FLIGHT COMMENT SEPTEMBER • OCTOBER 1972

Quick turn-around – page 6

Comments

Discussing the wearing of sunglasses, AVIATION MEDICAL BULLETIN points out that three or four hours without sunglasses on a bright day can reduce your ability to see after sundown by fifty percent or more. After only one day in the sun, it takes up to a week without further exposure to recover normal night vision. So when you're exposed to bright sunlight wear sunglasses. On the other hand, sunglasses should not be worn indoors. Prolonged indoor wear impedes the eye's natural ability to tolerate normal light.

A towing bash at one of our units earlier this year is typical of what can happen when you try to do too many things at one time. A T33 originally scheduled for an 0800 takeoff was delayed until 0915 because the flight line was being swept. Then just as the aircraft was finally being towed out, an alert was called. There were some conflicting orders to sort out initially, before the start crew were able to determine whether or not they were participants. At last they were told to launch the aircraft as quickly as possible and then take shelter. The start turned out to be no more successful than any other of their initial efforts that morning – the aircraft developed a fuel spill and the fire fighters had to be called to the scene. A tow crew was sent to move the aircraft away from the fuel spill, after which they proceeded to the hangar to tow out another aircraft. As they began moving the second aircraft a tip tank struck a nearby power unit – at which point it was decided to cancel the flight.

Readers with long memories will have noticed that the Birdwatchers' Corner in the last issue (Jul-Aug) was a somewhat modified repeat of an earlier subject. It was exactly ten years ago that the Forkliftus Terrorus first appeared, however, in spite of the additional ten years of experience, the proper technique of operating forklifts continues to be elusive for some.

FRONT COVER Night "Quick Turn-Around" of a 437 Sqn 707 at CFB Trenton. Photo courtesy Cpl J. Hooton of the Trenton Photo Section.

CANADIAN FORCES HEADQUARTERS — DIRECTORATE OF FLIGHT SAFETY

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Getting Involved

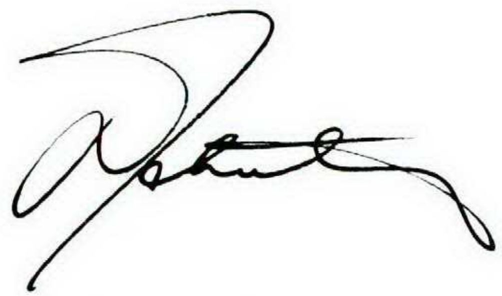
Some time ago you may have read of the case of a young woman who was murdered on the street while dozens of her neighbours and fellow citizens did nothing to prevent it. They did not become involved.

From time to time we learn of these extreme examples of man's indifference to the plight of his fellow man. To some degree this human trait prevails in our day to day activities, and could be summed up in the expression – "It's not my problem, I have enough of my own to worry about".

Often we in Flight Safety have to try to convince those who have the responsibility that *they* have a problem, and more often than not only *they* can fix it. We therefore become involved, and that is a basic flight safety need and responsibility which concerns all of us. That stone on the tarmac – don't pass it up, pick it up; it could save a jet engine: or more. The controller in the tower with a commanding view of the airfield should tell someone of the problems he sees occurring. The driver of the towing vehicle – should not hesitate to report the sticking gear shift, before it causes an accident. Those who have the responsibility are often too close to the issue to see the dangers. So why not help by becoming a part of the whole team – get involved.

Appreciation

On the occasion of LCol Garner's departure from DFS (see page 24), it is considered appropriate to express formal appreciation for his efforts during more than six years in the Flight Safety front line. Most of the thoughts in the above message came from this dedicated and imaginative officer who has never hesitated to become involved and as a result has contributed a great deal to our air operation through accident prevention.



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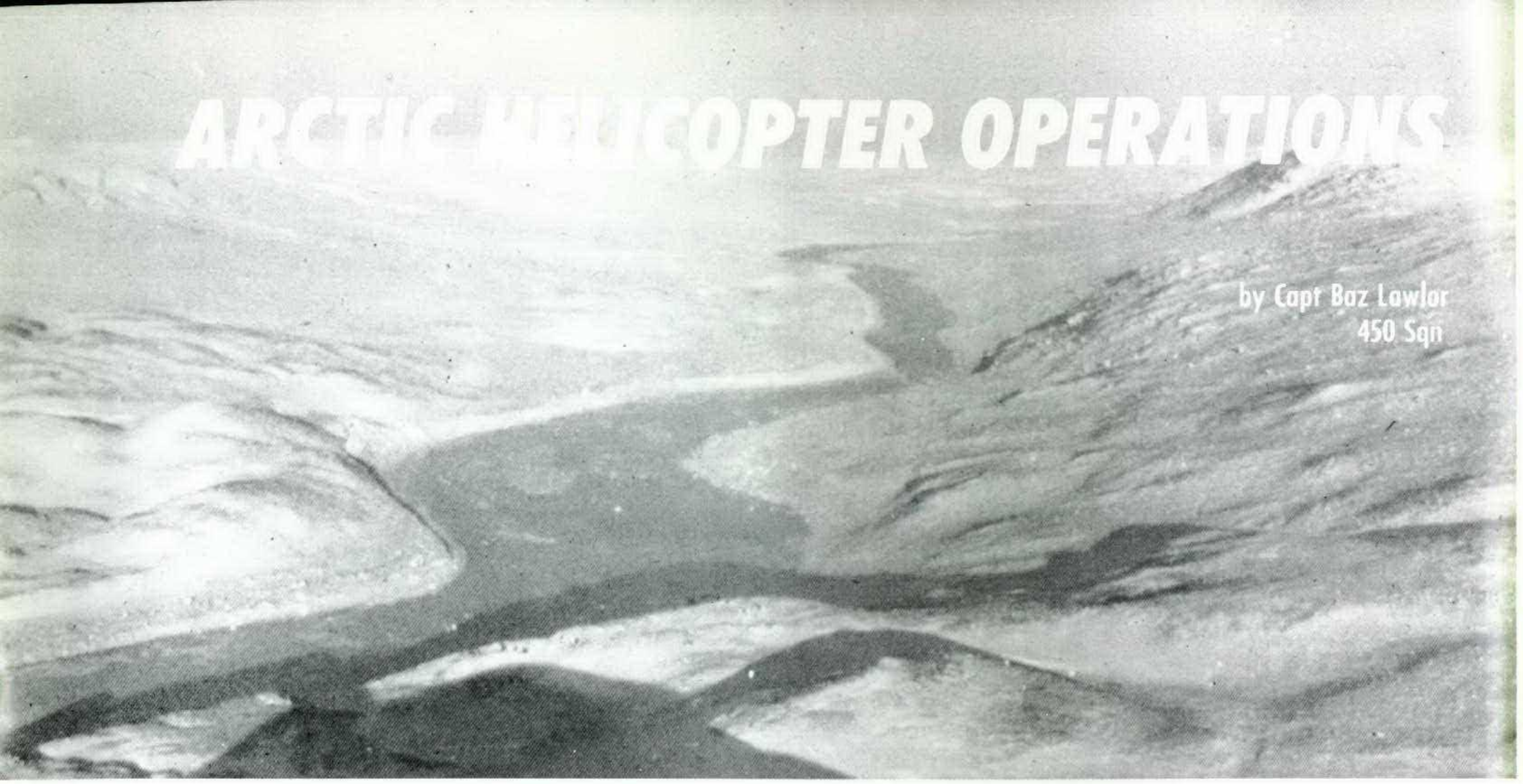


ARCTIC HELICOPTER OPERATIONS

by Capt Baz Lawlor
450 Sqn

"This is a bad thing to know just a little about", remarked an Eskimo hunter after inspecting the first aeroplane he had ever seen on the ground. We might well take to heart our Northern brother's words and also apply them to the 1.5 million square miles that he calls home and we call the Canadian Arctic. This vast Northern land is something most of us have seen only from afar and know about only from hearsay, television documentaries or National Geographic. Closer inspection shows it to be an area fraught with hazards, especially for the unwary or ill-prepared aviator who would match his skill and wits against its climate and terrain. Fixed wing operators treat the Arctic with great respect; helicopter units should follow suit.

Working helicopters in the Far North is a relatively new experience for Canada's current Armed Forces. Most previous experience occurred during the construction of the Mid-Canada Line and the DEWLINE. The SAR squadrons have occasionally ventured north of 60 in their forbidding, albeit impressive environment. There are flight safety hazards inherent in Northern Operations which are not encountered in more southerly climes. The occasional problem in the temperate zone can become frequent in the Arctic; the unusual become commonplace. The following paragraphs examine the potential hazards to be found in the areas of (1) Operations and (2) Maintenance.

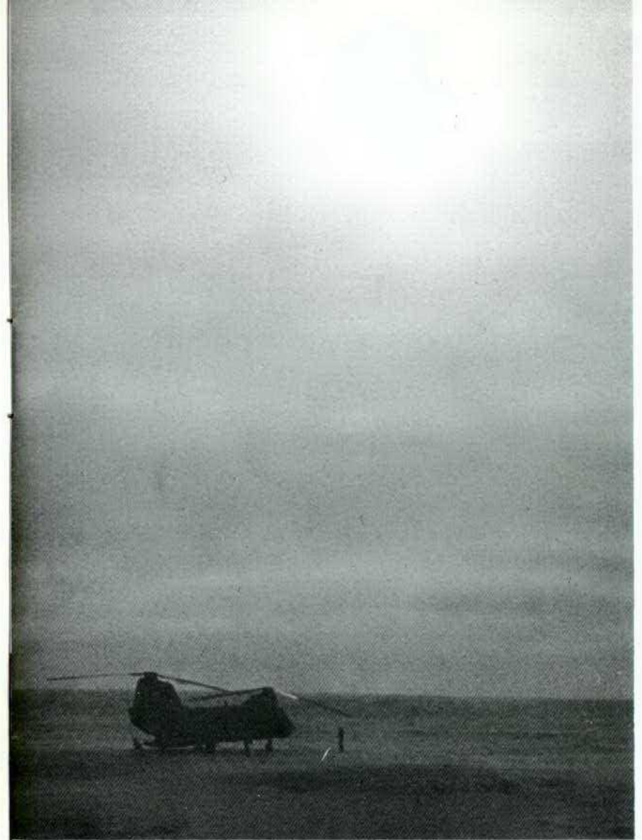
OPERATIONS

Roles:
1. Transport of Ground Forces in tactical and non-tactical situations.
2. Logistics support and re-supply.
3. Aerial Command Post and FAC.
4. Reconnaissance and Communications.
5. Search and Rescue.
6. Medevac.

These different roles call for great flexibility. Maintenance personnel are required to configure aircraft for slinging, hoisting, troop transport, and litter-bearing missions in extreme climatic conditions. Aircrew have to be physically and mentally prepared to fulfil a wide variety of tasks at short notice.

Terrain:

The variations in the terrain pose problems of navigation and landing area selection. The flat coastal plain of the McKenzie Delta contrasts sharply with the 3000' glacier peaks of Northern Labrador. The plains are fretted



by streams and dotted with thousands of lakes. In the more mountainous regions the valleys and fjords may slash the landscape with a monotonous regularity of shape and direction, the windswept peaks standing out starkly against the drifted snow. Skid equipped helicopters encounter problems with rocky off-level ground, and sharp-edged rocks can quickly damage fibreglass skis or slash pneumatic tires. Blowing snow in the final stages of an approach make obscured landings to un-recced areas particularly hazardous. Since the pilot is not always able to recce a landing site the ground forces detailed for the selection and preparation of Helicopter Landing Zones (HLZs) have to be well briefed on the requirements. A summer muskeg surface can appear as deceptively safe as the *apparently* thick ice on a lake in winter.

