FLIGHT COMMENT

NOVEMBER • DECEMBER
1970

Winter woes – part IV

Comments

The USAF/ADC PRIDE award in the July 70 issue of Interceptor was accorded to the pilot and navigator of a B57 who had successfully brought back their crippled aircraft under adverse weather conditions. The navigator was Capt L.B. Hall, a Canadian Forces exchange officer at Hill AFB, Utah. Capt Hall was previously a member of 410, 409 and 414 Squadrons before his transfer to Hill in 1969.

As the slogan which appeared during the last war stated, "the efficiency of a Unit can usually be judged by the state of its ground equipment". This is just as true today - RAF Flight Comment.

A recent fatal accident (in another country) involving a corporate jet brought renewed efforts in that country to warn pilots of the dangers of having either all eyes in the cockpit or all eyes looking out. Under IFR or mixed IFR/VFR, one pilot should fly the gauges and the other keep outside watch...or at least one pilot should be calling out altitude increments of the descent while the other is flying.

More and more, the types of aircraft in the CF inventory are common to those flown by many other users throughout the world. For this reason, we often use the applicable USAF Technical Orders (TOs) with CF Engineering order cover pages. However, as time passes, our aircraft become modified to such an extent that they are quite different from the version covered in the TO. So supplements are placed in front of the TO to explain the differences. But here's the rub - how often do YOU check to see if there's an applicable supplement before turning up a page in the basic TO?

With the introduction of a standard name tag for wear on CF uniforms, special precautions will be required to ensure that these tags are not worn by people working on or operating aircraft. We've already had one J79 wrecked by a name tag.

CANADIAN FORCES HEADQUARTERS — DIRECTORATE OF FLIGHT SAFETY

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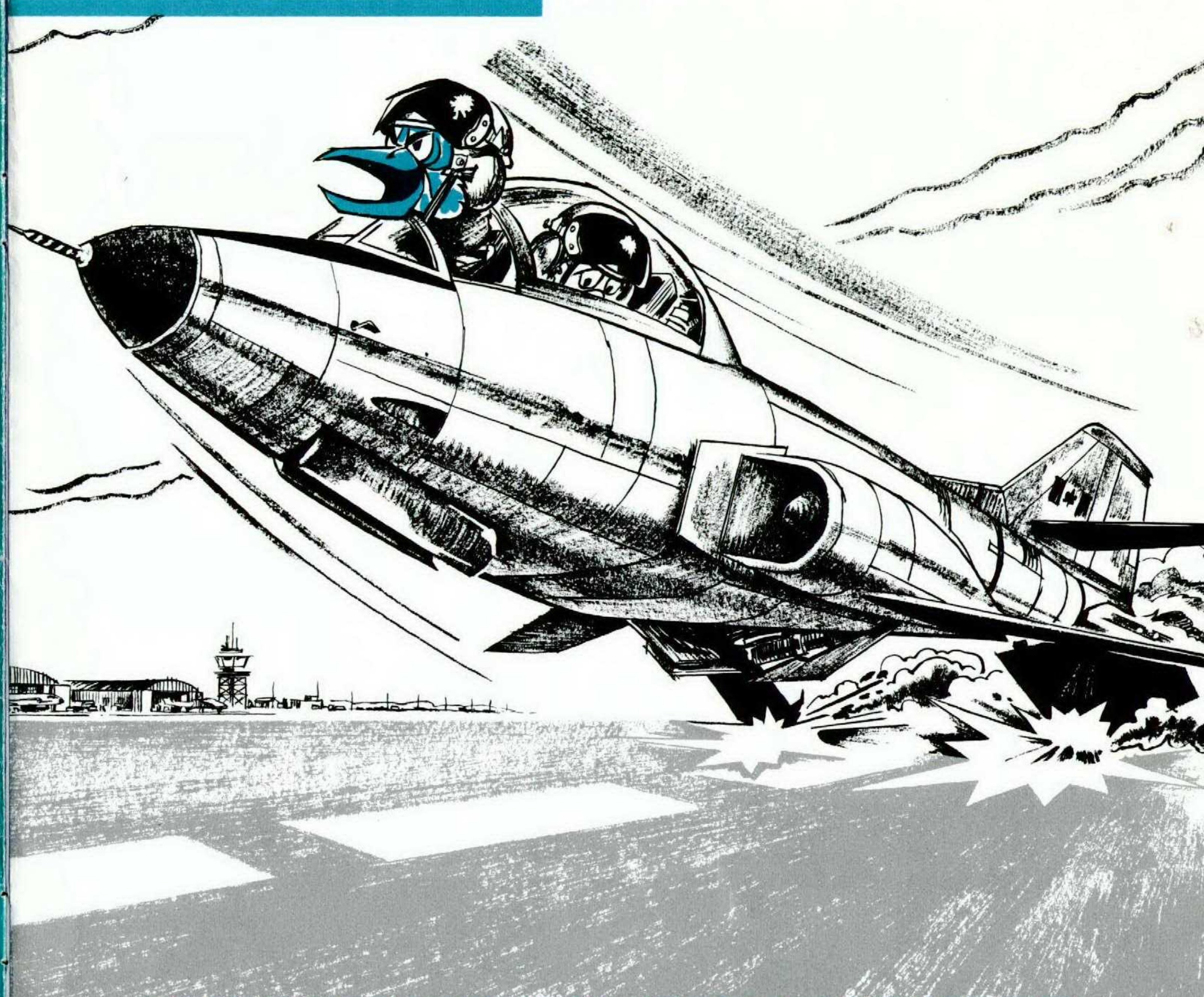
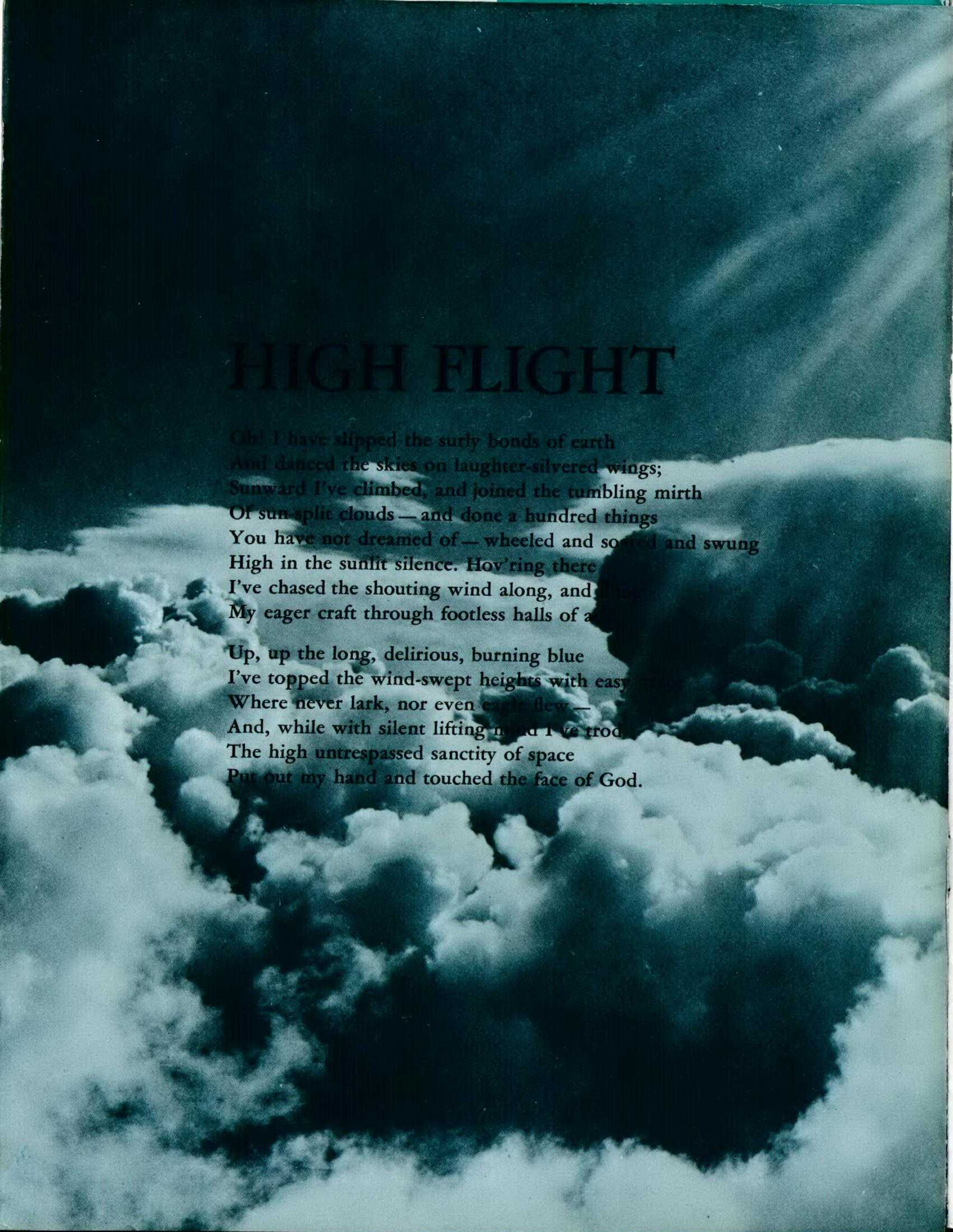
BIRD WATCHERS' CORNER



NUMB-TUMMIED GEAR SNAPPER

For incomprehensible reasons this avian oddity believes that observers will look upon him as one of the Feline Species (specifically, Tiger, although the connection often seems rather tenuous) when they see repeated demonstrations of his dominant flight characteristic — a tendency to tuck in his ambulatory apparatus on takeoff before his weight has been fully transferred from gear to wings. Unhappily this is often accompanied by a belly-rending crunch, a prelude to an unscheduled return to the runway. The Gear Snapper's peculiar ritual has aroused much scientific interest among ornithologists, most of whom attribute the behaviour to a solid cranium made of hickory. His curious birdsong rises above the sound of tearing metal:

IT'S-REALLY-QUITE-FUN 'CEPT-MY-TUMMY'S-ALL-NUMB



HIGH FLIGHT

Oh! I have slipped the surly bonds of earth
And danced the skies on laughter-silvered wings;
Sunward I've climbed, and joined the tumbling mirth
Of sun-split clouds — and done a hundred things
You have not dreamed of — wheeled and soared and swung
High in the sunlit silence. Hov'ring there,
I've chased the shouting wind along, and flung
My eager craft through footless halls of air.

