Capt R.G. Bartlett
SO ASW
MARCOM HQ

Wasn't that the wildest colour! It's actually called Rhodamine Red and we went for the deeper hue because we didn't want the Squadron Commanders on the inside to come out looking too pink and baby-faced. Unfortunately they turned out purple. However, we'll continue to use quieter colours to brighten up the inside pages (our centrefold suffers from enough competition without switching to black and white).

Our medical friends at DCIEM tell us that the phenomenon you experienced is called "complementary after-image" – and by the way how does your boss like being referred to as an "external noise"?

BLADE STALL RECOVERY

The Nov-Dec Flight Comment article on blade stall perpetuates the fallacy that a simple increase of RPM alone will unstall a retreating blade. In truth, an RPM increase by itself will merely bring the relative airflow closer to the tangential path of the retreating blade and actually increase the angle of attack and aggravate the stall.

The advantage of a higher rotor RPM is that, if it is increased before the onset of retreating blade stall a lower angle of attack will be required to produce the same lift, thus allowing a higher forward velocity before the advent of the stall.

Capt G.H. Fawcett
Rotary Wing Stnds Sqn
3 CFFTS
Portage la Prairie

Before discussing the theory set forth in your letter, we would like to again draw your attention to our article. Low rotor rpm was included as one of the conditions favourable to blade stall and hence increasing rotor rpm would to some degree counter the stall. However, we envisaged a situation where the pilot allowed rotor rpm to decay below the optimum e.g., a decrease from 100% to 95% rpm with all other parameters remaining constant. Admittedly this would be a rare situation given the automatic fuel and rpm control in the modern day helicopter fleet. We agree therefore that in most cases if a rotor rpm increase is used to combat retreating blade stall it must be accompanied by one of the other corrective measures.

In researching a reply to your statement: "In truth, an rpm increase by itself will merely bring the relative airflow closer to the tangential path of the retreating blade and actually increase the angle of attack and aggravate the stall", three texts were consulted;

- *CFP 169(1) Aerodynamics Manual of Training Volume I*
- *Fundamental of Fixed and Rotary Wing Aerodynamics (H.E. Roland, Jr and J.F. Detwiler)*
- *Aerodynamics of the Helicopter (Alfred Fessow and Garry C Myres, Jr)*

After examining these texts and consulting with one of the authors and a member of NDHQ/DAES, we find that CFP 169(1) stands alone in support of your statement regarding relative airflow. Gessow and Myers have documented the results of an experiment conducted to compare the theoretical with the actual stalled areas of the retreating blade. We have chosen their illustration and included it as Figure 1 to show the effect of changes in rotor rpm on blade stall. By comparing (b) and (c) we can see the difference in stalled area with a change in rotor rpm at a constant twelve degree blade angle of attack.

In summary then we agree that in most cases an increase in rpm alone will not necessarily overcome retreating blade stall but it should not aggravate the situation. Further, the theory expressed in Chap 22 Art 2225 of CFP 169(1) regarding relative airflow is questionable and will undoubtedly be examined very closely by TCHQ in their review and re-write of Chap 22 of that publication.