Weather:

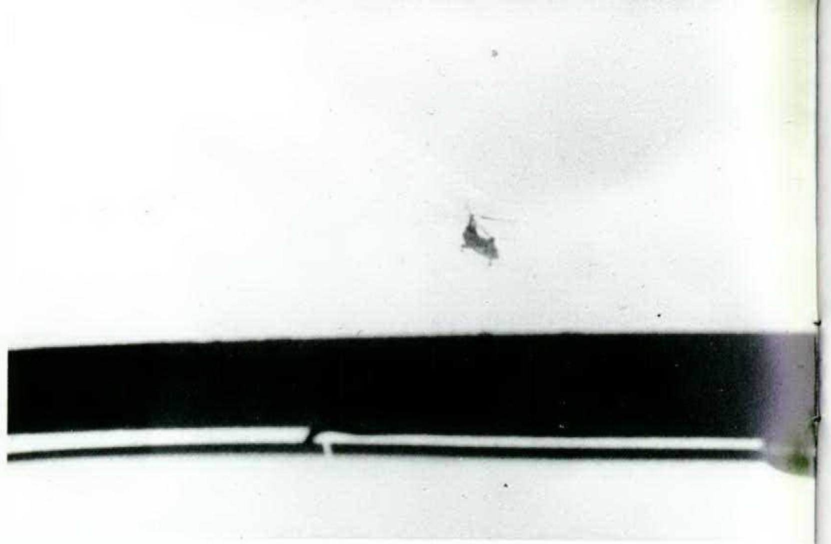
The variations in the Arctic landscape are only equalled by the vagaries of the Arctic weather. The most reliable meteorological information is available from the Arctic forecasters at the Northern ACCs but in many cases the forecaster is far removed from the scene of his predictions. For example, the Frobisher Bay forecasts are issued by Goose Bay! Although regular observations are made at the DEWLINE stations, the helicopter pilot must often use his own judgement and interpret the weather conditions for himself.

During spring and summer, when the temperature is comfortable for man and machine, the weather is at its worst for flying. Open water and leads in the ice increase the frequency of low cloud and fog. Conversely, when the visibility is good and the skies clear, as in the winter months, the extreme low temperatures and shorter days bring further restrictions to flight operations.

Blowing snow, low overcasts, ice crystal haze and fog all present problems to low flying aircraft. Unfortunately, a reduction in airspeed to cope with adverse weather results in increased fuel consumption. In winter the below zero temperatures add to the danger of static electricity build-up during slinging and hoisting operations. Freak winds of gale force are a possible phenomenon – with devastating effects! The reflected glare from the snow surface can be as high as 90%, so that dark glasses are essential. Loss of depth perception and the ever present danger of whiteout make VFR flying difficult – even impossible at times. It is somewhat disconcerting to discover that the rocks you have been using for visual contrast and ground definition are not mirages, but seals diving through cracks in the ice.

Navigation:

Helicopter navigation is dependant on the type of terrain, weather conditions and the navigational aids available, (individual pilot skill being taken for granted). These factors make Arctic navigation much more demanding than say, bird-dogging through Southern Ontario. The absence of roads, railways, hydro lines, towns, grain elevators, signposts – all the paraphernalia of normal helicopter navigation – forces the pilot to really concentrate on map-reading. The 1:250,000 maps available are quite adequate in the summer months when the lakes and streams are visible but trackcrawling, MDR, and accurate drift and groundspeed checks are an absolute necessity. Accurate navigation in the flatter areas during the winter months is often only possible by contour flying at very low level. A few inches of snow and the ice covered lakes cannot be picked out. The low contours make the lakes and streams disappear into an indefinable field of white and drifting snow quickly changes the shape and appearance of a shoreline. Eskars and deeply eroded river beds provide the best checkpoints under these conditions. The lack of readily identifiable features calls for a high degree of concentration when navigating – with no distractions. A momentary glance away from the map may necessitate returning to the last verified checkpoint.



To become "temporarily unsure of one's position" in this environment could be literally fatal.

Magnetic compass unreliability is a major factor to be considered in northern navigation. In the higher latitudes the directional gyro compass mode must be used. True North rather than Grid is preferable as a datum since the Runway headings and approach plate information at northern fields is published in True. DEWLINE sites also give bearing information in relation to True North.

Although modern helicopters are capable of instrument flight, an IFR Flight Plan is the exception rather than the rule. Suitable alternates are few and far between. Short range and icing conditions further restrict the IFR capability of tactical helicopters. However, encountering whiteout can require an immediate transition from visual to instrument flight. The radar coverage from the DEW-LINE and the powerful NDBs along the Arctic Circle (many with output in excess of 2000 watts) provide an excellent back up aid.

Control:

Safe helicopter operations in the Arctic will only be possible under conditions of strict control. Unfortunately tactical mobile operations with ground forces demand a flexibility – especially in any fluid "battle" situation which may make consistent flight following difficult to maintain. Flight planning, comprehensive pre-flight and post flight briefings, maintenance or communications and rapid dissemination of met information must be of the highest order, and requires close co-operation between *all* the units involved in the air support of land exercises. The role of the TACC cannot be overemphasized in this regard, especially where high speed jet aircraft are working low level in the same area as helicopters. Everybody has to be "on net".

MAINTENANCE

The most sophisticated flying machines are of no practical use if they cannot be adequately serviced and maintained. Helicopter maintenance problems in the North usually stem from the effects of the severe climate coupled with a lack of adequate servicing facilities. Maintenance equipment, much of it heavy and bulky, must be airlifted from home base to the forward staging area – of necessity a northern airfield. Accommodation and space is at a premium throughout the Arctic and winter operations away from a heated hangar are presently beyond our capability. Doubtless future experience will lead to the development of lightweight, air-portable equipment designed specifically for Arctic use. Compact, turbine powered heaters, generators, starter units, and portable "nose hangars" or shelters for servicing crews are a "must" if helicopters are to operate away from a permanent installation during winter.

Temperatures of –50°F with windchill equivalents below –100°F (Ex Patrouille Nocturne, Feb 1972) take a heavy toll of both man and machine. Lack of hangar space means that the aircraft are left outside at the mercy of the elements. The resulting "cold soak" condition may require hours of pre-heating before the aircraft engines and transmission are ready for operation. Again, the heaters used for pre-heating, if gasoline operated, may themselves prove rather troublesome to start – without some degree of pre-heating! The effect on operational readiness is obvious.

Very low temperatures produce recurring problems which can be anticipated to some extent. Electrical circuits and supervisory panels react to the changing temperatures, especially if moisture is present. Hydraulic accumulators and landing gear oleos quickly lose their pre-charge, if air is used. (Charging with dry nitrogen solves this problem). Similarly, tubeless tires soon go flat – inner tubes are essential. Cargo hooks and other components with micro-switches may stick or freeze. Ni-cad batteries, notorious for their hot weather antics, are equally tiresome in the cold. A "night with a Ni-cad", snuggled up in an Arctic tent, may well be the only way to guarantee a start next morning if a comstock is unavailable.

Second line maintenance in winter in the North is virtually impossible with the present facilities available. Even routine servicing chores such as refuelling, A, B, and AB checks take up to three times longer than normal. Groundcrew have to wear heavy, cumbersome clothing – an obvious safety hazard when climbing around helicopters. Head coverings – essential wear – can result in shouted warnings going unheard. Delicate maintenance work outside cannot be performed when the technician is wearing heavy gloves.

The physical hardships which confront servicing crews are reinforced by possible psychological stress resulting from general fatigue. Aircrew are not exempt from this problem but the ground personnel are more vulnerable by virtue of working more in the open. When the wind and cold are producing equivalent temperatures below –100°F most of one's energy is burned up simply trying to survive. The natural inclination is to try and get the job done as quickly as possible; an attitude which may lead to dangerous short-cuts.

Accommodation is usually overcrowded and uncomfortable, with all-important sleep being disturbed by shift changes. Food may be of the individual field ration variety (Yuk!) and the unfamiliar long Arctic days or nights can upset the most stable metabolism. Pushed to the limits physically, an individual soon falls prey to colds, sore throat, etc., as his resistance to infection decreases.

Helicopter Operations in the Arctic are an increasing feature of CF training. However, our experience is limited and learning from mistakes is both tragic and costly. The few points covered in this article are merely an introduction to some of the more obvious problems confronting helicopter operators in the North. One thing is certain. With adequate preparation and forethought we can learn to work safely and efficiently in what is effectively, the last frontier.

Capt Lawlor is a graduate of Liverpool University and a former high school teacher who joined the RCAF in 1965. His first tour was at Moose Jaw as a T33 instructor, following which he was transferred to 450 Sqn on Vertols in 1969. Since 1971, he has been flying Hueys with 450 Sqn's VIP Flight at Uplands.

Polaroid Sunglasses Surprises

For many people, polaroid sunglasses are standard equipment when it comes to taking the edge off bright sunlight. But polaroid glasses have their disadvantages, especially if you happen to be an aviator and wear them while flying.

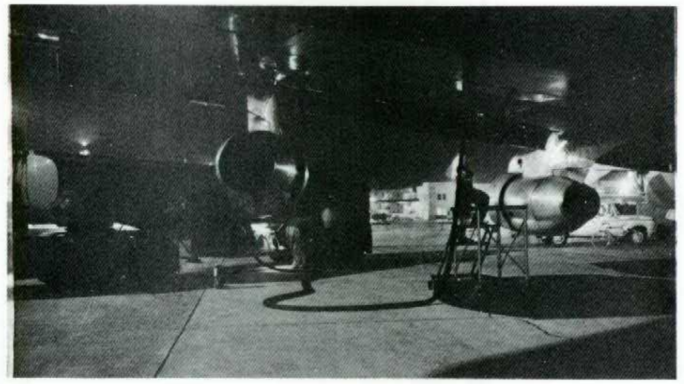
Unlike ordinary sunglasses, those with polarized lenses (trade name, polaroid) filter out polarized light, the primary cause of glare. Polarized light sources likely to be encountered by aircrew are calm water or other similar surfaces. Light becomes polarized when it is reflected off these surfaces. Polaroid glasses eliminate the glare without reducing the intensity of incoming light, however, in most polaroid glasses the polaroid material is combined with a coloured filter which does decrease the incoming light.

The potential hazard for aircrew wearing these glasses is best illustrated by the reports of aircrew who have encountered eerie visual illusions while wearing them. For example, one pilot reported that while flying over the water at low level in the late afternoon he could see the bottom, but could not see the water surface. Since the water was very clear and calm, the reflected polarized light was being eliminated by his polaroid glasses. (This phenomenon is at a maximum when the angle of sight is about 30 degrees above the reflecting surface.) Another pilot discovered that strain patterns in windscreens made of plexiglass, toughened glass, or similar material, show up as coloured bands, particularly in the areas of any compound curves. He reported that he could not see half of his front windscreen while he was wearing polaroid glasses! The cause: integral heating circuits in the plexiglass polarized the light passing through the windscreen and the addition of polaroid sunglasses had the effect of excluding all light. Another major disadvantage of polarized lens sunglasses is that the polaroid material is a soft plastic which is easily scratched and marred and is not impact resistant.

The answer is for aircrew to wear only approved sunglasses. For those in doubt as to what type of glasses are "approved", your Flight Surgeon can confirm that the requirements of Tri-Service Standard D634A are being met. Of course issue sunglasses meet the standard.

Quick Turn-Around

When a Service Flight taxies to a stop in front of the terminal, an observer's attention is soon drawn to the line of deplaning passengers making their way towards the passenger lounge. For some passengers it's destination; for others, the beginning of a boring hour in the terminal; for all of them it's something of a letdown after the excitement of flight. But for another large group of individuals, the Servicing Crews, the tension and excitement is just beginning.