Up, up the long, delirious, burning blue
I've topped the wind-swept heights with easy grace
Where never lark, nor even eagle flew —
And, while with silent lifting mind I've trod
The high untrespassed sanctity of space
Put out my hand and touched the face of God.

A Spot Check

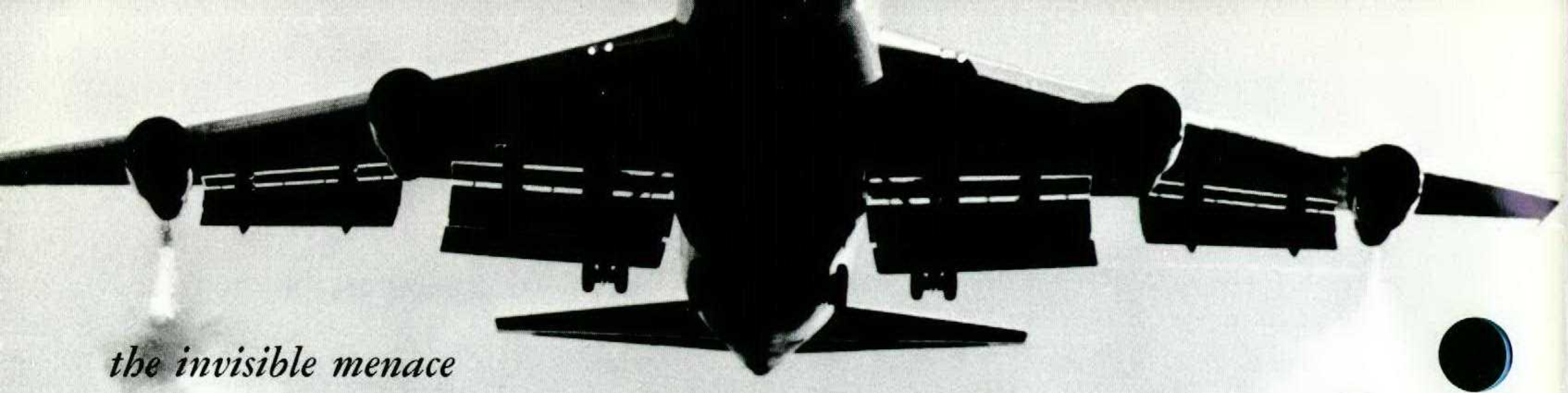
A comparison of the air accident record for the first nine months of 1970 with that of 1969 shows improvement in every significant area. Obviously statistics must be considered in relation to the numerous factors that influence each facet of the air operation, however, we have concluded that regardless of qualification the overall accident prevention program is getting results. See for yourself:

- 17 fewer aircraft seriously damaged or destroyed in *air* accidents
- 50 fewer aircraft damaged in *ground* accidents and incidents
- 9 fewer aircraft destroyed in air and ground occurrences
- 5 fewer fatalities and 10 fewer injuries associated with aircraft operations

I am telling you these simple facts at this unusual time for two main reasons. First, this indication that your efforts are paying off should encourage everyone to try even harder. Second, and more important, there are indications that some of you may have decided that things are going so well in your particular field that you can relax a bit. If this observation causes even a twinge of conscience, then do something about it right now and never forget that accident prevention is a continuous process, not an "on again-off again" thing.

Finally, I am sure that if you take a searching look at the immediate future you will see the developments which, if not considered carefully, could reverse this favourable trend very quickly. I am confident that you will not let this happen, so it only remains to prove me right in the long run.

COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY



the invisible menace

Watch for the Wake

Photos courtesy Boeing

Flying in the vortex of a "Heavy Jet" at 3 miles, the pilot of a 104 encountered a 90-degree/per second roll...

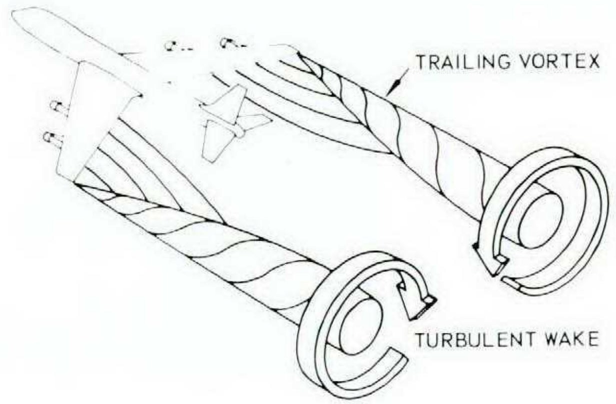
A problem still unresolved in the wake of the first generation of jet transports is that of Wake Turbulence (WT). This phenomena is the invisible cone-shaped atmospheric disturbance that flows from the wingtips of one plane and that can effect, distort or destroy the aerodynamic lift of planes behind.

WT occurs with most severity behind so-called "Heavy Jets", those with a gross takeoff weight in excess of 300,000 lbs. Included in this group, beside the jumbos, are the later version 707-type aircraft, ie, the intercontinental 707 and DC8, VC10, IL62 and C141. Recent experiments indicate no significant difference between turbulence caused by the new version 747 and these later version 707-type aircraft. The one exception is the Boeing 727 which produces more severe wake turbulence than other jets of comparable weight and dimension.

The Nature of WT

When an aircraft is in flight there is a differential pressure between the top and bottom of the plane. The high air pressure below has a passion to neutralize the lower pressure on top. Since it cannot go around the front or the back of the wing because of its momentum, it flows laterally along the span and slips up and around the tip. The current up and around the tip is what generates the wingtip vortex. Generally the greater the lift, the greater the energy transmitted to the airmass in the form of turbulence. The intensity of the turbulence is directly proportional to the weight of the aircraft and inversely proportional to its speed. As the angle of attack is increased, the pressure differential increases, thus developing more turbulence. The greater the drag the greater the turbulence.

Experiments have shown that violent vortices can be developed by aircraft with gear and flaps down, and *power off*. The greatest action comes in the takeoff and final approach phases of flight, when near the ground. Your initial concern may be with the disturbance made by his powerplants; FAA tests have shown that this hazard only extends 400 or 500 feet behind the offending aircraft.



Two counter-rotating air masses form trailing vortic behind the aircr

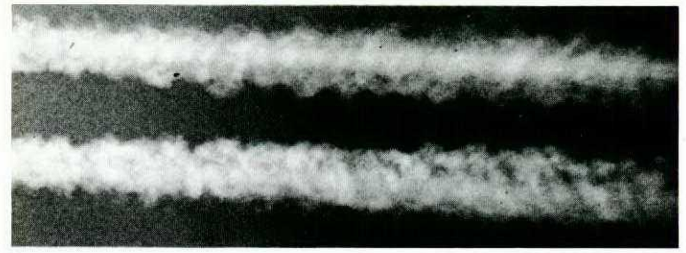
Lack of Visual Clues

One hazard of wake turbulence is the lack of visual clues as to its existence. Except where vortices are entwined with the contrails of high flying aircraft or there are smoke trails from large jets, WT cannot be observed. It is the "unknown" about this phenomenon that presents most of the problems to pilots. No one can tell you exactly where the vortices will be, how long they will last, or what affect they will have. Wind velocity, weather, temperature, the direction of the wind and other environmental factors make it impossible to predict the exact course of the dual vortices at any given moment.

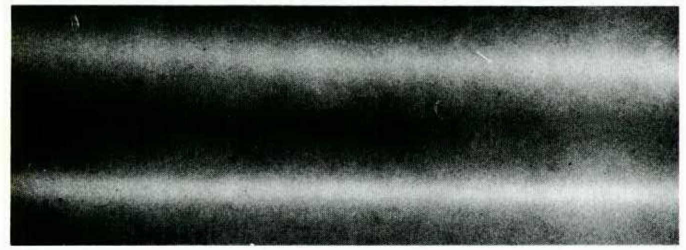
Certain characteristics of wake turbulence are fairly well known. The windmilling air settles below and away from the path of the aircraft, whirling in opposite directions. Avoiding an encounter with wake turbulence calls for trailing aircraft to fly *above and well behind the flightpath of the leader.* (Turbulence may persist for five minutes or longer after the passage of a large aircraft.)

However, it must be borne in mind that local turb lence or crosswinds may alter the expected dispers picture, so that pilots should be always alert and read to counter the effects of disturbed air whenever flying in the vicinity of similar or larger aircraft.

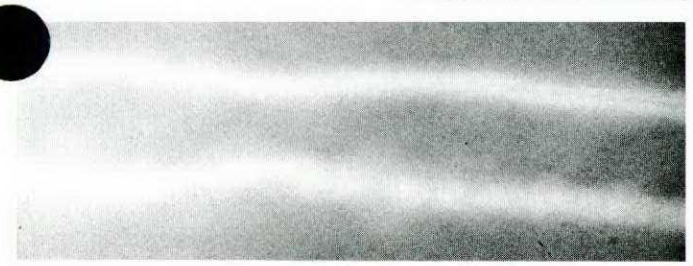
Wingtip vortices are present from the moment the weight of the aircraft is transferred from wheel support to wing lift. Since aircraft at altitude are usually not in close proximity, wingtip vortices normally are a problem only around airports. Nevertheless, pilots should be wary of crossing the visible wake of jets (ie, the trailing smoke) aloft since the *invisible* turbulence they create may be encountered - especially if a crossing is made at right angles. When wake turbulence is still present the greater the angle of crossing, the more severe will be the jolt received. When the telltale jet smoke is in the area, it is a good precaution to reduce eed and be alert for corrective action, since it is ossible to guess where the invisible vortices may ve drifted.