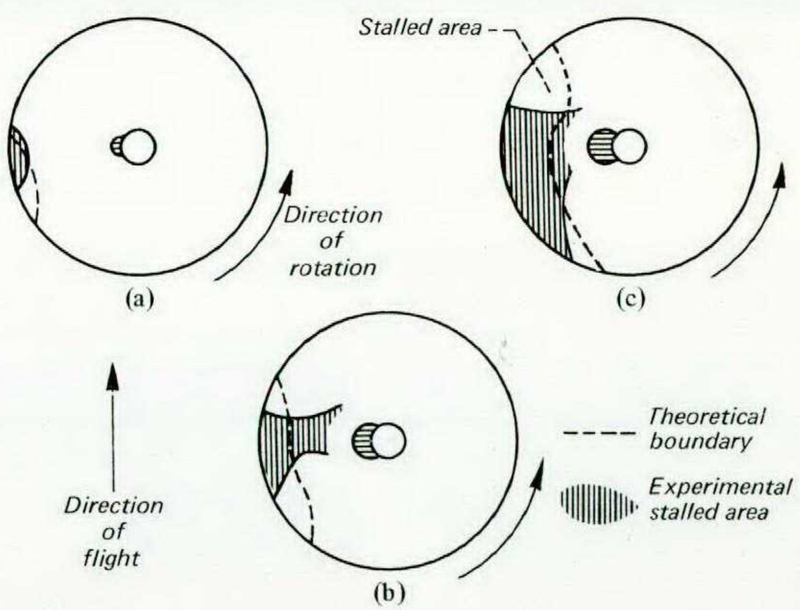
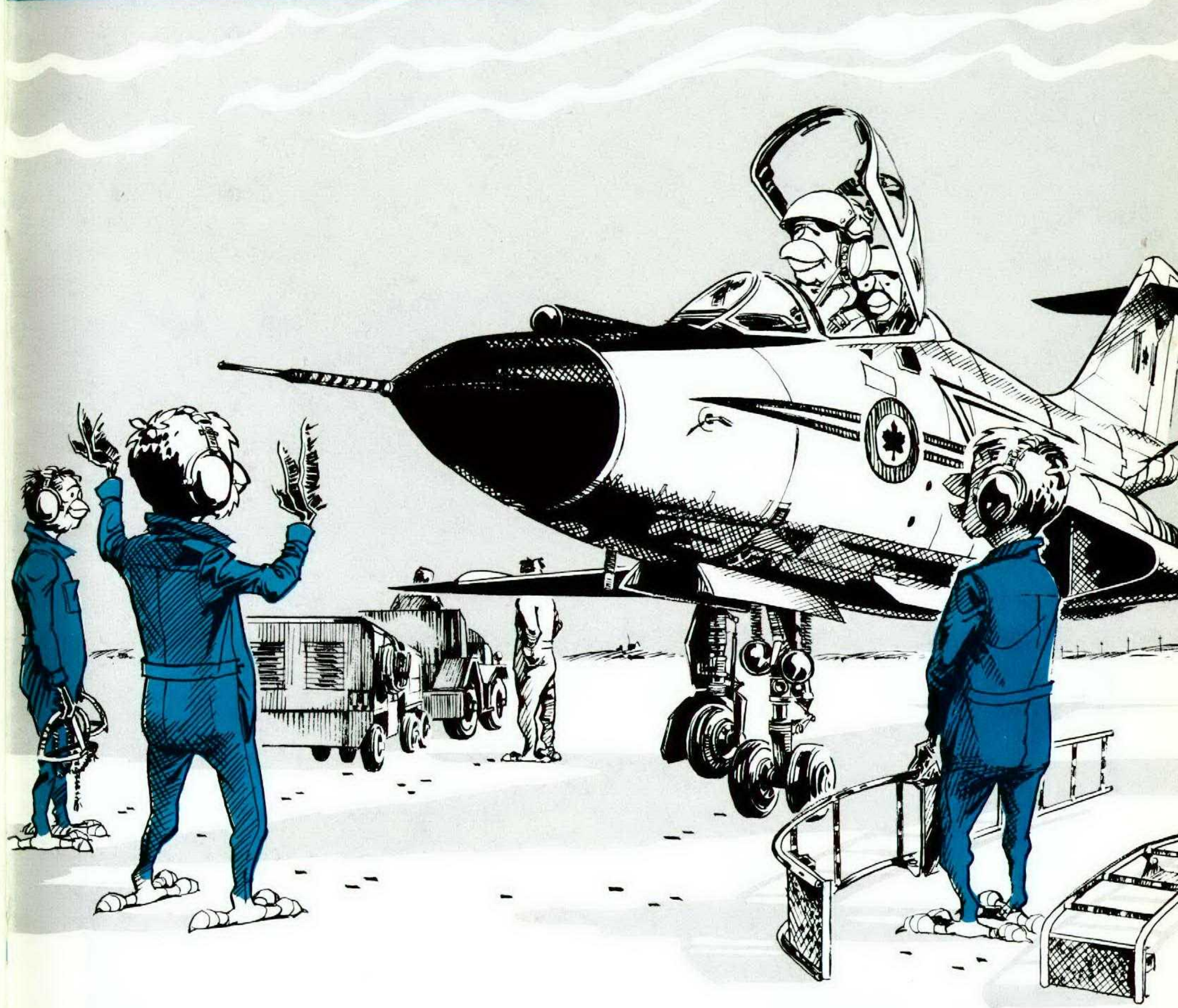


Figure 1. Comparison between theoretical and experimental stall areas

(a) V = 40 mph,	R = 408 fps
(b) V = 70 mph,	R = 448 fps
(c) V = 70 mph,	R = 408 fps