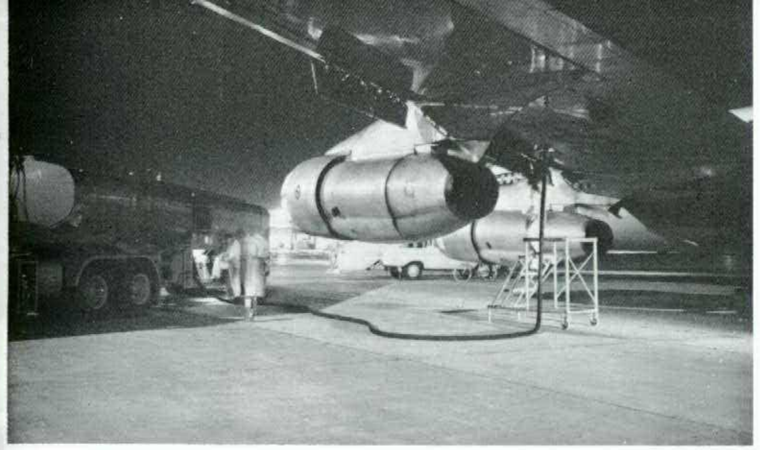
Before a Service Flight 707 is parked, these individuals, some forty strong, gather on the tarmac like hunters awaiting their quarry. As the passenger ramps are driven to the aircraft's doors and ground power is hastily applied to maintain passenger services after engine shutdown, the forty move in for fifty minutes of hard work, known as a "quick turn-around".

A person quietly watching from a terminal window must feel he is observing some awesome choreography with performances ranging from the polka like movements of those on foot, and the slithering precision of a string of luggage carts, to a well timed duet performed by the somewhat ponderous fuel bowsers on each wing. Interspersed with all this, the flashing red lights on the vehicles compliment the urgency of the operation.

Choreography is perhaps an appropriate term for the planning that is required to integrate the resources of many Base sections into an effective team that can complete the numerous tasks of a quick turn-around in the short time available.

The most important of these tasks are usually the most common: refuelling, luggage transfer, meal provision, cabin cleaning, waste disposal and the much practised though frequently sticky job of toilet servicing. Refuelling, for example, although simple in theory requires a technician in the cockpit to co-ordinate two simultaneous operations on opposite wings. In addition, the fuel loading must not only be extremely accurate, it must be completed rapidly in order to permit other operations to take place. At night the fuelling is illuminated by lights on the buildings and the aircraft, resulting in harsh shadows that effect depth perception. In the rush, mistakes can easily be made, but seldom are thanks to the extra care of the crew. Even a minor fuel spill can delay a departure by fifteen or twenty minutes while the fire department washes down the tarmac – an exciting show for our observing passenger in the AMU, but not very economical in time.

While the refuellers are pumping, others in the claustrophobic surroundings of the luggage compartment are panting in the rush to off-load three tons of luggage, only to reload another three tons a few minutes later. Within approximately thirty minutes the baggage handlers must



carefully move over four hundred pieces weighing an average of thirty five pounds each.

Care is exhibited by all the crews: the cabin cleaners must tidy up after 166 passengers and remove the large piles of garbage; food services people must refrigerate 166 or more perishable meals before they spoil; maintenance technicians must cope with assignments which are varied and always numerous. All are fighting a battle with time and all have carefully organized plans of operation so that their tasks do not interfere with the actions of others. Overall co-ordination of the effort is a function of both a tacit knowledge gained through experience with many quick turn-arounds and efficient communication networks in and between the various sections involved.

The last of the important aspects of a quick turn-around is the repair of unserviceabilities. Large complicated aircraft can be plagued by varied and frequent "snags". Successful snag rectification usually results from an important interplay between aircrew and maintenance personnel. Of prime importance are two factors: early and accurate notification of any unserviceabilities, and efficient technical debriefing of the crew. At Trenton, aircrews inform the base an hour or so before touchdown of any unserviceabilities that have occurred during flight. This allows the acquisition and positioning of materials and men to effect rapid snag rectification. Of equal importance, a senior NCO and a group of technicians debrief the aircrew as soon as possible after shutdown to obtain first hand information of the symptoms and progression of the malfunction. This information gives valuable clues regarding snag origins and allows the senior NCO to efficiently plan the use of his most valuable (and often rarest) resources, time and men.

During a quick turn-around the over-riding consideration is that in all the hustle and bustle, Flight Safety must not be compromised. Despite all haste and urgency combined with the importance of the flight and its timely departure, it will not go unless all systems are functioning. Although the turn-around team is rushed in their task, they are professionals who ensure that they do the job correctly.

The sixty minute turn-around may indeed be somewhat boring for a passenger waiting in the AMU. Yet without the effort and careful planning by all members of the support service teams the time would most certainly be longer. A quick turn-around is a measure of the standard of professionalism of Canadian military personnel. From all indications the standard is high.

Freon Decomposition

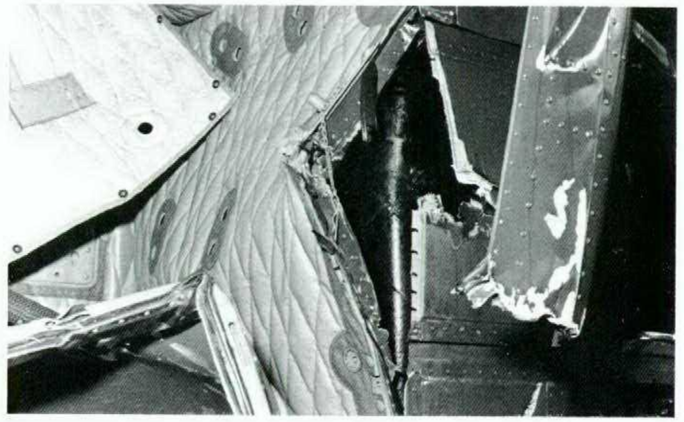
One of the more commonly used freons is Freon-12 (dichloro-difluoromethane), primarily used as a refrigerant. Freon-12 has a low order of toxicity. However, if it comes in contact with an extremely hot surface or a high temperature flame (about 1000°F) it can decompose into such toxic products as hydrogen fluoride, phosgene, chlorine and fluorine. These products can affect the throat, eyes and lungs and lead to a number of respiratory ailments. Situations which could lead to this decomposition are not unusual. For example, the temperatures reached when using an acetylene torch to make repairs to a refrigeration system greatly exceed those necessary to decompose Freon-12.

Although gases such as phosgene can have harmful effects in concentrations less than those necessary to allow for detection by human senses, the concentrations of the above toxic gases/vapors which would be present with the thermal decomposition of significant Freon-12 leaks in confined spaces would normally be sufficiently high to have a pungent odor and be irritating to the eyes, nose and throat thereby giving adequate warning of their presence.

If while working on a system these warning signs become apparent, the exposed personnel should leave the area, adequate exhaust ventilation should be made available, and steps taken to control the exposure before work is resumed. If exposure has been severe, personnel should proceed to sick call for examination.

USAF Safety Officer's Study Kit

Fuel system integrity was maintained despite major airframe damage.



Investigators draining the fuel from a crashed CUH-1N.

A Crash-Worthy Fuel System

Accident investigations over the years have shown that in many instances, particularly with helicopters, occupants survive the impact forces only to perish in a subsequent fire. The fire is usually caused when fuel flowing from a ruptured fuel system is ignited by a hot part of the aircraft or an electrical short circuit. Within seconds, before fire fighting equipment can be brought into action, cockpit temperatures can exceed 1000°F, eliminating any chance of survival.

Studies of test crashes conducted by the US Army have revealed four areas of high failure potential in the standard fuel systems of older aircraft:

- The rupture of fuel tanks along seams. This is particularly true of seams at corners as a result of crushing of the fuel cell;
- Impact penetration or tearing of the cell by aircraft structure, trees, rocks and so on;
- Fittings pulling out of fuel cells due to deformation of the airframe;
- Fuel lines shearing.

As a result of the information obtained from the test crashes, a crash-worthy fuel system was developed which is being installed in most US Army helicopters. The major problems listed above have been resolved by the new system:

- The tank is entirely self sealing.
- Resistance to impact has been greatly improved. The fuel tanks (full of water) can withstand a 60-foot drop onto a 15-degree cone.
- A spill proof vent system allows the escape of gases only.
- To prevent fuel spilling from sheared lines, frangible fittings with quick disconnect sealing features are incorporated at probable failure points, including points where lines join fuel cells, pumps and filters.

The disadvantage of the system is that it is more expensive and it reduces the fuel capacity by three per cent.

In 1969 a CF operational equipment requirement (OER) was raised giving high priority to having a crash-worthy fuel system installed by the manufacturer on the purchase of any new aircraft. Where feasible, retrofitting was planned for selected aircraft, with first priority going to the CHSS2 helicopters.

The first new CF aircraft with the system installed was the CUH-1N which was introduced in May '71. Since then there have been two major accidents involving the aircraft, both of which demonstrated the effectiveness of the system. The fuel system integrity was maintained and fittings broke as advertised under high impact forces, one of which was estimated to have been in excess of 45 feet per second. There was no fire. Investigators in both cases were able to drain the system of approximately the same amount of fuel it contained before the crash.

The second new CF aircraft with the system installed is the COH58A, now in service. The Sea King modernization program is approved and scheduled to commence in early 1973, while approval to retrofit the CUH-1H is expected shortly.

"Crew From Pilot... Our Controls Are Jammed!"

The Argus was engaged in dropping sonobuoys while on a routine patrol over the North Atlantic. As one of the buoys was released, the Observer in the ASW compartment reported hearing a "thump" somewhere in the aft section of the aircraft. A short time later, when the Captain initiated a descent, he found that the controls were jammed.

The Navigator reported that Lajes was the nearest airfield and so an easterly course was set towards the Azores, 3-1/2 hours away. Heading for Lajes had a number of other advantages besides time, in that the aircraft would remain over warm water in the event of a ditching and a Search and Rescue unit was available for an airborne intercept.

An emergency was declared and while the Radio Operator was reporting the situation to MARCOM Headquarters (on HF radios), emergency information and clearances were relayed on VHF by a USAF MAC aircraft passing nearby who was in HF contact with Lajes. All flammable and explosive stores were jettisoned and the aircraft readied for a possible ditching.

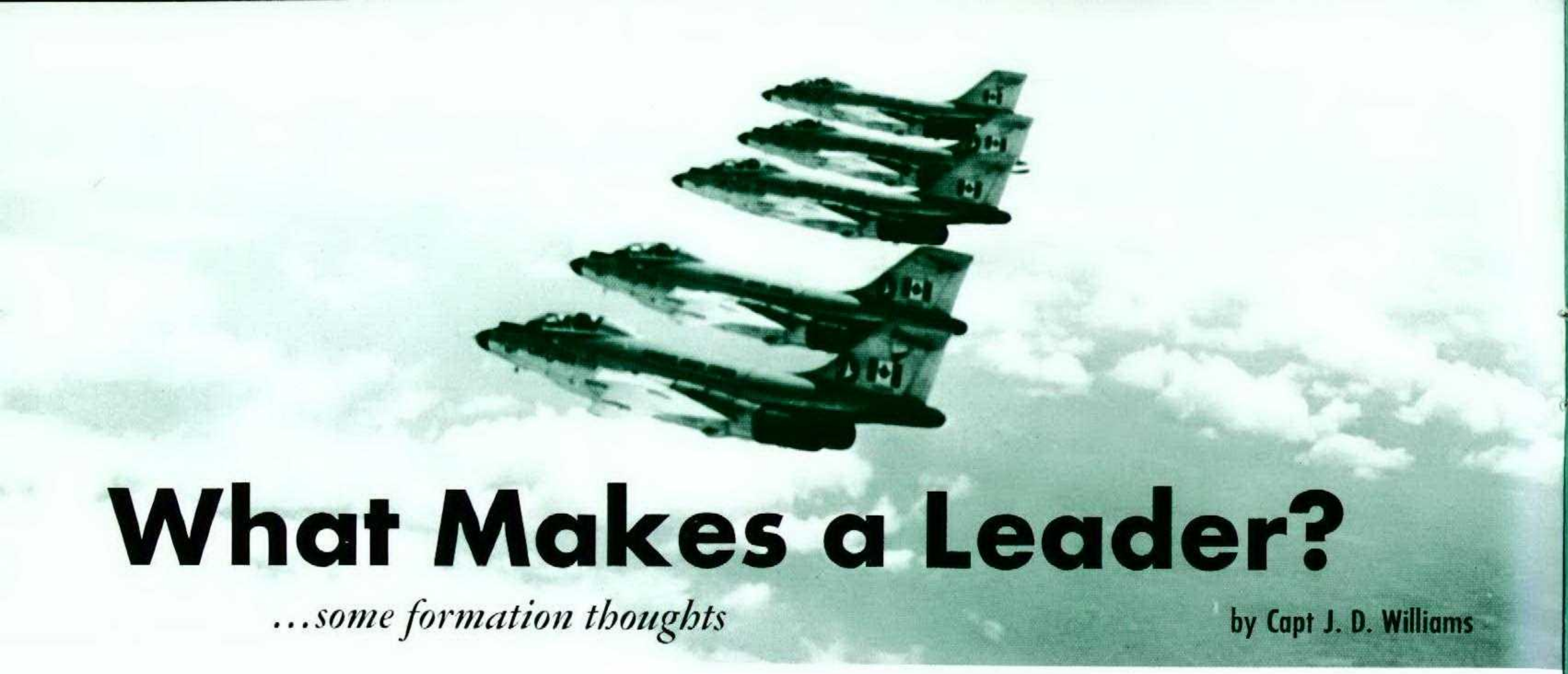
In troubleshooting, the crew disconnected the autopilot and artificial feel. The controls were then gently moved to determine if the restriction had cleared, but elevator control movement was still restricted to a very small range around the neutral position. Next, the control system was inspected. The inspection revealed a badly bent elevator torque tube in the rear section of the aircraft. Damage to the torque tube had been caused by a sonobuoy vane which had penetrated the lower fuselage striking the tube and then lodging itself in the interior of the rear fuselage section.