Immediately behind the 747



20 seconds and counting



80 seconds, break-up begins

Jets or large transports are by no means the only source of hazardous wake turbulence. If you are flying a single-engine aircraft, virtually any other light aircraft can, under some circumstances, generate enough turbulence to jolt you if you follow too closely in its wake. Quick takeoffs behind aircraft flying touch-and-go practice can provide unpleasant surprises.

Airports constitute an environment where wake turbulence is always a potential and sometimes an unavoidable problem. However, solving the problem calls for pilot judgement, not mere reliance on airport or tower authorities.

en in Doubt, Ask

If a tower controller cautions you about wake turbulence, he is warning you that it may exist because of another aircraft that has recently made a takeoff or landing. He cannot tell you *where* it is, or if you will actually encounter it during your operation. When you receive such an advisory, don't hesitate to ask for more information, if you think it will help you to analyze the situation and determine your course of action. Even though a takeoff or landing clearance has been issued, if you believe it would be safer to wait to use a different runway, or to change your intended operation in some other way, it's a pilot's prerogative to ask for a revised clearance.

Sometimes clearances include the word "immediate" such as "cleared for immediate takeoff." Such communications are to be interpreted as meaning that if the pilot takes off at once he will have adequate separation from other aircraft. *It is not an "order" to go.* If you have any reason to believe you cannot proceed safely, it is your responsibility to decline the clearance. The controller's primary job is to aid in preventing collisions between aircraft, and expediting and maintaining an orderly flow of traffic, *not to advise pilots on flight procedures.*

It is up to the pilot to recognize potential wake turbulence at an airport, and to know what he can do about it. At least five options are open to him:

- For takeoffs on the same or parallel runway behind a large, heavy aircraft, takeoff should be *before* the point where the larger aircraft left the ground. Remember that even in a "no wind" condition, a vortex from a departing aircraft on a nearby parallel runway could descend on your proposed takeoff route. So check out the takeoff point of that 707 on the runway next to you, as well as the one that took off ahead of you.
- For takeoffs on intersecting runways, remember the basic rule is to *stay above* the flightpath of other departing aircraft. If the departing aircraft on the other runway was still on the ground well past your intersection, and your takeoff will permit you to climb approximately 100 feet or more before you reach the intersection, you should have clear air.
- When taking off after a larger aircraft has landed on an intersecting runway, make sure that it touched down before it crossed your intersection. If this is not the case, you may request a delay or an alternate runway.
- When landing behind a large, heavy aircraft, it is essential to *remain above the flightpath* of the aircraft you are following and to touch down well beyond the point where he landed if runway length permits. In this way, you will avoid encountering the turbulence which is settling behind and to either side of the larger aircraft.
- Landings after the takeoff of a larger aircraft should be planned to land before the larger aircraft's point of liftoff.

Remember that "cleared to land" means only that the runway is no longer in use by other aircraft. It is not an assurance that no other hazards, visible or invisible, are present.

It is recommended that if you haven't seen it, you arrange to view the film Wake Turbulence (02234 - CF Film Catalogue) which provides good information on this hazard to flight.

adapted from FAA Aviation News
and Flight Safety Foundation Bulletin

Visual Phenomena in Flight

the film makers . . .

In its analysis of accident causes, DFS has found over the years that certain visual phenomena repeatedly occur as significant factors in aircraft accidents - both fatal and non-fatal. Snow illusion is one (see Nov/Dec 69 Flight Comment). Others include, loss of visual reference during night takeoff, water and terrain illusions, St. Elmo's fire, rotor-wash whiteout, windscreen refractions, and whiteout.

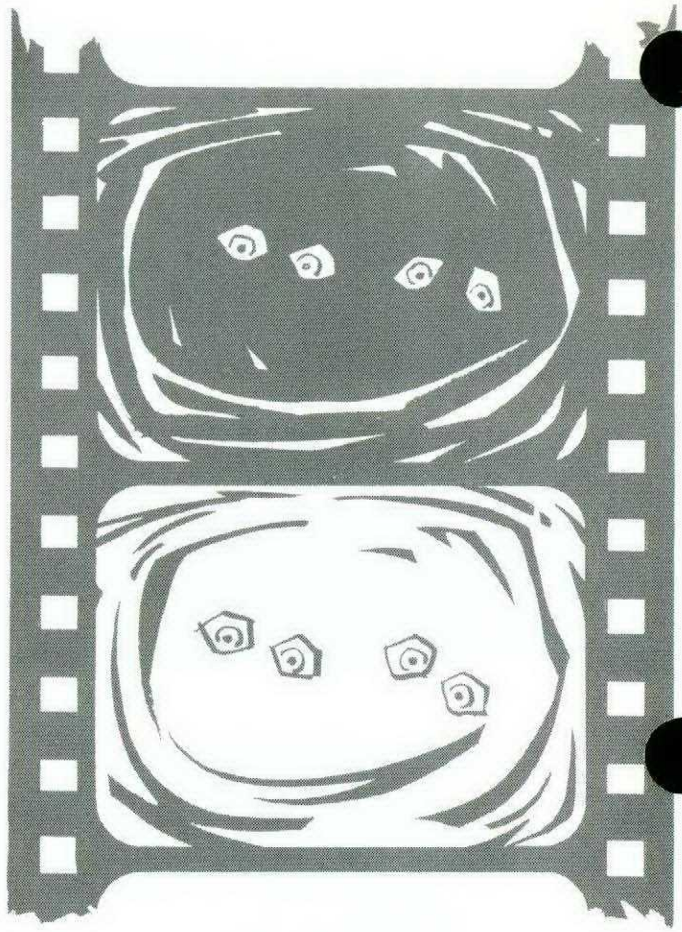
The following examples illustrate the causative relationships between these phenomena and accidents:

- Since 1963 whiteout has been a cause factor in 18 accidents and incidents involving damage to aircraft.
- Three of these aircraft were totally destroyed and four aircrew were killed.
- St. Elmo's fire was a factor in the fatal night crash of a CF104.
- Windscreen refraction was a cause factor in two accidents involving low-level flight.

Because the elusive nature of these conditions precludes their readily being taught in classrooms or cockpits, DFS has sponsored the production of a film, "Visual Phenomena in Flight", to be used in the pilot training program and also for annual updating of aircrew.

"Visual Phenomena in Flight" is a unique attempt to present hazardous pilot illusions or visual phenomena. Here is where the action is:

Phenomenon	Aircraft	Location	Squadron
-Loss of visual references during night takeoff	CF101	Comox	409
-Water illusion (loss of height perspective over glassy water)	Tutor	Moose Jaw	2 FTS
-Terrain illusion (inability to detect rising terrain under low overcast or deteriorating weather)	CF104	Cold Lake	417
-Snow Illusion (loss of height perspective over snow)	CF5	Cold Lake	434
-St Elmo's Fire (electrical charges "playing" on surface of aircraft and windscreen)	Argus	Summerside	415
-Helicopter rotor wash whiteout (disorientation in loose blown snow)	CUH-1H	Petawawa	403
-Whiteout (merging of snow covered ground and sky with loss of horizon)	Tutor	Moose Jaw	2 FTS
-Rain on windscreen (impaired visibility on landing)	Falcon	Uplands	412



Although the project is relatively ambitious, the requirements are well within the capabilities of the squadrons involved, and Canadian Forces cameramen; it will be made as dramatic and interesting as possible.

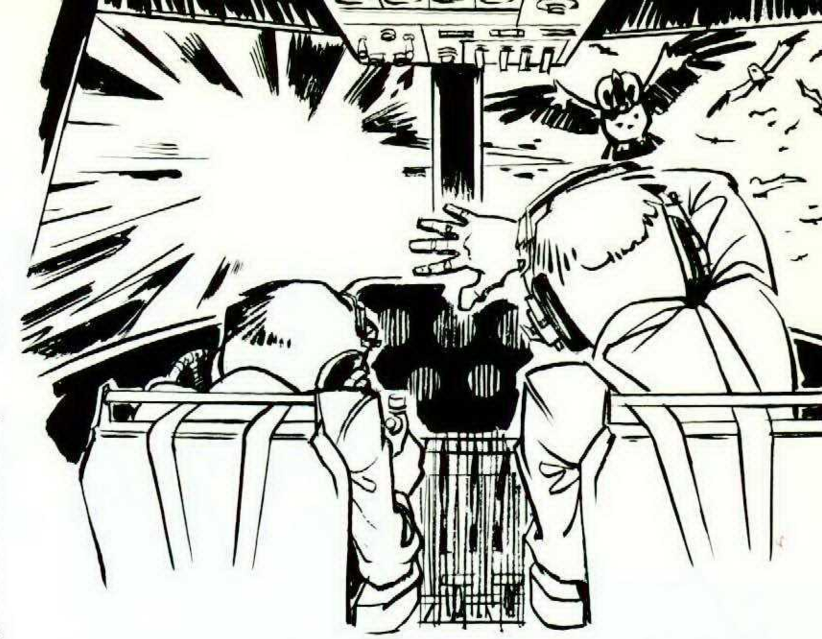
The coordinating authority for the film at CFHQ is the Directorate of Aeronautical Engineering. Capt Brian Smith of CFB Moose Jaw is project officer and Capt Robin McNeill of the CFHQ Directorate of Information Services will write the narrative and shooting scripts. The photography crew will be headed by WO J.A. Wright of Canadian Forces Photo Unit, Rockcliffe. Final direction, editing, and sound will be by the National Film Board of Canada.