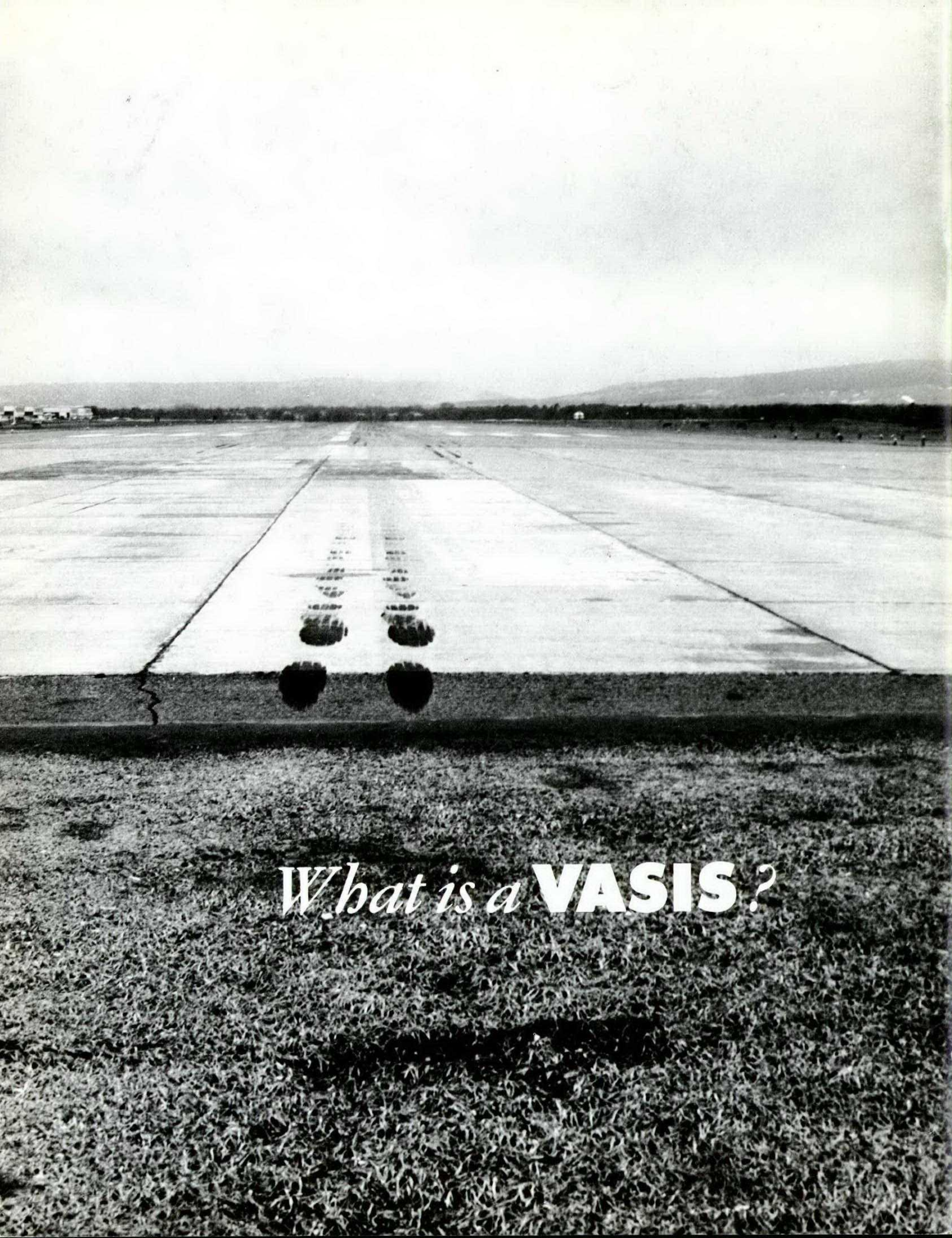
BIRD WATCHERS' CORNER



TRANSIENT SERVICING TARMACANS

A migrating bird considers himself fortunate when he lands at a base where the Transient Servicing Tarmacans are nesting. Whatever the weather he is confident that all his needs will be carefully attended to as the well-preened Tarmacans quickly carry out A and B checks, refuel the bird, replenish oxygen supplies and generally ensure that the transient traveller is well looked after. If the migrating bird is staying overnight he can be sure of a warm nest and if he just needs a quick turnaround the Tarmacans will be waiting on the ramp as he hovers or taxies in. As the flock of friendly fixers flutter about they warble a happy refrain:

"WE-TAKE-CARE-OF-YOU-WHEN-YOU'RE-JUST-PASSING-THROUGH"


What is a VASIS?