As the torque tube was nearly out of its spline, gentle hand pressure was used to straighten it somewhat, then it was strengthened with hose clamps removed from other equipment in the aircraft. The pilots flew the aircraft using trim only so as not to place any stress on the elevator controls.

An airborne intercept was made by a Search and Rescue Hercules from the Lajes unit which then escorted the aircraft to the Azores. On arrival at Lajes, fuel was dumped and then the Captain made a successful flapless landing using trim as much as possible and keeping elevator control movement to a minimum.

During the emergency, the Flight Safety organizations at MARCOM and Greenwood obtained valuable information from similar incidents in the past which was radioed to the crew in time for them to use in their preparations for landing. Throughout several hours of tension and stress, the crew remained coolheaded while coping with a serious emergency and ultimately landing the aircraft safely.

Our thanks to Capt S.W. Brygadyr of 404 Sqn, Greenwood, for his interest in passing along this account.



What Makes a Leader?

...some formation thoughts

by Capt J. D. Williams

"All two, three, and four heard was "Tuck it in a little guys," and it wasn't until they'd landed that they found they were the first formation ever to fly under the Angus L. Macdonald Bridge."

If you haven't heard that story before you're either not in the fighter business or you're a nationalist at heart and would rather substitute "Golden Gate Bridge," or "Tower Bridge," or perhaps even the "Eiffel Tower." The essence of the story remains the same, and what to me at least is the critical detail is always missing. What did two, three and four do to lead when they found out, and how did they dispose of the body?

If the foregoing wasn't the world's favourite formation story, then there's little doubt that one of the goodies about the formation aerobatic team which crashed in perfect formation will surely get the nod, and just as every nation I can think of has a famous bridge, so do most countries have such a legend about one or more of their teams.

I was first introduced to these stories as a student at flying school beginning the formation phase. My instructor was doubtless trying to inspire me with the blind devotion so necessary in this sort of activity. It was the old "and if I fly into a hill I want the investigators to find the remains of your left wingtip exactly three feet to the right of my right wingtip." I of course responded with my very best steely-eyed squint and tight-lipped grin, which he doubtless interpreted as "I'll follow you anywhere" and which more accurately translated would have read "You've got to be kidding." I suppose this article was conceived right then and there, and the intervening six years have simply been the gestation period.

Six years of single-stick flying gives a guy a fair bit of time on the wing. You don't start out as lead, you start out holding the nose cone on the maple leaf and you fly entire missions with no more than perhaps twenty seconds of looking out the front window, what seems an eternity with neck fully swivelled left or right and eyeballs riveted on that lead aircraft. There are of course some interesting background flashes. Sometimes when the ground is visible you notice that it does not relate properly with your concept of up and down. Sometimes there will be a quick head movement in Lead's cockpit, maybe even a twitch on the controls and the debrief will include a question like "Did you see how close we came to that glider?" Lots of interesting things go on.

After a while you begin to notice that there are leads you enjoy flying with, and leads you don't. Sometimes the judgement is based upon the smoothness of their flying, sometimes upon the wisdom they demonstrate (or fail to demonstrate) when a decision is required, sometimes upon an intangible sort of trust (or lack thereof). No one will deny I'm sure, that eventually there is a judgement made, and that the outcome has no necessary relationship to rank, seniority, or flying experience. There are colonels who couldn't lead their way out of a wet paper bag and shouldn't be trusted to try, and lieutenants who could lead a wing down through thirty thousand feet of crud to zero-zero landing. Naturally most of us fall somewhere in the spectrum between these two extremes.

Too often I think, we look upon good formation flying as a skill to be developed in a young pilot acting as a "follower" when the real requirement is the development of good leaders. A barely adequate follower can stick with a good lead, and a real pro has trouble if his lead just isn't up to standard.

About three years ago two of our aircraft were deploying to a base in the northeastern U.S., and it was decided that they would make the trip in formation. The enroute phase was uneventful, but as they neared their destination, approach control informed them that the base was experiencing fairly severe thundershowers. The lead, a highly experienced pilot, took his wingman down through the weather, and all was well until the last turn to final approach when, in a steeper-than-normal bank, the lead called for speedbrakes and landing gear in rapid succession. Number two was unable to maintain visual contact with lead, and suddenly found himself trying to transition to his own instruments from a nearly 90-degree banking dive, with a very dirty aircraft, and with a flying speed only a few knots above the stall. Recovery was finally made about five hundred feet above ground (IFR) seconds before ejection would have been initiated. In fact, the pilot concerned admitted to me later, that had he not felt the initial embarrassment of dropping off the wing, he would undoubtedly have ejected long since, as he was suffering complete spatial disorientation. A successful radar approach was carried out and a much chastened junior officer repaired to the mess, where, he felt, there would be a lot of explaining to do.

That a lot of explaining was in order goes without saying. The biggest question in my mind was "Who should be doing it?", and the answer keeps coming up "Lead".

It was the lead who decided to make the trip in formation in the first place. Having arrived overhead the destination, it was the lead's decision to carry out a formation approach into very poor weather conditions (a decision incidentally not based on low fuel or heavy traffic considerations, just on personal preference), and finally it was the lead's lack of proper "leading" which caused number two to lose contact. Nothing really happened except that "two" got razzed at the bar, but the potential was definitely there, and lead was certainly guilty of setting the whole thing up.

Another comparable problem occurred quite recently when two of our fighters returned from a bombing mission and landed just after the airfield had been subjected to a fairly spirited spring shower. Lead's landing was uneventful, as was his rollout, but number two *who* encountered hydroplaning, was unable to maintain directional control, and went whistling off his side of the runway into the boonies. Neither the aircraft nor the pilot was damaged in this little incident, but given an infinite number of such runoffs, somebody is going to connect with something substantial at about a hundred knots, making it by far a sadder story.

Now it's always easy to second guess the actual players in any game, but taking a closer look at this specific occurrence might prove constructive. Subsequent investigation of the runway surface itself revealed that rainwater tended to pool on Number Two's side. The centre and the side chosen (albeit unwittingly) by lead drained well. Is it not possible therefore, that a single-ship landing by these aircraft might have prevented the incident completely? Perhaps even probable? The two aircraft might have made their penetration together with one overshooting on final for a square pattern, or they might have separated on top. The main point is that there was no real need for a formation approach, and that the lead, by opting to come down in a section placed his wingman in an unnecessarily hazardous position by raising the final approach speed (most of us add at least five knots for the wingman, and many add more) and by halving the width of runway available to each aircraft – a move which couldn't matter less nine times out of ten, and could mean the difference between life and death that tenth time.

Most anyone who wears a set of wings and pushes a fighter aircraft around the sky is capable of flying adequate formation if he remains current, and if he doesn't remain current he has an obligation to admit it to himself and govern himself accordingly. "Practice" is a self-explanatory term. You're not "practising" when you make an approach to minima in actual IFR conditions, you're doing it, and if you haven't practised the same thing regularly in decent conditions you're jeopardizing not just yourself and aircraft, but that of your wingman. It doesn't matter if you squeak it through a hundred times in your career without incident, it's tantamount to criminal negligence and should be treated as such.

Anyone who can fly formation as a follower can fly as a leader too. Being lead is simple, you need only fly the best possible solo aircraft you can and you're well on your way. Add to that consideration for the problems of the "hanger-on", smoothness, pre-briefing, and adherence to S.O.P.s, and you've got it "aced". I speak of course of non-operational leading, we will realize that combat flying has its own distinctive requirements.

The biggest problem in formation is not how to follow. That is pretty basic, and is dependent upon the acquisition of many hours of practice. We all understand what we should be doing with our airplanes, it's just a matter of developing the ability to do it consistently well.

Neither is the problem how to lead. The techniques of leading are the techniques of flight itself, refined to their highest level and coupled with a modicum of communication. Probably every existing air force has a training manual which includes a "How to Lead" section, and they are probably all basically correct. Reading one however does not make you an instant leader. It's not that simple.

Part of the problem is when to lead. There are times when formation is inappropriate, and there are times when formation is imperative, and the ability to discriminate between these times is the mark of a real leader. If you've got too much pride to split up your section and send them down independently when conditions dictate, you're no leader and as a matter of fact your intelligence is subject to some question.

Another part of the problem is who to lead (more properly who is to lead). I for one will put my money on the guy who isn't going to fly under a bridge, who isn't going to lead me into the ground, and who remembers how nasty it is to follow an obvious "hoper-groper" through the murk waiting for him to decide that it's time to punch up or turn around. It doesn't take any red baron to meet these qualifications, just a plain ordinary, highly professional fighter pilot will fill the bill quite well.

ABOUT THE AUTHOR *Captain Williams is a frequent contributor to Flight Comment, his most recent article being "The Devil at 6 O'Clock", which appeared in the Sep-Oct '71 issue. He is currently flying CF104s with 439 Sqn at Baden Soellingen.*

a groundcrew winter checklist

Each winter ground personnel become involved in a significant number of accidents and incidents which are attributable in some way to environmental factors. (Last winter a technician even managed – albeit inadvertently – to get an aircraft airborne briefly.) Some say that there is little that can be done about the weather except complain, and hope that people will use common sense in the face of extreme conditions, but as it happens, there is plenty of evidence to suggest that people don't always use common sense. What the evidence does suggest is that it behooves supervisors to ensure that they furnish adequate instructions to guide their people when adverse weather conditions prevail. The following list of winter wisdom has been adapted from AIRSCOOP.

CLOTHING

Keep clothing dry and free of fuel, oil and grease.

Have an extra pair of dry gloves handy.

Avoid getting overheated. When indoors, remove the outer layer of clothing. This will give the outer garment time to dry out and warm up.

Several layers of clothing are better than one thick bulky garment – layers give the best balance between heat retention and weight of material. Three layers are ideal.

FLIGHT LINE OPERATION

Use extra caution when running up aircraft engines.

Even though it is cold, take time to make a thorough preflight of the aircraft.

When possible, warm up electronic bays and cockpits with external heaters. Be sure to observe all electrical and fire safety precautions.

Wet drag chutes can freeze at altitude. Be sure to dry the chutes before packing and install only dry drag chutes.

Supervisors should ensure that new people are briefed, especially those coming from bases which are not subject to nasty winters. (We do have the odd one.)

Keep fuel tanks filled to reduce condensation. There is nothing worse than excess water in the fuel. It can cause fuel control problems and engine flameout.

Keep accumulators charged to the correct pressures according to the temperature.

If towing is a must – do it slowly. Use both towbar and cables on main wheel struts when towing on snow, ice or mud.

Use extra caution when climbing ladders and walking on wings. Wing mats should be used if you have to work on wings; slippery surfaces can bring about a nasty fall. Fasten a safety harness or rope to personnel who use brooms on wings and horizontal stabilizers.