Snowmobile Warnings

The BATCO stated that there is a need for a definite demarcation line to indicate the boundaries of the airfield and prevent inadvertent violations by snowmobiles.

- Flight Safety Committee

Splat!



Capt G.B. Bennett
404 SQN CFB Greenwood

It is always nice to read articles on the subject of birdstrikes and how to avoid them. It seems that the tracking of birds and the forecasting of large migrations are becoming more and more understood, which is all to the good. But what do you do in an operation which by its very nature almost invites birdstrikes? In Maritime Command we frequently operate out of coastal airfields which are virtually strips of concrete through salt marshes. Take Ballykelly in Northern Ireland for example, with a field elevation of 5 feet ASL and subject to change! Kinloss in Scotland is similar. But my own story happened at Ballykelly, the only airfield to my knowledge on which a sheep has been killed by a train on the main runway! But that's another story...

I was in the left seat of an Argus taking off at 0400 local time with a full 17-man crew and enough fuel for 22 hours. When all the checks were finished I called for landing lights. In the first cold glare a sizeable flock of gulls rose gracefully from the runway and departed the scene. Very considerate of them! As the takeoff run started, two rabbits made lead collision attacks on the aircraft, one from each side. Some 1500 feet further on another flock of gulls left the runway ahead of us with minimum separation. By now we were aware that we had unfortunately planned our takeoff during the rush hour, and traffic was heavy. Just after liftoff a third flock was encountered and it was obvious that they delayed their departure too long. The copilot uttered an appropriate comment and put his arm over his eyes. I simply dug my elbows into the armrests to lock the yoke in its present position, which seemed to be about right at the time, ducked, and awaited the crunch. I was not disappointed. After the staccato drumming of gulls on the windshield and surrounding area had stopped, I bravely raised my head and eyes and carried on.

We escaped almost unscathed. Minor torque fluctuations occurred on a couple of engines, the windshield was well decorated, a draft cooled our feet, and a fishy smell pervaded the aircraft. Subsequent examination revealed a 6-inch hole in the nose perspex. The IFR departure was cancelled and we proceeded seaward to dump fuel, after which we landed in the wet grey dawn.

Even supposing we get away successfully on patrol, one of our jobs is photographing things at sea. This task calls for a pass by our target at 200 feet and close in. The seagull traffic on the downwind side of some ships is large and diffuse but can be avoided by passing upwind of the ship. Unfortunately this may require taking photographs into the sun, thereby ensuring frowns and disparagement from the Base Intelligence Officer on return. Anyway, one seagull can mess up your whole day just as well as a hundred.

However, without belabouring the point let's look at our takeoff birdstrike. The chicken copilot was the smartest member of the animal kingdom around. Remember he put his arm over his eyes. Now, if I'd got it in the face he would have been able to keep the aircraft under control, and if he'd got it in the face at least his eyes would have been protected; if we'd both got it, at least one pair of eyes would still have been in operation. His arm might have been a bit messy, but his eyes are the really vital thing.

Much later, I flew through a flock of vultures on the localizer and the glide slope at Piarco, Trinidad, and when a birdstrike appeared imminent, I ordered the copilot (a different one) to put his arm over his eyes. We didn't hit any that time and he might have felt a bit stupid, but I am convinced that the procedure has merit...if you must fly through flocks of birds without a helmet or visor.

Capt Bennett joined the RCAF in 1957 after serving as a pilot in the RAF. Most of his early RCAF career was in Training Command, having spent three years at Trenton and 2 FTS, Moose Jaw as an instructor followed by an additional three years at Moose Jaw as an FIS instructor on Harvards. He next flew Expeditors and held a desk job in Winnipeg. Transferred to Maritime Command, he trained on Neptunes at the OTU in Summerside and in 1967 was transferred to his present assignment on 404 Sqn. He has been an Argus crew captain for a year and a half.

Arctic Survival Training

The CO stated that with the increasing emphasis on Northern operations, there was a definite requirement to ensure that a suitable number of aircrew received Arctic survival training. It was considered that our requirement was in excess of the number of course openings normally available at the CF Survival School.

- Flight Safety Committee

Good Show

Cpl K. Cotter and Pte R. Heisler

Cpl R.B. Tuck

Cpl R.A. Mickelson

MAJ E.M. LENTON

Maj Lenton, the Senior Air Traffic Control Officer at Lahr airbase, has been instrumental in devising and managing an extremely effective bird control program. Largely as a result of his efforts the birdstrike rate at the base has been greatly reduced.

Through Maj Lenton's hard work and persistence with this vexing problem a serious threat to jet flying operations was reduced and Lahr has become one of the best examples of successful aerodrome bird control.

CPL K. COTTER and PTE R. HEISLER

Cpl Cotter responded to a call for assistance from the pilot of an American Cessna 172 which had become lost near Trenton; heavy precipitation was preventing the pilot from using local beacons. Although radar return from the rain was almost obscuring his scope, Cpl Cotter managed to locate the aircraft 20 miles west of base, and guide the pilot to the runway approach.

As the aircraft was about to begin final descent, the precision radar scope failed. The duty technician, Pte Heisler, was summoned; he quickly traced the fault to its source and completed the repairs in time for Cpl Cotter to continue the "talk-down". The Cessna pilot landed his aircraft safely with only five minutes fuel remaining.

The calm and efficient manner in which Cpl Cotter and Pte Heisler handled this emergency, undoubtedly saved the civilian aircraft from disaster.

CPL R.B. TUCK

While serving as a crewman on an ATC Special Flight, Cpl Tuck detected unusual noises emitting from the Falcon's starboard engine at idling power.

He had been monitoring the engine noise level for some time and determined that the pitch, and degree of noise was becoming unusual. After consulting with the aircraft commander and two engine technicians, a major unserviceability was entered against the engine. On inspection it was discovered that number three bearing was excessively worn and beginning to disintegrate. Had this condition been left unnoticed or unreported, an engine failure would probably have occurred during the next few hours running time.

Cpl Tuck's alertness probably prevented a subsequent engine failure which could have occurred during a critical phase of flight.

CPL R.A. MICKELSON

In the course of a Daily Inspection on a visiting T33, Cpl Mickelson found torn skin and popped rivets on the underside of the fuselage, just aft of the left wheel-well. Investigating further, he had the aircraft placed on jacks for landing gear retraction tests. The tests revealed that both main gear and gear doors were badly out of alignment.

Subsequent investigation revealed C category damage, apparently the result of a hard landing some days previously. The aircraft had flown at least four times since, the damage remaining undetected after two DIs and four "A" checks.

By his important preventive effort in detecting the extensively damaged landing gear, Cpl Mickelson prevented a possible serious accident.

CPL A.J. CURRIE

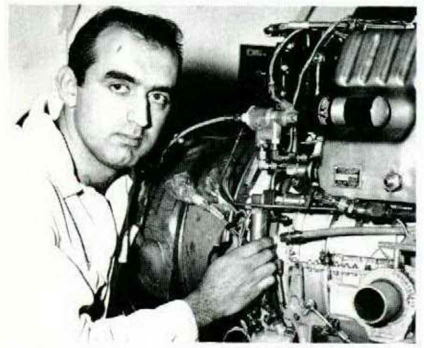
While performing a sampling inspection on a Buffalo at the Aircraft Maintenance Development Unit (AMDU), Trenton, Cpl Currie noticed a slight drag on the port propeller control. Thoroughly inspecting the control system, he located the trouble within the fuselage, in the cable run. The control cables had been installed incorrectly and were rubbing on a guide pin for an adjacent control pulley. Deep grooves had been worn, indicating that the condition had existed for some time, possibly since initial manufacture.

By his thorough inspection, Cpl Currie uncovered a problem area which had not occurred previously and possibly prevented its being discovered only as the result of an accident.

CPL L.D. BENNETT

During a routine oil filter check on a Tutor engine, Cpl Bennett discovered a chafed oil-vent line. Further investigation revealed a very small crack in the oiltank vent connector which, had it gone undetected, could have caused a malfunction in the engine lubricating system and possibly an engine failure.

Cpl Bennett's thoroughness is an excellent example of attention to detail and professional competence.



Cpl L.D. Bennett

Cpl R.H. Bentley

Cpl A.J. Currie

CPL R.H. BENTLEY

During a routine inspection of a Tracker elevator, Cpl Bentley noticed cracks in the brackets supporting the elevator paddle assembly. Investigating further, he found after disassembling the unit that two paddle-to-elevator attachment bolts had sheared and that fractures had occurred in the end of the elevator main spar. Only the aircraft skin rivets were holding the paddle assembly in place.

By his careful attention to detail in an area not specifically designated in the check, Cpl Bentley prevented a serious in-flight control malfunction. Moreover, his alertness resulted in a special inspection which uncovered similar defects in four other aircraft.

No yellow peril

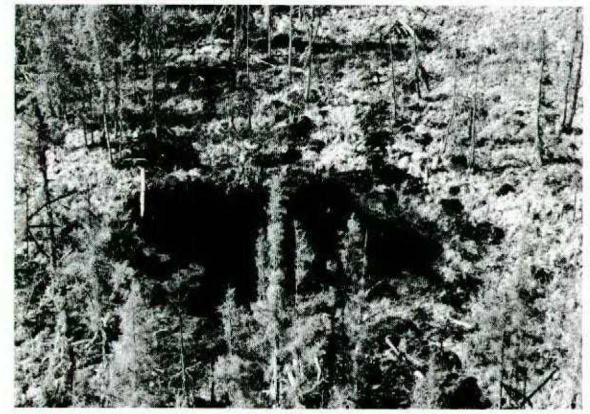
Tower personnel and aircrew have no difficulty picking out a yellow aircraft against almost any background. The use of white on the other hand, entirely reverses the situation and is considered by the members to constitute a flight safety hazard.