Use a broom or brush to remove snow from the aircraft – but do not use them on the canopy. And use the bristle end only, please!

Lift canopy covers off. Don't slide them off as they will scratch the surfaces.

Use canopy, engine intake and exhaust covers to provide maximum protection from snow, sleet and rain.

Be sure that the canopy is clean and dry before putting the cover on. The cover will freeze to a wet canopy.

Do not spray de-icer fluid on canopies or windshields.

Don't de-ice too early. Be sure to drain the de-icer fluid from ailerons, flaps and elevators. The de-icing fluid when diluted with snow or ice can refreeze.

Do not spray de-icer fluid directly into flap wells, elevators or inaccessible areas or near engines or starter exhausts.

Be sure the battery is kept fully charged. A weak battery will lose its charge rapidly in cold weather. Check that all cells are in good electrical and mechanical condition.

Quickly investigate leakage spots which show up on ice or snow.

Remember that taxiing aircraft need more room for turning and stopping on snow or ice.

Greater attention must be given to the maintenance and inspection of such items as static ports, vent lines, fuel drains and filters.

Inspect the tires carefully after landing. Patchy surfaces and rough ice can easily abrade the tread.

Allow more time when scheduling work orders for out-of-doors.

Carefully inspect for fuel and hydraulic leaks caused by the contracting of fittings or shrinkage of packings.

FLIGHT LINE/RAMP DRIVING

Clean all windows before driving. Windows covered with frost and ice reduce visibility – and don't forget those rear-view mirrors.

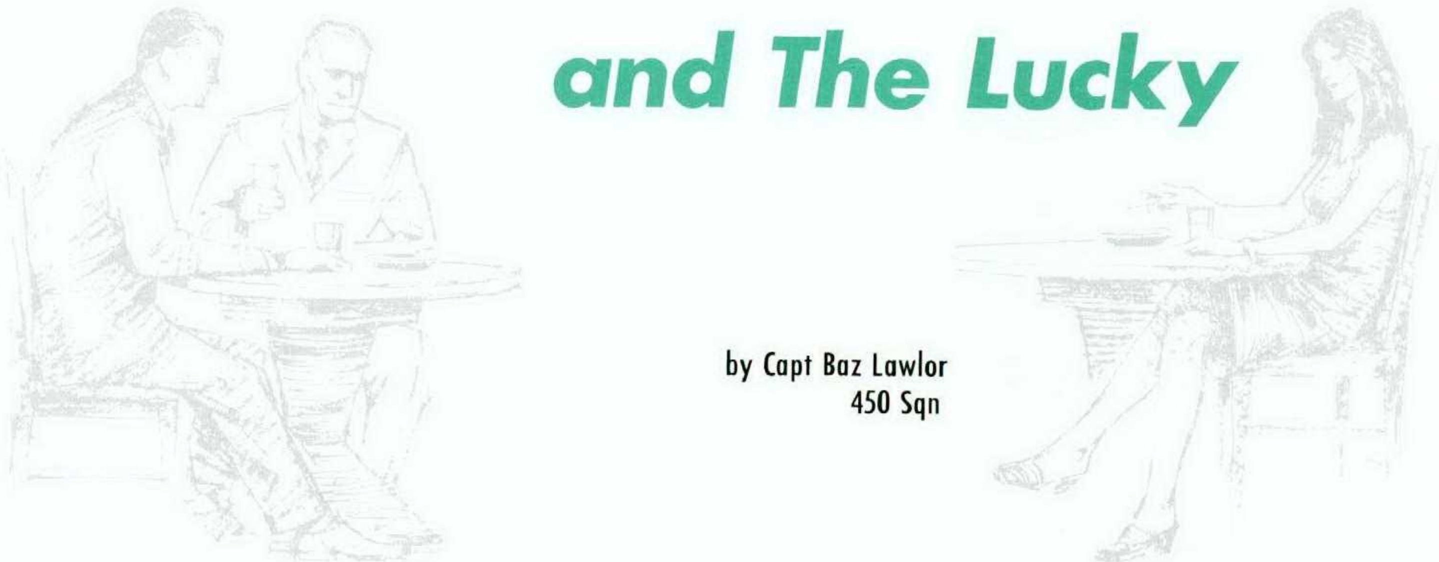
Expect reduced visibility due to blowing snow – slow down.

Beware of the increased stopping distances required on ice or snow. Automatically slow down when it rains or snows.

Be alert for the pedestrian wearing bulky head coverings. The hood of a parka restricts side vision and interferes with the hearing.

Don't aim your vehicle at an aircraft and count on the brakes to stop it.

The Young, The Quick, and The Lucky



by Capt Baz Lawlor
450 Sqn

This recent documentary program had me glued to the TV for all three episodes as I followed the live adventures of the RCAF from birth to integration. The only disappointing part of the series was the title which implied that teenybopper tigers alone had sufficient zest and vitality to rack around the sky. What was all this "young", "quick" and "lucky" stuff? What about the rest of us; the much-maligned over thirties and forties who are still pickling and pitch-pulling – are we really that far over the hill?

Well it isn't quite time to hang up our helmets and flying boots but it's probably a good time for a little self-analysis. Growing old is a sneaky process of mental and physical degeneration which we like to pretend isn't really happening. It is also a process which can be very dangerous for airframe drivers who disregard the symptoms. You can't prevent old age but you can learn to *live* with it. What are some of the more obvious indications of this universal, irresistible decay?

- ★ Air Canada finally turns down your application with a curt "too old" form letter (How dare they!)
- ★ Your eyesight starts to fail and you have difficulty reading the price tags at the L.C.B. (Lack of Control Board)
- ★ The SYT (Sweet Young Thing) in Chicoutimi won't dance with you and tells your Navigator that she thinks you are a "dirty old man".

Most of us can live with these relatively minor disturbances to our otherwise swinging existence, but there are other, more insidious aspects of the aging process of which we may not be aware.

Physically and mentally we are slowing down and falling behind the power curve. Reflexes and reaction times are adversely affected and the mile and a half run seems to get longer every year. Perhaps that little pink body of yours, once so vigorous and lively, is becoming flabby and sluggish. Even the keenest jockstrapper must eventually fall prey to the ravages of Old Father Time. Of course physical fitness can be looked after to some extent by good exercise and careful dieting but what about our mental faculties? The *corpore sano* still needs the *mens sane*. Stress tends to build as responsibility increases, and the demands of growing families, liberated wives, insurance agents, mortgages, schooling, pension plans, retirement prospects and so on are all features of "middle age" generally quite foreign to the younger set. Driving aeroplanes safely demands 100% of a pilot's energy and concentration *all of the time*. Often, without realizing it, the older pilot starts to cut corners, making experience, which should be his most valuable asset, become his worst enemy.

How often have you watched a "new" pilot carefully prepare his log card for an IF mission. There he sits, winding up that old E6B confuser that you've forgotten how to use – could you find yours right now? You're laughing up your sleeve because you have all the tracks and frequencies memorized from way back. You don't even bother to use a cigarette pack as a log card anymore – maybe you don't bother to check NOTAMS anymore. Perhaps you're an ICP. Remember how you joked that the best part of being an ICP was not having to write the exams. Could you pass them now, or do you just mark them from the answer key?

Here's our young sprog again, doing a careful, detailed external check. "You're gonna fly it, not buy it", you yell derisively from the blister where you've just signed out the L14 – without reading it! Are *you* guilty of cutting corners? Have you blasted off recently without a proper met briefing? Do you always operate inside the flight envelope? Do you just *guesstimate* your fuel requirements? Do you always wear appropriate flying clothing and carry adequate survival gear? Do you *really* know your emergency procedures? Perhaps you're reaching that dangerous stage where thousands of accident-free hours have lulled you into a blasé attitude towards flying. This is a kind of complacency you can't afford. It's too easy sometimes to make experience an excuse for laziness. Familiarity may not necessarily breed contempt but it can give birth to complacency – which has no place in the cockpit.

The careful pre-flight planning and seemingly long-winded preparation of the junior pilot, fresh from FTS, is based on instruction that experienced pilots, like you, have deemed essential for the training syllabus. Don't sell the teenybopper tiger short by setting a bad example when he arrives on an operational squadron. You may just hack a tricky situation because of your background, but the newcomer doesn't have your hours to fall back on. Give him the true benefit of your grey hairs and bald patches and who knows, ... some day you may get to dance with his SYT in Chicoutimi.

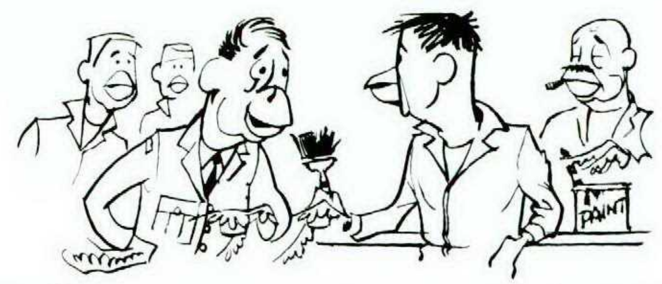
Flu In The Air?

With the approach of winter, flying units like everyone else, go through an annual ritual of preparation during which clothing, flight line operations and so on get a thorough dusting off and all hands get the cold wx word. A perennial winter hazard, often overlooked in the briefings, is influenza, which during most winters occurs in small epidemics, but periodically – perhaps every ten or fifteen years – becomes a severe world-wide epidemic. Mild or severe, we all know that when the "flu" strikes it can put you right out of the picture for several days.

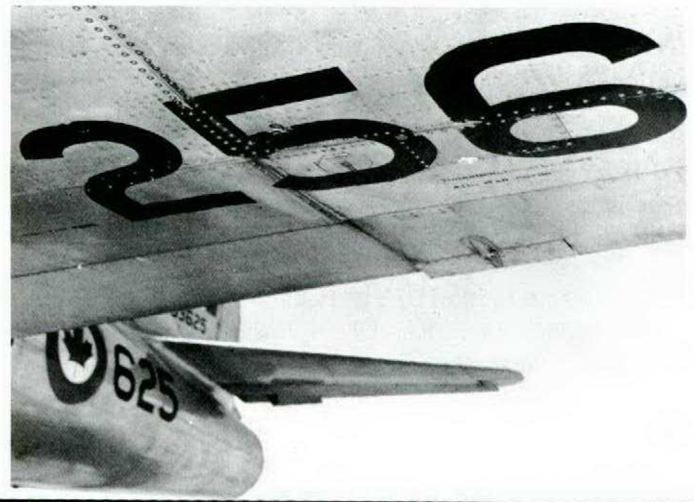
The danger for aircrew lies in being unaware the "flu" is catching up with you. To go to work in the morning feeling a bit off and by lunch time feeling distinctly miserable can be a serious problem in the flying environment. Symptoms such as fever, headache, bone pain, nausea and dizziness may produce weakness and lack of coordination and disorientation resulting in a pronounced inability to do one's job.

There is no definite way for an individual who feels a little unwell in the morning to know that later in the day he will have the acute symptoms of influenza. Individuals must recognize the time of year and the presence of the illness in the community or in their families. Bearing these facts in mind aircrew should ground themselves during the early signs of illness during the "flu" season, and as always they should not hesitate to consult the medical officer.

Overheard In The Paint Shop



"Well they just gave me three stencils – they didn't say what order."



helmet loss and head injuries . . .

Remember When We Had 20!

by Capt R. E. Noble
DCIEM

In the first fatal aircraft accident in the United States the pilot died from a skull fracture. The second Air Force pilot, Lt. Henry "Hap" Arnold, decided that he had better protect his head, and got himself a football helmet.

There have been arguments about helmets ever since. Are helmets any good in the first place? Do they really provide protection? Does it really matter if that chinstrap is done up, and if so, does it matter whether it is tight or not? And what about the nape strap? The author has been involved in research and development for all types of CF helmets since 1968 and is well qualified to answer these and other questions.

Number 20 means different things to different people. The lady in the back row won the jackpot when 20 was called. A well-known baseball pitcher has won 20 games for four consecutive years. How relieved you were when the lawyer told you she was over 20.

However, those involved with ejection statistics note that in the last five years, 20 of 61* aircrew lost their helmets during ejections. This loss rate of 32.8 per cent is unacceptably high. An analysis of ejection data indicates, however, that this percentage can be misleading.

The following facts, comments and recommendations will hopefully stimulate interest and controversy, and may serve as a reminder that if you have to go – KEEP YOUR HELMET ON!

During the five year period, 1967 through 1971, there were 61 ejections from CF aircraft. In these, 20 individuals lost their helmets (Table 1). It was found through analyzing these data that *helmet loss* was attributed to chinstrap breaklink separation (4), ejection too low (3), seat/man collision (1), midair collision (1), unknown/suspected unfastened chinstrap (3), failed chinstrap stud (1), improper fit or tumbling (3), deteriorated inner helmet (1) and unknown (3).

TABLE 1 – EJECTIONS – HELMET RETENTION/LOSS

Year	Ejections	Helmet Retention	Helmet Loss
1967	11	8	3
1968	10	10	0
1969	17	9	8
1970	10**	9	3
1971	11	5	6
Totals	59	41	20

* There was a total of 65 ejections, however, four aircrew were using other than CF equipment and are not included in these statistics.

** Plus 2 parachute descents following a midair in which the pilots did not eject, but were thrown clear of the aircraft.

TABLE 2 – HELMET RETENTION – HEAD INJURY

Ejections	Injury
41	30 Nil
	7 Minor (Debris during windblast, bird strikes)
	2 Fatal (Ejected too low, contact with ground)
	1 Fatal (unknown/drowned)
	1 Serious (Man/Seat collision)

As you can see from Table 2, helmet retention helped prevent serious injuries in 37 cases. Of the three fatalities, two were the result of forces which far exceeded the design criteria of the helmet. The other fatality was probably the result of drowning. In the accident in which the serious head injury was incurred it could be argued that without the helmet it could have been a fatality.

TABLE 3 – HELMET LOSS – HEAD INJURY

Ejections	Injury
20	3 Fatal (Ejected too low, contact with ground)
	1 Fatal (Midair collision)
	1 Fatal (Man/seat collision)
	1 Fatal (Improper fit or tumbling)
	10 Minor (Various causes)
	4 Nil Injuries

TABLE 4 – ANALYSIS OF HELMET LOSS CAUSES

Year	Losses	Assessed
1967	3	1 Man/Seat collision
		1 Unfastened chinstrap
		3 Unknown/suspected unfastened chinstrap
1969	8	3 Ejected too low (contact with ground)
		2 Improper fit/tumbling
		1 Deteriorated inner helmet
		1 Chinstrap breaklink separation
		1 Unknown
1970	3	1 Struck by aircraft in midair collision
		1 Chinstrap breaklink separation
		1 Failed chinstrap stud
1971	6	2 Improper fit/tumbling
		1 Chinstrap breaklink separation
		1 Unknown/suspected unfastened chinstrap
		2 Unknown

In the helmet loss statistics, five of the fatalities occurred under conditions exceeding the helmet design criteria. One fatality was a combination of unusual circumstances in which, for unexplained reasons, the pilot fell out of his chute after apparently ejecting successfully. Ten individuals suffered minor injuries while four others were uninjured. Comparison of Table 2 and Table 3 indicates that while the helmet will not necessarily prevent fatality, minor and serious injuries are greatly reduced by helmet retention.

Table 4 is interesting as it reflects on the apparently high helmet loss rate (32.8%). Three helmets were not recovered and as such have to remain assessed as unknown. Five helmets were lost due to conditions which exceeded the helmet design criteria and three were due to chinstrap breaklink separation, a design feature of the helmet. Disregarding these eleven helmets, the nine remaining helmet losses were preventable. These represent a loss rate of 19.7% overall. This figure of nearly 20% is still too high.

To eliminate CF losses the following helmet design improvements and better maintenance instructions have been submitted by DCIEM to CFHQ:

a. All inner helmets (DH41-2 and Type 411) currently in use are to be replaced on a progressive basis beginning when replacement stocks are available.
b. The inner helmets are to be replaced more frequently, based on far more critical criteria and giving SSTech supervisors authority to condemn helmets at their own discretion.
c. The present breaklink chinstrap to be replaced. (NOTE: A non-breaklink chinstrap is a part of the dual visor kit for the DH41-2.)
d. The present breaklink chinstrap on the 411 helmet will be changed to a non-breaklink type.
e. A revised helmet EO detailing more specific fitting and maintenance instructions is being issued.

The revised helmet EO (mentioned in e.) includes nape strap adjustment. The importance of having the nape strap properly adjusted is documented in a study of USAF ejection experience during the period 1963-1967. In cases where individuals could remember, the direction manner in which helmet loss occurred during tumbling (after ejection or during free fall) the loss was from the back to the front of the head.

For comparison purpose, the USAF study covered 838 ejections. In these, 122 individuals lost their helmets and 4 experienced helmet failures. The study showed that a three-fold increase in head injuries resulted in cases where helmets were lost. Helmet loss occurred most frequently during the ejection and free-fall phases, and as mentioned above, the most frequently reported direction of helmet loss was from the back to the front of the head.

An attempt is being made to improve our retention rate by better instructions and helmet improvements, but you as the user have the final role. An unfastened chinstrap will undoubtedly influence the loss of your helmet with a possible sore head as a reminder.

Good Show

Maj E.G. Willett

Col A.J. Bauer

Lt P.D. Higgins

MAJ E.G. WILLETT   COL A.J. BAUER

During a routine air combat training mission in a CF104D, Maj Willett, the instructor pilot in the rear seat, initiated recovery from a separation manoeuvre which he was demonstrating to Col Bauer. As the throttle was retarded from afterburner it jammed at the full military power setting. Suspecting a binding throttle cable, Maj Willett decided to accept this power setting rather than risk the chance of the throttle binding at a lower setting, which might have proved insufficient to sustain flight. He then returned to base and by turning and pulling 'G' was able to reduce the airspeed sufficiently to permit the lowering of flaps and landing gear. As the base weather was IFR, a GCA approach was initiated at the minimum speed obtainable of 240 Kts.

Major Willett performed the landing, and as the wheels touched, Col Bauer activated the main fuel cut-off switch, flaming out the engine. In spite of having only manual braking available, the pilots were able to bring the aircraft to a stop on the runway with only minor damage to the landing gear resulting from the high speed landing.

Subsequent investigation proved Major Willett's assessment of the problem to be correct, in that the throttle was in fact permanently jammed.

These pilots, through their close co-operation, superior knowledge of their aircraft, and first class flying ability, prevented what could have been a much more serious occurrence.

LT P.D. HIGGINS

Lt Higgins was on downwind in a Musketeer when he found that he had no throttle control. With his engine running at full power, he positioned his aircraft at high key for the runway in use, shut down the engine and made a perfect forced landing. Subsequent investigation revealed that the throttle control rod was disconnected at the carburetor.

Lt Higgins demonstrated his capability in an emergency situation by safely landing his aircraft.

CAPT L.E. OLSON AND CREW

Capt Olson and his crew (consisting of First Officer, Capt J.A. Anderson, Navigator, Lt. D.L. Smith, Flight Engineer, Sgt F.W. Moran and Loadmaster, Cpl J.P. Gillis) had just completed a night takeoff in a Hercules when Cpl Gillis reported heavy smoke coming from the utility hydraulic area. Sgt Moran immediately went aft to check the problem while Capt Anderson shut off the hydraulic system. As the Hercules rapidly filled with smoke, Sgt Moran returned just in time to notice the illumination of the overheat light for the air turbine motor. The crew then turned off all engine bleed air sources and isolated the wing bleed air manifold ducting. Following that, they carried out the smoke elimination procedure.

An emergency was declared and a short time later Capt Olson made a successful emergency overweight landing. The total airborne time was approximately fifteen minutes.

After shutdown, investigation showed that the bleed air manifold had blown apart and ripped a 30-inch-square hole in the fuselage, blowing out the wheel-well bulkhead, and fusing all wiring bundles in the compartment.

Capt Olson and his crew displayed fine airmanship and expert knowledge of their aircraft's systems. Their quick action in closing the wing isolation valves and engine bleed air valves prevented further damage that could have resulted in the loss of the aircraft.

MWO F. HONEY

MWO Honey was patrolling a CF104 dispersal area in his vehicle during an exercise when he noticed a small object lying on the taxiway. Aware that even the smallest piece of material can cause severe damage to a Starfighter engine, he retrieved it and immediately initiated an investigation to determine its source.

The object was eventually identified as an afterburner flame holder pin which had been incorrectly secured – a mild steel split pin had been used instead of the stainless steel type. Because of the high heat present in the afterburner, the split pin had eroded allowing the flame holder pin to fall out.

When the aircraft with the missing pin was located it was discovered that the six remaining pins in the aircraft were also improperly secured. Had the mistake not been discovered, an afterburner failure could easily have occurred, possibly creating a serious hazard for a pilot.

MWO Honey is commended for his concern in preventing Foreign Object Damage and for his initiative in following through an investigation which resulted in the elimination of a hazard.

CAPT H.C. ELLERY   CAPT M.D. ELKINS

During a spotting mission for an artillery unit, an L19 flown by Capt Ellery and Capt Elkins experienced a partial power loss due to a carburetor malfunction. Capt Ellery, the aircraft captain, immediately commenced a forced landing procedure, although a combination of low

L to R. Capt J.A. Anderson, Capt Olson, Cpl J.P. Gillis, Sgt F.W. Moran. Inset, Lt D.L. Smith

MWO F. Honey

Capt H.C. Ellery

Capt M.D. Elkins

Cdt G.A.M. Jacobs

Cpl J.F. Martin

altitude (demanded by the tactical situation) and a swamp and tree covered terrain below, made the selection of a suitable landing area very difficult. With engine power insufficient to maintain altitude, he flew towards a possible safe landing site in the area, however before he could establish an approach, total power failure gave him no choice but to put the aircraft down in a small clearing in the artillery impact area. Fortunately firing had been stopped, thanks to Capt Elkins' quick response to the emergency: When the power loss occurred, he had immediately transmitted a MAYDAY and advised the artillery units to cease fire.

Their calm reaction under stress enabled Capt Ellery and Capt Elkins to analyse their situation quickly and make a successful emergency landing.

CDT G.A.M. JACOBS

Cdt. Jacobs was climbing to circuit altitude in a Tutor when he noticed that the engine was producing only 88% RPM at full throttle. Realizing that this power setting was adequate to maintain level flight, he left the throttle at maximum and proceeded to set the aircraft up for a straight-in approach. He considered a PFL-pattern, but having previously only done one dual, he rejected the idea. He lined up with the runway and at four miles lowered gear and selected takeoff flap. When he found that he was going low he raised the gear. He then lowered it again at a mile and a half and landed safely.

The investigation uncovered a malfunction in the main fuel control unit which severely restricted thrust and caused the engine to compressor stall on both acceleration and deceleration.

Cdt Jacobs displayed excellent judgement in assessing and reacting to the partial power loss. Had he moved the throttle, he could have been faced with a compressor stall and probably a forced landing or ejection. With limited flying experience on the Tutor, Cdt Jacobs displayed excellent airmanship throughout the emergency.

CPL J.F. MARTIN

During a Periodic Inspection of a Cosmopolitan, Cpl Martin discovered that the bushing in the solenoid lock for the landing gear selector lever was missing. He installed a replacement bushing and then initiated an investigation to locate the missing one and to ascertain how and why it had fallen out.

His investigation revealed that the missing bushing was lodged in the pedestal near control cables where it could have caused jamming. Cpl Martin then reviewed the applicable Engineering Orders and discovered that the bushing could be installed incorrectly, allowing the solenoid lock pin to literally hammer the bushing out of position. Suspecting that this was the cause of the bushing falling out, he checked two other aircraft and found that both had improperly installed bushings. As a result of his efforts, a Special Inspection was issued on the remaining aircraft to ensure correct installation on all aircraft. All but one of the aircraft were found to have the same problem.