- Flight Safety Committee

CPL T.R.A. PEELAR

While flying as an H34 helicopter crewman on a transport mission over the Cold Lake Air Weapons Range, Cpl Peelar spotted something on the ground among the trees that appeared to be aircraft wreckage. A further scan of the immediate area revealed a water-filled hole that looked to him like CF104 crash craters he had seen. Recognizing that it was not a previously known crash site, Cpl Peelar asked the pilot to turn back for a more thorough search. The search confirmed that it was indeed an aircraft crash site and the number "746" was sighted on a portion of the wreckage. Back at base a check revealed this to be the number of a CF104 missing since December 1966.

Cpl T.R.A. Peelar



Cpl Peelar's spotting of this crash was not just a chance occurrence; while flying over unpopulated areas, he had on many occasions previously, asked for a closer look at objects that appeared to be wreckage, only to find discarded CF104 rocket pods, Arcus missile parachutes and bleached moose horns. Undeterred, he maintained his sharp lookout and although near a much-used target, and in an area over which the base helicopter had often flown, be insisted on a closer look. This time vigilance and perseverance paid off with an outstanding sighting of what was virtually nothing more than a hole in the ground. The aircraft had impacted in muskeg and the wreckage was strewn throughout brush timber and sloughs, making sighting almost impossible. In spite of close to 1000 flying hours on the comprehensive original search and random searching by pilots from time to time since, the disappearance of the CF104 had remained a mystery for over three years.

You can't ~~fuel~~ fool the pros

Capt T.P. Hinton CFHQ/DMC (Air)

You ease on the binders. The nose dips as the old Bird rolls to a stop. You set the parking brake while waiting for some chocks, flip open the canopy and start to unstrap with the balmy West Coast breeze wafting over you. Beautiful! You've come out to VR with your student on a long-range x-country and he has flown an outstanding trip - an eight, at least. The winds were light and variable across the rocks and the Bird was doing .73 at thirty-five thou, movin' right along and hardly using any fuel at all. Its Friday afternoon. You'll spend Saturday in VR - a game of golf, a swim, see some old buddies, and then on Sunday you plan to throw a couple of salmon in the luggage carrier and be home in time for supper. Great stuff! Couldn't be better!

The fuel truck pulls up and the driver hops out and sets some chocks in place. You release the parking brake, holler "fill 'er up", and head down the ladder. Just then you start to wonder if that guy has the right type of juice for your Bird. Better safe than sorry and no harm in asking.

"Is that JP-4?"

"I dunno," says the driver. "We call it Jet-B." Tilt!

"Jet-B?" "Hang tough for one while I check my AOI."

You flash through the AOI, but it really isn't very helpful because it says to use 3-GP-22, whatever that is. Then it says NATO F-40. Still not much further ahead because this truck driver hasn't been any closer to NATO than Penticton. It seems that there just may be a bit of a communications problem here. Let's see if we can't get to the bottom of this one.

For the Tutor, T33, CF5, CF104, Voodoo, CF100, and other assorted high speed aluminum, the good books say to use 3-GP-22, NATO F-40. But what the AOI doesn't tell you is that the fuel used in these aircraft must contain what is called a Fuel System Icing Inhibitor (FSII). So now its 3-GP-22, NATO F-40 with FSII. Great Stuff! But what is it? Is 3-GP-22 the same as JP-4? Is JP-4 the same as NATO F-40? Is NATO F-40 the same as Jet-B? Which ones contain the icing inhibitor? Some explanation of the various terms used to describe the fuels would help.

First JP-4: This is an American military term which has come into non-official use in the Canadian Forces and since its use is non-official it must be given the status of slang. Also, to further complicate matters, the term JP-4 (unless you happen to be at an American military base) gives no indication of the presence or absence of an icing inhibitor. While use of the term JP-4 confuses the issue, some allowance must be made for it because its use is quite common and its meaning is widely understood.

Next 3-GP-22: 3-GP-22 is jet fuel as defined by the Canadian Government Specifications Board. The term 3-GP-22, like JP-4, does not indicate the presence or absence of an icing inhibitor. In fact the specification for this fuel reads, "the NATO symbol for this product is F-40 when fuel system icing inhibitor is present, and F-45 when fuel system icing inhibitor is absent". Now we're getting somewhere. The terms JP-4 and 3-GP-22 are of little use to us because they give no indication of the all-important icing inhibitor, however the NATO symbols tell us exactly what we want to know. Jet fuel with icing inhibitor is NATO F-40, and jet fuel without icing inhibitor is NATO F-45.

You still haven't solved your problem though because the fuel truck you're looking at has Jet-B painted on it.

"Jet-B eh?"

"Yeh, Jet-B".

Well the fact is that Jet-B is jet fuel as defined by the American Society for Testing Materials (ASTM), and is the term most commonly used by commercial aviation fuel suppliers. But Jet-B falls into the same category as JP-4 and 3-GP-22 in that it tells you nothing about the required icing inhibitor. You're not out of the woods yet, but at least things aren't getting any worse. Try pulling out your trusty "new type" GPH 205 and turn to the fuel legend.

Ah so! The book has been changed. It now uses the NATO symbols which, as we have already seen, are the only ones that tell the story about Fuel System Icing Inhibitor. Also, it equates the NATO codes to the most common commercial terms for each fuel, which is a handy thing when you stop to think that one of the times you're most likely to use the 205 is when you're at a civvie airport.

You now know that Jet-B is at least in your ball-park fuelwise, but how do you determine if it's NATO F-40 or F-45? There's only one way: Ask the truck driver. "Say Chief, does this Jet-B of yours contain an anti-icing additive?"

"No Sir, but we have it available as an additive."

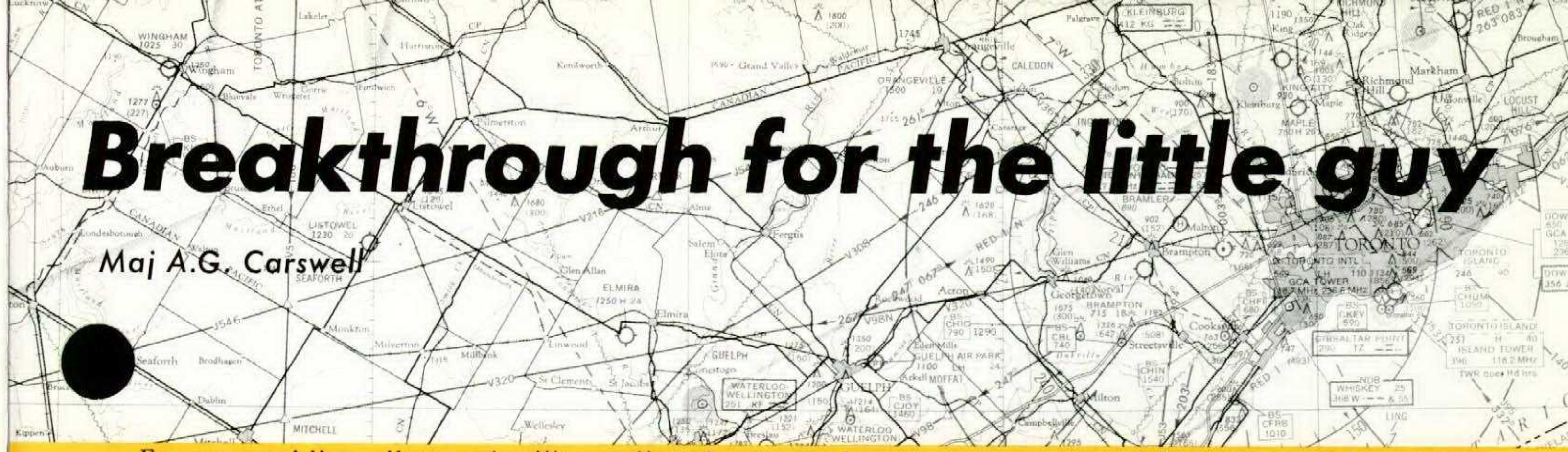
"Right, fill 'er up and chuck in the right amount of anti-icing."

After the Bird has been topped up you batten down the hatches and head for town, secure in the knowledge that skill and cunning have once again triumphed.

NEW FUEL LEGEND APPEARING IN GPH 205

80 NL	**- 80 non-leaded**
F-12	**- 80/87**
F-15	**- 91/96**
F-18	**- 100/130**
F-22	**- 115/145**
TX	**- Fuel type unknown**
JA	**- ASTM Jet-A**
F-30	**- Similar to ASTM Jet-A**
F-34	**- ASTM Jet-A1 (contains FSII*)**
F-35	**- ASTM Jet-A (no FSII)**
F-40	**- ASTM Jet-B (contains FSII) JP-4**
F-42	**- AVCAT-40**
F-45	**- ASTM Jet-B (no FSII)**

***FSII - Fuel System Icing Inhibitor**



Breakthrough for the little guy

Maj A.G. Carswell

For years airline pilots and military pilots have been complaining about the hazards created by light aircraft flitting about the skies near heavily populated areas. The "little guys" have naturally fought back, arguing that as taxpayers helping support the entire airways system, they have as much right as anyone to use the system and facilities. And they have a point.

However, the carnage goes on. Regularly, some large aircraft, letting down in his own established flight pattern, concentrating on the dials, performing pre-letdown checks, cockpit checks, pre-landing checks, and all the other checks necessary for the safe landing of a large aircraft, suddenly looks up to see a Cessna or Piper coming straight at him out of the blue. Occasionally the results are tragic, with the loss of many lives, and millions of dollars in aircraft and property. And the argument starts again. How to keep those light planes out of the way? How to keep VFR traffic away from IFR traffic.