Cpl Martin's attention to detail and his conscientious and thorough investigation revealed an unsatisfactory condition which could have resulted in a serious in-flight control problem.

CPL C.A. HEIDT

Cpl Heidt was tying down the right seat of a Tutor, preparing it for solo flight, while the pilot was strapping into the left seat. It was night, and external power had been applied to provide lighting for the pilot to strap-in and complete his checks.

When the pilot looked back to check the ailerons visually, he suddenly realized that the external power unit was on fire. He yelled to Cpl Heidt who immediately disconnected the unit from the aircraft and towed it off the tarmac into the infield, thereby preventing any further danger to the aircraft, equipment or personnel on the tarmac. The fire was subsequently extinguished by fire fighters.

Cpl Heidt's immediate reaction to this dangerous situation prevented the possible destruction of an aircraft.

CPL F.R. FOOTE

In the course of a Primary Inspection on a Musketeer, Cpl Foote heard an unusual sound from the interior of the port mainplane when he tapped the underside of it. As there was no way of gaining access to the mainplane through the inspection panels, metal workers were called in to drill out sufficient rivets in order to permit peeling back a portion of the mainplane skin. The subsequent inspection of the interior revealed a 10-1/2-inch reamer which was apparently used during manufacture of the aircraft mainplane.

Cpl Foote is commended for his keen inspection leading to the discovery of this foreign object. The reamer represented a potential flight hazard since it could have shifted into the aileron control system area causing the ailerons to jam.

cont'd on next page

Cpl C.A. Heidt

Cpl F.R. Foote

Cpl W.G. Vrooman

Cpl F.N. Meisinger

Cpl W.K. Forsey

CPL W.G. VROOMAN

Cpl Vrooman was conducting an independent check on the installation of two master cylinders on a Musketeer. He found that although the brakes worked and held pressure properly, they did not feel "quite right". Although all functional checks had been completed Cpl Vrooman insisted that the cylinders should be removed, dismantled and inspected. This revealed that the cylinders had been incorrectly assembled and that the internal springs were missing.

Hydraulic lines connect the wheel cylinder to cylinders mounted individually on each of the pilot's and co-pilot's rudder pedals. Without the springs the brakes may not have released properly and created a hazardous situation.

Cpl Vrooman's initiative and thoroughness resulted in the detection of a fault that may have resulted in an accident.

CPL F.N. MEISINGER

Cpl Meisinger was replacing a chafed #2 Hydraulic System Return Hose on a CF104. His research into the cause of the chafing revealed that during operation it was possible for the ground cooling door to come in contact with the mesh-covered hose. Further investigation by Cpl Meisinger revealed that an identical problem existed on many other CF104 aircraft.

This problem has existed for many years but its rectification was limited to replacing the chafed hose because the cause was not known. As a result of the special interest and attention to detail shown by Cpl Meisinger in diagnosing the problem, it can now be rectified easily by repositioning the hose, thus preventing further occurrences.

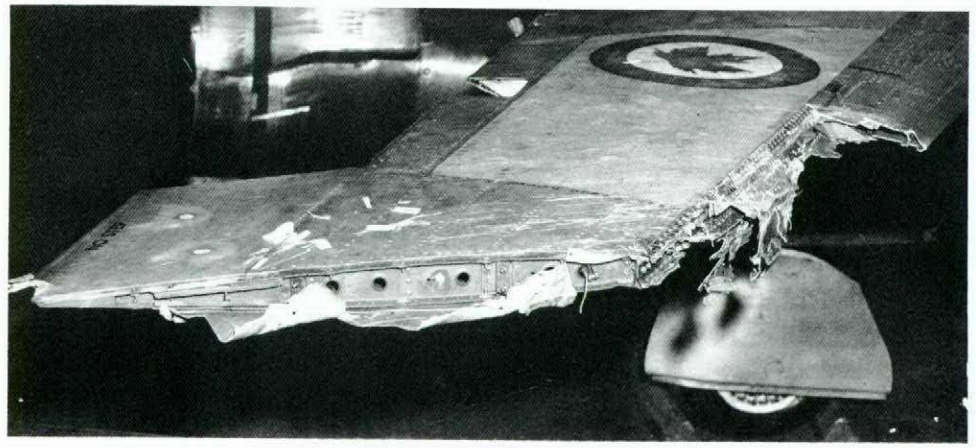
CPL W.K. FORSEY

Cpl Forsey was doing a Primary Inspection on a Musketeer when he noted an unusual sound from the area of the left mainplane in response to tapping the underside of it. Since a previous instance of this nature on the unit had resulted in the discovery of FOD in the area near the control cables, he felt that further investigation was warranted. Metal technicians were employed to drill out sufficient rivets in the skin surface to permit access to the area in question.

Inspection by Cpl Forsey turned up a Cleco fastener (used to hold metal surfaces in place prior to rivetting) which had apparently been left in the mainplane interior during its manufacture.

Cpl Forsey's keen and professional inspection technique resulted in the discovery of a foreign object capable of causing a potential flight hazard.

After The Midair



If you have never had to do a controllability check because of structural damage, the routine may seem pretty cut and dried. The usual steps are to put at least 10,000 feet of air between yourself and terra firma, set up landing configuration, and slow to near landing airspeed. If in the course of this exercise the aircraft becomes difficult to control, we note the critical airspeed and decide between ejecting or attempting to land. If we decide to land, we remember the control difficulty airspeed and try not to get that slow again until the wheels are rolling. Simple, isn't it? Simple, that is, until we consider one critical factor: the rate at which airspeed is reduced during the controllability check may be the difference between a successful recovery and disaster!

In reducing airspeed we are not trying to locate an airspeed at which control authority is insufficient to sustain or regain a desired flight attitude. That is an uncontrollable airspeed, and when we get there the paragraph in Emergency Procedures entitled "Ejection" applies. What we are looking for when we slow down is a zone between full controllability and zero controllability, an airspeed range in which the airplane is telling us that pretty soon it's going to give up unless we speed up. The width of this marginal zone may vary with the situation, so what we are looking for is the earliest possible indication that the aircraft is getting difficult to control. We note that airspeed and recover to the controllable airspeed range. The point, then, is that we must reduce airspeed at a cautious enough rate that we do not pass too quickly into the uncontrollable area. If we aren't cautious enough, the score can quickly become airplane 1, pilot 0, without the pilot even getting at bat.

A second reason for slowly reducing airspeed during the controllability check concerns the need for accuracy in determining the control difficulty speed. The decision whether to eject or land rests on the feasibility of attempting to land at higher than normal speed. It's also nice to know the exact "no lower than" airspeed during the actual landing approach. If your idea of this speed is only a vague WAG because of a hasty controllability check, you still run the chance of losing it in the flare.

Successfully recovering your aircraft after a midair collision or other structural damage can be a stern test of your mental and motor skills. You can help your odds with a properly performed controllability check at altitude. An essential part of this is the careful and deliberate determination of control difficulty airspeed.

USAF ATC Safety Kit and AEROSPACE SAFETY

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.

QUESTIONS

In the past few months several questions and suggestions have been submitted in response to "On the Dials" articles. We welcome these and although we do not profess to know all the answers, we will research them and publish our answers as soon as possible.

Suggestion: Regarding TACAN letdowns published in GPH 201, it is suggested that missed approach points be set at visibility limits for the approach, normally 1 statute mile, or that the distance of the MAP from the end of the runway be shown on the profile view of the approach. For example, on the H-8-TACAN 1, 2 and 3 at Calgary the MAP is 0.6 miles from the end of the runway. At Trenton (H-25-TACAN 1 RWY 24) the MAP is about 1/4 mile from the end of the runway. Note that the weather limits for each of these approaches are 500 and 1. The problem is that it is impossible to tell from the plates what DME reading coincides with visibility minimums for the approach, and at what DME the pilot should be looking for the runway. It is impossible to do a straight-in approach from the MAP in any of the examples given above.

Answer: It is quite true that with weather at limits straight-in landings cannot be made from some MAPs. This is the case with virtually all ADF approaches as well because the MAP is the end of the runway. By the same token, larger or faster aircraft may have trouble executing a straight-in landing from MAPs that do not present problems for smaller or slower aircraft.

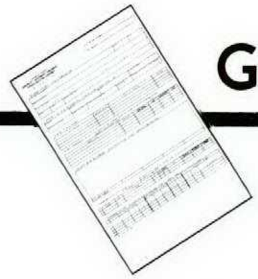
In reference to the Missed Approach, GPH 209, the Manual of Criteria for Instrument Approach Procedures, states that the MAP shall be a specified DME fix on the final approach radial which occurs no later than:

a. for straight-in — the threshold of the runway served; or
b. for circling — the first usable portion of the landing area.

As you see, there is no mention of visibility requirement. With the impending acceptance of a category system of minima, varying the MAP would not make sense.

On a TACAN as well as ADF approaches, the pilot should attempt to arrive at his MDA some distance back from the MAP providing sufficient time to spot the runway, line up and land.

The suggestion that the distance of the MAP from the end of the runway be shown on the profile view of the approach has merit and will be looked into. Perhaps something can be done.



Gen from Two-Ten

T33, LADDER FAILURE While climbing the ladder of a T33 to carry out a cockpit inspection the technician suddenly fell to the concrete as the ladder gave way. The ladder fell on top of him breaking two of his front teeth and cutting his lip.

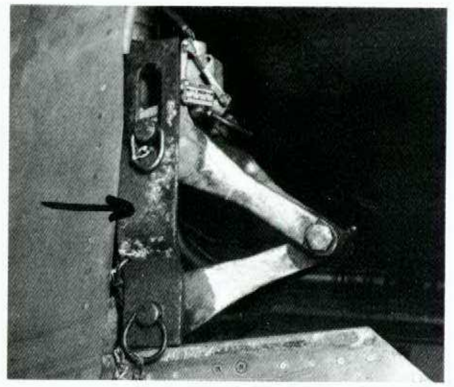
The ladder broke at the two hooks which hang over the canopy rail. When the rubber protectors strapped around the two hooks were removed it was apparent that the breaks had occurred at points where the ladder had been previously welded. A subsequent check of all ladders on the unit showed that 50 percent were either cracked or too weak to be used. Many had come from other units and evidently had been repaired from time to time in the past. In the absence of a standard repair scheme or modification for the ladder, the failures had been occurring in a variety of ways.

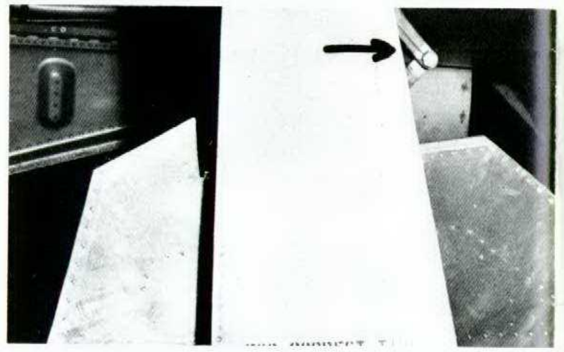
An urgent UCR was raised by the unit and inspection instructions for the ladders will be issued by CFHQ. Technicians and aircrew have been urged to exercise caution when using ladders.

T33, WHEEL-WELL FOD After a cross-country, the pilot carried out a "smooth, on-speed" landing at destination. He applied light braking initially, but because of the aircraft's increasing tendency to turn to the left, he eventually had to use considerable right brake to keep on the runway. When he came to a stop he found that the left tire had blown.

The left wheel was changed and the aircraft signed out serviceable to return to home base. After takeoff the pilot could not raise the gear handle and finally resorted to using the "up override" switch. The handle then came up but the left gear indicated unsafe. A visual inspection revealed that the left gear was hanging about ten degrees. A foreign object attached to the scissors was preventing the wheel from entering the wheel-well.

The pilot continued back to home base at reduced speed and landed uneventfully with no evidence of the previous swing to the left. However, a close post-flight inspection revealed flat spots on the left tire indicating that some degree of brake was on at touch-down. The foreign object was identified as a scissors extension locking tool which had been left attached to the left wheel scissors.