Metropolitan Toronto is a good example of this problem, which is duplicated in any large city in North America. Regulations have been established which depict "VFR corridors" supposedly to channel VFR traffic around the city and away from heavy traffic. These regulations are tucked away in the centre of a thick book called "Class 2 NOTAMS" and have a nice little diagram showing the light-plane pilot where he should and should not be. Meanwhile, the average light plane pilot is approaching Toronto from Muskoka, or Montreal, and is busy peering at his World War 2, 1 in 500,000 scale TOPO trying to figure out where he is. As he arrives over the greater Toronto area he discovers that the topographic features, roads, rivers, and landmarks have all disappeared under a mass of lines, figures, frequencies, and shapes, which apparently indicate the airways structure. As a relatively inexperienced light-plane jockey, he may be eyeballing the ground, trying to sort out where Buttonville, King City, Brampton, Markham, or some other small airport is. He can't really remember where that VFR corridor is, it doesn't show on the map, and he naturally forgot to bring his thick volume of Class 2 NOTAMS along. Finally with DC8s, 707s and other assorted gigantic jets zipping around his ears, he suddenly realizes that he is on the centre of the main flight path into Toronto International Airport. He immediately does a panic turn and heads for a safer area.

The preceding story has an obvious moral. The giant jets and other leviathans of the sky have a dozen different methods of fixing their exact position at any point in time. But the poor benighted light-plane pilot has, in many cases only a map. And what a map! At his most critical point, Metropolitan Toronto, he gets lost because all his landmarks have been covered up by useless IFR information that no professional pilot would likely use. Naturally, the professional pilot carries airways charts containing all the proper frequencies, headings and airways information which are always up-to-date. The TOPO, is naturally a year or two old. So why all the IFR data? As we can see, the airlines pilot doesn't use it, and the VFR pilot can't.

Well, help is on the way. Ottawa agrees that the "little guy" has a problem and that if we want him to stay out of harm's way - which is OUT OF OUR WAY, we could at least give him a proper map, with all the corridors, airports, control zones, and flightways clearly marked. Other information and regulations which he needs could be put in the margin - in large print. The DND, DOT, and Dept of Mines and Resources are now co-operating on this project which will hopefully in the near future, give the little guy a fighting chance to stay away from big aeroplanes.

"So what!" you may say, "the real solution is to ground all the light planes, or make sure all light-plane pilots have a valid ATR". Not so. The light planes are here to stay, and their numbers are multiplying. Amateur pilots are a fact of life, and their numbers are also increasing at a phenomenal rate. What professional pilot wasn't an "amateur" at some stage in his career?

The door has been wedged open a little. We admit a responsibility for the little guy and suddenly realize that it is in our own interest to give him more information in order to keep him alive. And as a very important fringe benefit, keep ourselves healthy too.

The new VFR Area Chart for built-up Metropolitan areas will prove to be such a boon. Help is on the way for the little guy!

Capt Hinton, a native of Verdun P.Q., joined the RCAF in 1958. After pilot training at Centralia, Penhold and Portage, he graduated in 1960 and later in the year joined 430 Sqn at Gros Tenquin, France, flying the F86. Three years later he returned to Canada as a T33 flying instructor at Gimli. With the introduction of the Tutor in 1965 Capt Hinton became a Tutor instructor and in 1966 was selected for the Golden Centennaires aerobatic team based at Portage. When the team disbanded at the end of 1967, he remained at Portage as an instructor at the Flying Instructors School (CFFIS). In May 1970 he was transferred to the CFHQ Directorate of Mapping and Charting (Air).

Wx influences on bird migration

Articles on bird hazards to aircraft appearing from time to time in Flight Comment have indicated that the timing of the twice-yearly bird migrations is closely linked to weather factors. In this issue the influence of weather is outlined, showing how the acquired knowledge assists in the increasing accuracy of bird concentration forecasts being made available to pilots.

Dr V.E.F. Solman
Canadian Wildlife Service

Much of the information about bird migration that is available in literature is based on visual observation, either in daylight or by moon watching. In both cases, the birds that are observed are those that can be observed from the ground under the prevailing conditions of visibility. The only really effective tool for studying the details of bird migrations which could be encountered by aircraft in flight is radar.

Radar studies have been made in Canada on a continent-wide basis using as many as 18 radar stations. Continuous time-lapse 16 mm. motion picture photography of the plan position radar scopes is used to provide permanent records for study. One frame is exposed for each sweep of the radar antenna (six frames per minute). When projected at normal speed, the films compress the time scale by a factor of 240 times and simplify cataloguing of observations. The radar observations have shown that earlier data on bird migration times and patterns have been less than complete.

During either spring or autumn migration it is known that birds generally begin their migratory flight when conditions are favourable. Birds flying north in the spring and entering a southward-moving cold air mass usually stop moving north. If the condition is sufficiently severe, they may reverse their direction and move back southward.

"If that groundspeed doesn't pick up, we'll have to cancel out."

Radar films from many points in Canada indicate this reverse movement in the face of inclement weather. It appears that movement in favourable weather and back-tracking when the situation gets too bad may be the rule for many species in the northward migration rather than an exception as it used to be considered. Studies have shown that the major hazard to aviation caused by mass movements of birds from gull size upward, occurs in rather limited times and locations which can be forecast.

Much of the bird migration across Canada is in a general north-south direction whereas airline traffic is generally east-west. When the numbers are considered - tens of millions of ducks, about 5 million geese, 300,000 sandhill cranes, 100,000 swans, and millions of small birds moving across the civil and military air route twice each year - it becomes evident that the possibilities for collision are large during certain short intervals of time and in prescribed locations.

Keeping aircraft away from major bird migrations is not too different from keeping them away from thunderstorms, in that both are short-duration phenomena, potentially damaging to aircraft. Much time and effort go into forecasting the time, place, and duration of thunderstorms and into rerouting aircraft to avoid them. As bird hazard forecast techniques improve it is expected that bird hazard warnings will be similar in their value to thunderstorm warnings. Air traffic control can warn pilots of the bird migration hazard in the same way they vector aircraft around thunderstorms.

Experimental forecasts of high bird hazard situations have been made for military purposes. Even in the early stages, these studies have led to hazard situations being forecast with a good degree of accuracy.

Now enough detailed information is available to permit the correlation of migrations with weather patterns to make really good forecasts of high utility. Months of radar bird observations are being compared with the weather data from the same and adjacent areas.

Birds Check Met

One item on which more information is needed is the triggering mechanism which initiates waves of bird migration. For some species there are clues. It is known for instance, that a build-up occurs during October in James Bay of blue and lesser snow geese from nesting grounds farther north. Large groups of geese will leave the build-up area during a period of several weeks. Each movement will begin in late afternoon within 24 hours after the passage of a cold front at a time when the early hours of the migration movement can be carried on with a strong favourable wind and clear skies.

In other words, it is known that two of the four to seven cold fronts that pass through the southern end of James Bay in October of any year will initiate migrations of geese. Those geese will constitute a hazard to aircraft at altitudes between six and ten thousand feet over a 1700-mile route from James Bay to the Gulf of Mexico. The moving geese may occupy an area 100 miles long, 30 or 40 miles wide, and 2000 feet in depth flying in a southerly direction at a speed of 60 or 70 knots, depending on the strength of the tailwind. The problem is to determine which of the several cold fronts that go through the area during the critical period are the ones which trip the integrating mechanism in the geese and start their migration. For each cold front that passes without any action, the likelihood of migration on the next cold front is increased. Scientists believe further study will help them understand the triggering mechanisms, enabling them to issue a warning before the beginning. Once the geese are in the air, radar can be used to monitor their progress to provide warnings along their route about the likelihood of encountering a quarter of a million geese in any given part of the sky.

Because of limitations in distribution of radar height-finding equipment, knowledge of the altitude of migrants is not complete. Special radar techniques including Precision Approach Radar and portable vertically directed radar are being used to get information on bird heights to supplement the information from pilots. As studies continue, more of the fine details of weather effects on bird migration will be worked out. It's now possible with special arrangements for aircraft to avoid large groups of migrant birds.

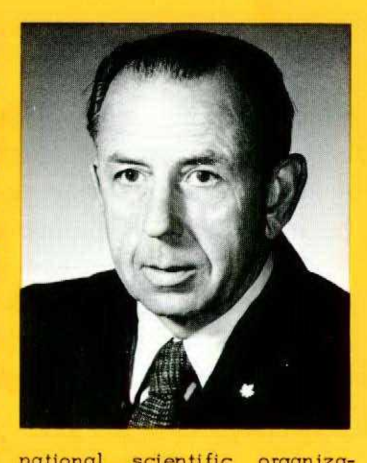
Some of the European studies including those which the Associate Committee on Bird Hazards to Aircraft initiated on behalf of the Canadian military units in Europe, have shown that local movements of birds from roosting areas to feeding areas may create a hazard as severe as that caused by major migrations. The mass movements of gulls from large feeding areas such as garbage dumps to resting areas is a case in point. In one case, that kind of movement occurred several times each day and took thousands of gulls across a flight route approaching a major aerodrome. There had been damaging gull strikes near that aerodrome which were difficult to understand until radar surveillance showed the type of bird movement and its regularity. Once the timing of bird movement was recognized, it was possible to schedule aircraft landings and takeoffs to avoid the major periods of gull traffic.

There are North American situations where gulls and even blackbirds pose a similar problem. The committee has studied some local bird movement patterns around airports, and recommended change to increase safety.

The technique of time-lapse photography of a radar scope is relatively simple and deserves to be more widely used, not only for bird surveillance but also for recording aircraft traffic patterns.

Long-decay-time radar presentations (becoming more common now) produce records for use by a dispatcher. They permit a check of the validity of forecasts of bird movement. That permits minute adjustments of aircraft traffic patterns to make use of the safe portions of the sky and to avoid those which are heavily cluttered with birds.