The ensuing investigations at both units, brought out the following points:

- There was no suspicion of a brake problem at the time the wheel was changed because the pilot had not made an entry against the brakes.
- A servo wheel was installed on the aircraft while it was still on the runway because a serviceable wheel was not immediately available. Later a serviceable wheel was installed. The same technician did both jobs and then forgot to remove the oleo locking tool.
- The NCO in charge signed out the work without checking it.
- The pilot missed the foreign object on his pre-flight inspection.
- After takeoff, when he found he could not raise the gear handle, the pilot elected to use the override switch to bring the gear up.

The immediate corrective action arising from the incident was to have the scissors extension locking tool painted red and a "remove before flight" streamer attached.

One of the precautions suggested by this episode is that most snags are best attended to on the ground. A gear handle that won't come up is a reliable indication that something is out of kilter. Chances are it will prove more troublesome sooner or later – usually sooner.

ARGUS, TAXI TANGLE The aircraft, manned by a partial crew (the co-pilot's seat was unoccupied), had just completed a compass swing. Since a test flight was planned following the compass swing the pilot's intention was to taxi back to his Squadron and pick up the others, including the crew captain. Because the normal taxiway was closed for repairs, the route back to the Squadron was through a congested tarmac

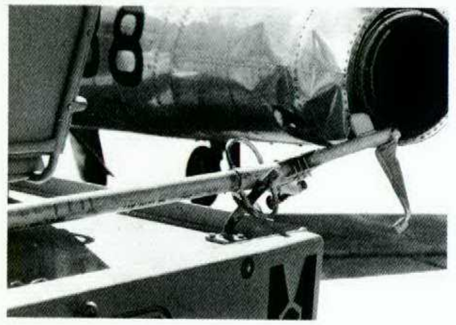
area, consequently the pilot called for marshallers. But before they arrived he decided instead to wait at the button of the runway and arrange for the rest of the crew-members to be transported out. The call for marshallers was cancelled. Meanwhile, some aircraft equipment had gone u/s and the flight had to be called off. So the pilot began taxiing in through the congested tarmac, but without recalling the marshallers! A short time later the right wing struck a metal light standard.

This was one of two expensive taxi tangles that have happened in recent months. In each case the pilot elected to taxi in confined spaces without adequate marshalling – with predictable results.

TUTOR, STRUCK BY TOW BAR A technician assigned to start the aircraft approached it from behind and to the right with a starting unit in tow. As he came around the tail towards the start position behind the left wing, a spare tow bar (which he had somehow failed to notice) on the brackets across the back of his D-6 towing tractor struck the aircraft causing extensive damage to the tail pipe and fuselage.

The investigation revealed that a similar mishap had occurred some 21 months earlier, but unfortunately, although the hazard caused by tow bars protruding when carried cross-ways on mules was recognized at the time, the opportunity for preventive action was missed as no written directive was issued on the matter. Thus "cross-ways" remained a "not uncommon" method of conveyance.

The proper position for the bar is along the right side of the vehicle. Stowed in this position there are no protrusions, however, getting in and



out of the vehicle becomes difficult. So, not surprisingly, various brackets have been installed by units to stow the tow bars across either the front or rear of the tractor. In some cases, the entire problem has been solved by the installation of wheels on the tow bars so that they can be towed.

The second time around on this type of mishap brought positive action to prevent a recurrence. Steps taken by the unit included:

- an interim directive forbidding the carrying of tow bars on the back of mules, the word "NO TOW BARS" to be painted at an appropriate location on the back of the vehicles;
- action to modify all tow bars to the wheel configuration;
- a UCR to determine the feasibility of lengthening the power lines on energizers – so that drivers will not be required to manoeuvre the units so close to the aircraft;
- more specific instructions in local orders relating to the handling of ground equipment in the vicinity of aircraft.

Danger From Decibels

A sudden blast of intense noise can rupture an ear-drum. Noise levels below those of "acoustic trauma" can also damage hearing if they are loud enough and long sustained.

So say numerous medical authorities and experts on sound who hold that strong, harsh and unrelenting noise can overstimulate and destroy delicate nerve endings in the inner ear, producing varying degrees of deafness.

They cite the following factors as the ones mainly involved in hearing loss due to noise pollution:

Intensity ... the sound level measured in decibels (dba) with reference pressure of 0 decibel.

Frequency ... the inner ear is rated more susceptible to injury from medium and high rather than low frequency noise.

Exposure time ... prolonged exposure to noise has been related to progressive loss of hearing.

Individual Susceptibility ... a complex variable conditioned by differences of age, sex, personal physiology, etc.

USN Safety Review

DFS Staff Change

A summer staff change saw the departure of LCol W.W. Garner. During his tour at DFS LCol Garner served first as head of the Education and Analysis branch, then as head of the Investigation and Prevention section. He has been appointed BAdminO at CFB Trenton. His replacement, LCol F.G. Villeneuve, brings more than 20 years of jet flying experience to his new position, as well as over four years of Flight Safety experience in Air Defence Command where he was SOFS. After joining the RCAF in 1950, he flew the F86 with 441 Sqn at St. Hubert and North Luffenham. This was followed by an instructional tour on T33s at Portage la Prairie and three years on the staff of Central Flying School. In 1959, he was assigned to form the Golden Hawk aerobatic team and went on to lead it for two years. Since then, in addition to his tour at ADC, LCol Villeneuve has commanded 434 and 430 Sqns (CF104s) at Zweibrucken, attended Staff College in Toronto and most recently was CO of 414 Sqn at Uplands.

LCol Garner and LCol Villeneuve

Murphied Messages

Most will agree that there is a certain art involved in message writing. Having mastered it, however, the drafter still can't be sure how his message will look at the other end, for he is harassed by those same gremlins who bedevil typographers. The following excerpts from recent incident messages illustrate both problems:

"THE CAPTAIN'S MEAL WILL BE WRAPPED IN RED FOIL IN THE NEAR FUTURE AND EITHER HE OR THE FIRST OFFICER MUST EAT IT."

"ENVIRONMENT – ALIGHTING AREA – AIRCRAFT BEING MANOEUVRED ON RAMP CONTACTED TALL RIGIDLY CONSTRUCTED FIRE HYDRANT."

" . . . HEAVY BRAKING RESULTED IN A BLOWN TIRE . . . THIS INCIDENT IS CONSIDERED ISOLATED. THE STUDENT HAS BEEN DEGREIFED."

"THE ONLY SERVICEABILITY THAT COULD BE DETECTED WAS A CRACKED FLANGE . . . "

"AIRCRAFT LANDED AND WAS SHUT DOWN. VISUAL INSPECTION SHOWED FUEL LEARING OUT OF BOMB BAY."

"THE CAPTAIN ORDERED THE AIRCRAFT EVACUATED. THERE WERE 12 SOB, OF WHICH 4 EXITED USING THE ESCAPE ROPE AT THE MAIN CARGO DOOR . . . "

"SHORTLY AFTER LEVELLING OFF AT 35000 FEET PLT EXPERIENCED SYMPTOMS OF ANOXIA. THE BUNKER WAS NOT MOVING."

"WHEN TEMP RHEOSTAT SELECTED TO FULL TOT DURING PRACTICE EMERGENCY DESCENT COCKPIT FILLED WITH WHITE SMOKE."

(after a T33 tip tank contacted the ground on takeoff)
"STBD TIPTANK ASSY SCRAPED LOCALLY."

"DARING NORMAL TWO PLANE LANDING THE WINGMAN . . . "

"DURING THE SYSTEMS CHECK PRIOR TO TAXIING FROM THE LICE . . . "

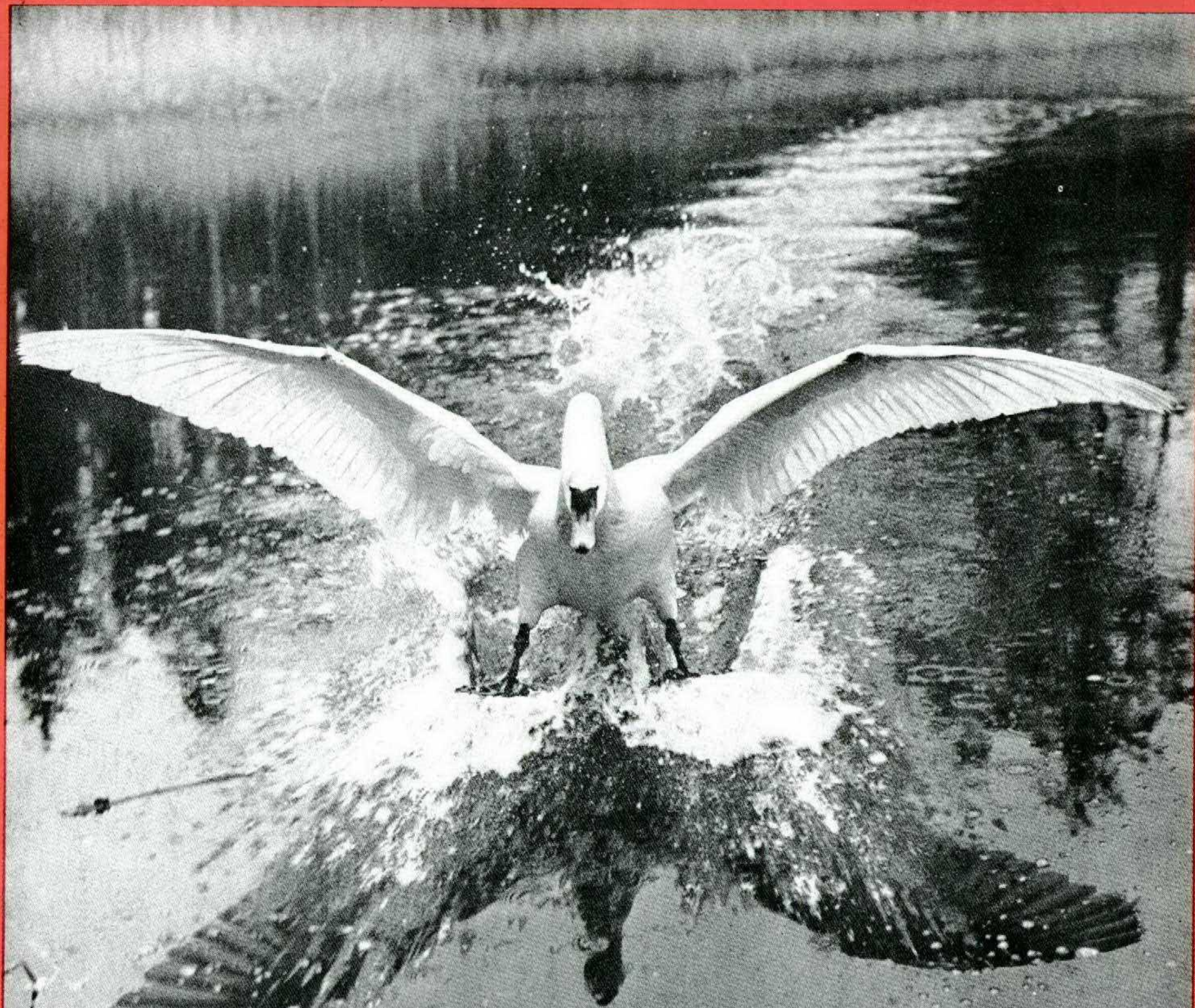
BIRD WATCHERS' CORNER

HICKORY HEADED FLINCH

This flying oddity is easily recognized by a lumpy head pulled down between his shoulders, and a permanent involuntary flinch. These characteristics are fostered by his environment, a confined area bristling with levers, switches and an assortment of other protuberances which somehow always seem to be just where he is putting his head. The problem is that old Hickory Head hard-headedly refuses to wear his protective helmet, even when his operational role involves a high risk of being knocked about. He may come a cropper from the most devastating of these knocks, a birdstriking personal visit from one of his feathered relatives. In the aftermath a faint call rises from the debris:

OH-MY-HEAD I-WISH-I-WAS-DEAD

$9 \times \sqrt{\text{TIRE PRESSURE}}$ = HYDROPLANING



How Does Your Bird Perform on Wet Runways?