By using modern techniques heavy civilian and military air traffic can be directed through the same skies travelled by millions of birds with fewer damaging impacts than have caused loss of life and high costs in past years. For less than the multi-million dollar expenditure which is now required to repair aircraft damage, presently available radar is being used to save dollars and human life.



Dr Solman is a Ph.D graduate of the University of Toronto with long experience in the wildlife field. During the war years he was in charge of weather forecasting and meteorological training at the RAF Transport Command Training Base at North Bay. Shortly after the war he joined the Canadian Wildlife Service (CWS) where he was chief biologist 1949-52, Assistant Chief CWS 1952-62, Superintendent Eastern Region CWS 1962-64 and Staff Specialist Migratory Bird Habitat 1964-68. The author of more than 100 papers and reviews in the wildlife field, Dr Solman has experience in 10 foreign countries as a member of national and international scientific organizations. He is presently Staff Specialist Canada Land Inventory (Wildlife), CWS.

Flying gear spot check

It was decided to investigate the possibility of taking a crew from a landing aircraft and placing them in the bush for a few hours with the equipment they had on, and their seat packs.

- Flight Safety Committee

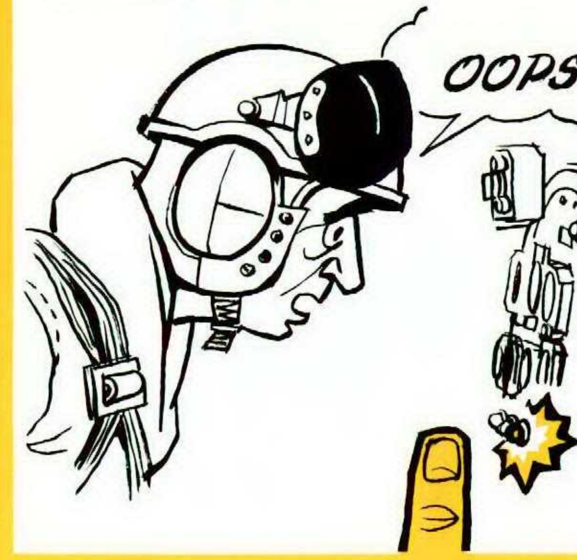
AIRSOP'S FABLE

The unfair fickle finger of flying fate

Maj S.O. Fritsch
DFS

When the unfair fickle finger of flying fate (UFFFF) appears on the scene it is normally incredibly smooth...

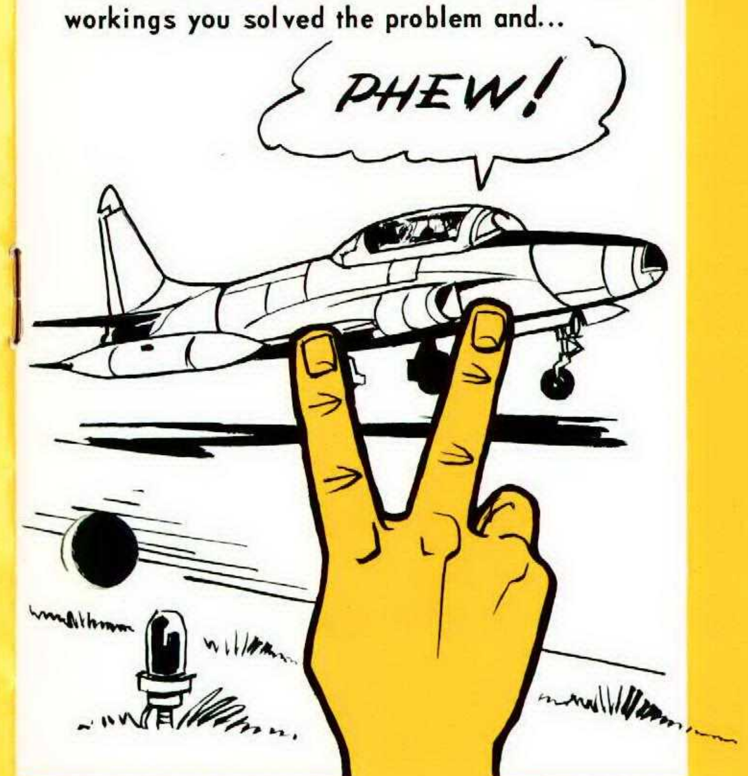
When an overheat light goes on, your brain knows very well that this is not too serious. But the opposite end won't reason - it puckers. The result of this conflict is that you are now a little less bright than normal. This is the dimness factor. However, no sweat - you throttle back.



Life is not fair. The amber light stays on and the "starter" light and the low fuel quantity lights also go on. (Hey, that's not in the book! Right you are - life is not fair.) Due to puckering you are now twice as stupid as normal - the double dimness factor! So now you have to do a standard drill by the book for "amber light on"...

...and use your knowledge of the aircraft to figure out the other ones. Your solution is called airmanship.

Thanks to sound knowledge of your kite's workings you solved the problem and...



MORAL:

OPEN BOOK EXAMS DO NOT PREPARE FOR QUICK SOLUTIONS IN THE AIR.

OR

IN THE BOOK YOU CANNOT READ ALL SOLUTIONS YOU WILL NEED.

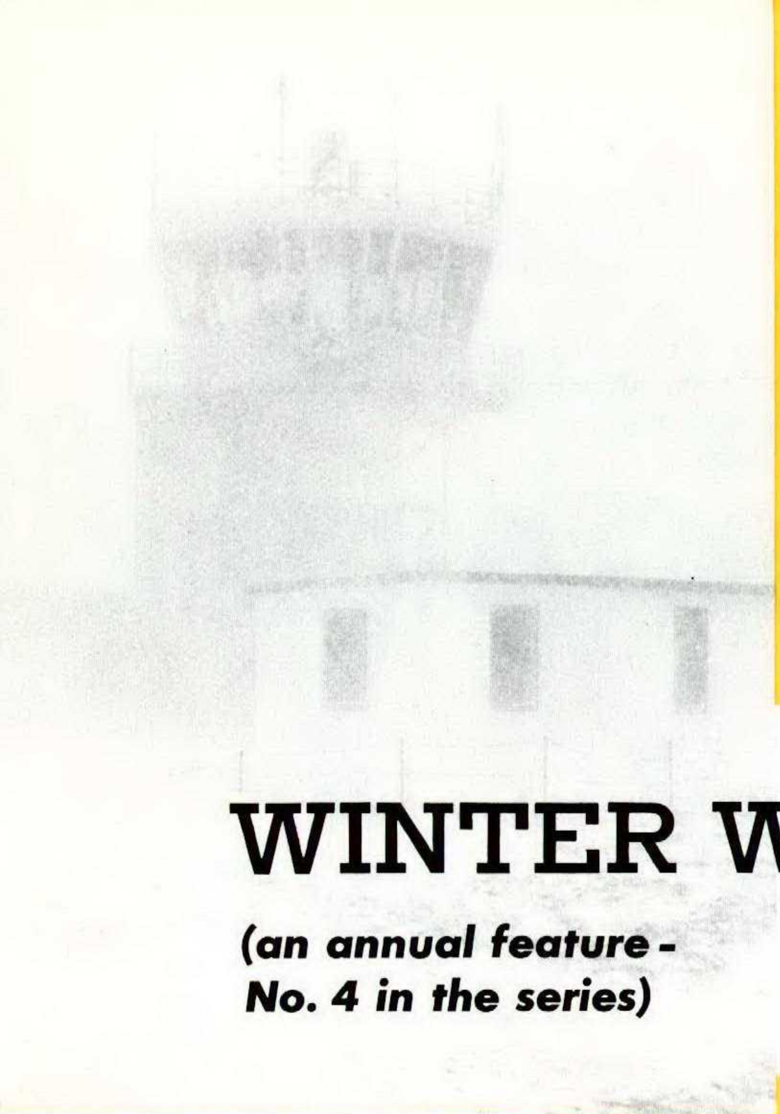
OR

FOR LESS PUCKERING IN FLIGHT KNOW PROCEDURES AND YOUR KITE.

OR

OF ONE THING YOU MAY BE SURE THE UFFFF HAS NO SIMPLE CURE.

P.S. The amber light went on because of a leaky tailpipe. The other two lights went on when an instrument grounding strap shorted a terminal block.



WINTER WOES

(an annual feature - No. 4 in the series)

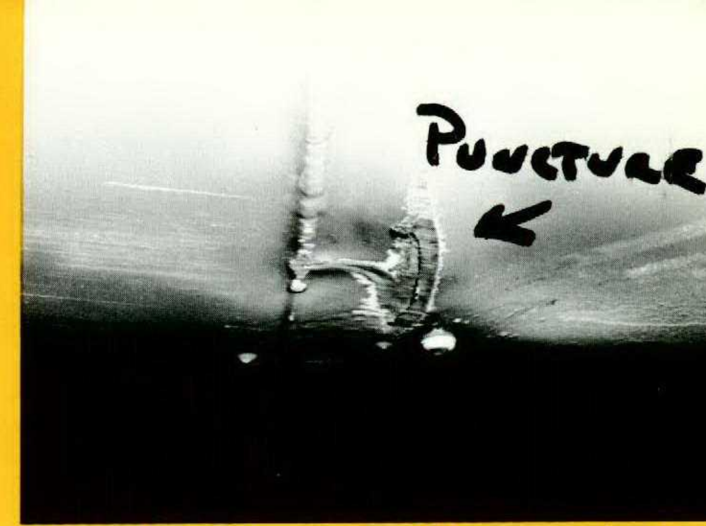
Winter hazards faced by aircraft operators in this northern country, again brought winter woes to pilots last year. The familiar scenes illustrated here remind us that we somehow manage to duplicate accidents of previous winters. A notable exception last winter was the absence of fatalities attributable to whiteout or pressing-on into snow showers - and that's good. Now is the time to review previous winters' operations; learning from the mistakes of others continues to be one of the best means of avoiding winter woes.

Last winter's record shows that...

- ★ Whiteout conditions continue to be a major hazard in winter operations
- ★ Exposure to extreme temperatures can lead to errors in judgement and personal injury
- ★ Completely effective ice chocks are a definite requirement
- ★ Personnel continue to take chances by not wearing adequate environmental clothing
- ★ When ice patches are present on runways, the danger of blowing a tire increases
- ★ Even private automobiles can get in the act - one attacked a T33.
- ★ For the second year in a row Otters avoided thin ice

	WINTER INCIDENTS		WINTER ACCIDENTS	
	68-69	69-70	68-69	69-70
SNOW ON INFIELD	0	3	2	0
RESTRICTED VISIBILITY - HEAVY SNOW AND WHITEOUT	1	1	2	2
SNOW/ICE/SLUSH - RUNWAYS TAXIWAYS AND RAMPS	[illegible]	9	0	1
ICING - AIRFRAME, ENGINE LANDING GEAR, FLIGHT CONTROLS AND INSTRUMENTS	10	12	2	1

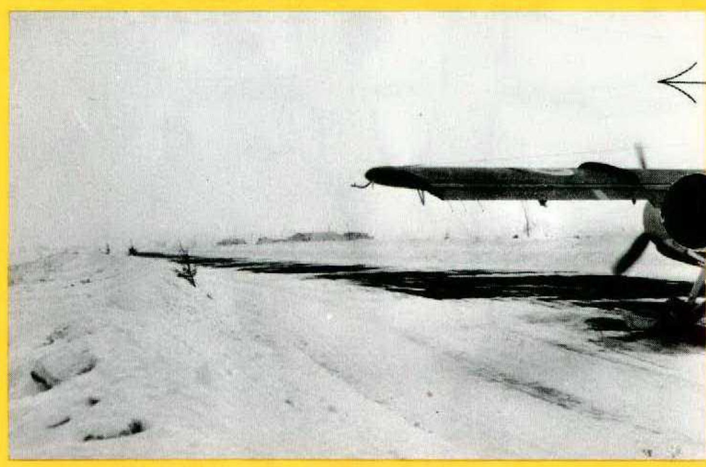
After a rain-saturated RON, the flight to colder climes ended with a maingear uplock jammed by ice.



T33 tiptank ruptured on contact with runway as the pilot struggled with the combined landing hazards of whiteout, windscreen icing and strong crosswinds.

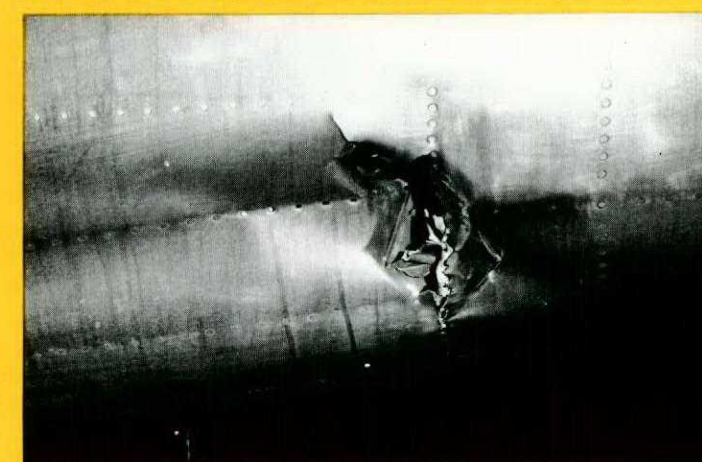
Snowbank encounter on the ground provided airborne surprise for an L19 pilot when he checked his "six o'clock".

Pilot's failure to correct swing resulted in Otter climbing a snowbank along the narrow runway and damaging a wingtip on the runway surface.



Whiteout over frozen lake led to Otter heavy landing.

While attempting to back over a snow ridge, an airman lost control of his car and crashed into a parked T33.



Meet QETE

DFS investigators learned early in the game never to pre-judge any aspect of an occurrence. A continuing need therefore exists to support them with specialized test facilities and competent professional advice. This assistance has been most capably provided over the years by an "in house" agency which has operated under several names. Now known as the Quality Engineering Test Establishment (QETE), it has previously been called the "Quality Control Lab", the "RCAF Materiel Lab" and the "Quality Assurance Laboratory".

QETE comes under the CTS (Chief of Technical Services) branch of CFHQ as a field unit "lodger" to CFB Rockcliffe; it is located in spacious, air-conditioned laboratory accommodation within the Canadian Government Printing Bureau (CGPB) Building in Hull, PQ. QETE Superintendent is Mr Cec Sager.

Mr Cec Sager, QETE Superintendent

Competent technical and professional capability cannot be developed over night. QETE is fortunate in this respect for, with a majority of its staff being permanent public servants, many of them from the former Inspection Services organization, it has established a complement of civilian personnel with many years' experience in investigating failures. Additionally a small military staff of technical officers and senior NCOs ably provides the necessary field "know-how" and familiarity with aircraft and their systems.

This impressive grouping of professional talents embraces most of the technical disciplines, and is supported by a complex array of test equipment. In this way, evidence not readily interpreted at the scene of an occurrence can be sent to QETE, where DFS and QETE investigators plan an approach which will reveal all details of the present condition of a component or system - as well as how that condition was produced.

For example, in any aircraft accident where the cause is not self-evident, the flight control system and powerplants are usually prime suspects. These highly complex mechanisms are sensitive to contamination, particularly in their fluids. QETE's Chemical Laboratories are capable of identifying any contamination in fuel, oil, hydraulic or oxygen systems in terms of amount, size, kind and possible source. This permits DFS to interpret whether the contamination was a factor in the accident and, if so, indicates the measures required to prevent recurrence. Similarly, although FOD is a frequent cause of jet engine failures, a foreign object that has gone through an engine is usually so disfigured that much sleuthing is required to establish its origin. Again QETE assists; if that object is metallic, the combined efforts of their Metallurgical and Chemical Laboratories are used to analyze and identify its features. If the FOD is organic - such as bird ingestion or cloth - there is usually little left but blood and flesh smears, or only ash. But even then, QETE staff working with DFS investigators have developed a technique to reclaim the evidence and make an analysis.

There are many examples of such co-operation - indeed, it is a daily affair. For instance, DFS investigators are frequently confronted by the "chicken-or-egg-first" problem. A recent case involved a wheel and tire failure where analysis was necessary to eliminate the possibility of pilot or maintenance error and to assess the initiating cause. QETE Chemical (Rubber) Laboratories were able to show that the tube had "thinned" and aged to a dangerous degree, while damage to the failed tire was caused when it rolled flat on a damaged wheel. Metallurgical analysis indicated that the wheel material met specifications and that the fracture mode was sudden - possibly caused by the flattened tire and tube "bundling" in the wheel rim.

Of course, despite their ingenuity and versatility, QETE does not have the capability to respond to every request by puzzled DFS investigators. However, they are usually able to find assistance through their working relationship with laboratory staffs of other federal departments. Such co-operation extends QETE's effective capabilities to include allied disciplines for which there is only occasional need. To illustrate, a recent series of failures were determined by the QETE Metallurgical Laboratories to have been caused by fatigue in an aircraft component that was in short supply. However, QETE facilities could go no farther, so QETE engineers worked with the electron fractographic analysis experts and equipment of the National Aeronautical Establishment to predict the safe number of loading cycles the components could endure. This permitted maximum safe utilization of the components pending development of a "fix".

That's a capsule picture of the part QETE plays in assisting DFS. In future issues we intend to focus on each of QETE's laboratories in detail.

An FSO Speaks

Maj W. J. Hutchinson
BFSO, CFB Edmonton

no requirement for an FSO?

"Safety should be a part of everything that is taught not set aside to be looked upon as a separate event. Accident prevention meetings should be discontinued and these lessons interwoven within the outline of procedure training or other pilot discussions. That's where I learned my respect for safety and safe procedures."

"I don't really believe a true professional has to think "safety"! His philosophy about safety is that it is ingrained in everything he does."

These two quotes are from an interview in the MAC Flyer with LCOL Albertazzie, the Presidential Aircraft Commander. Having just returned from a very small detachment which operated under fairly demanding conditions without an FSO, without a flight safety notice board and without an accident, I found his remarks interesting. On a specialized unit, particularly a small one, the importance of each individual's effort becomes obvious and the individual sense of responsibility becomes highly developed which leads to plenty of spontaneous discussion, a professional approach to the job and a built-in flight safety program.

Of course, the larger the unit and the more diversified its task the harder it is to maintain this attitude because of the almost inevitable breakdown in communication and the lack of adequate information. I think that LCOL Albertazzie's remarks are probably only applicable under special circumstances, but his point is well taken, in that nothing can substitute for professionalism on the part of the individual.

If your job is connected with flying in any way, then flight safety should be ingrained in everything you do. You may never be able to get rid of the flight safety organization but please try your best. Speaking as an FSO, I for one would like to be redundant.

Maj Hutchinson joined the RCAF in 1951. After Wings graduation he was transferred to 426 Sqn at Lachine on North Stars. This was followed by an instructing tour at 3 FTS, Claresholm, on Harvards and Expeditors, and a tour as UFSO and UICP with 424(AUX) Sqn at Hamilton on Expeditors. In 1960 he was transferred to 435 Sqn at Namao where he was UICP on Dakotas and Hercules. In 1966 he was posted to the Aircrew Standards Unit at Trenton, flying Otters, Dakotas and Hercules, before being posted in 1969 to 424 Sqn Detachment (Caribous) UN Military Observer Groups in India and Pakistan. In April 1970 he became BFSO at CFB Edmonton.

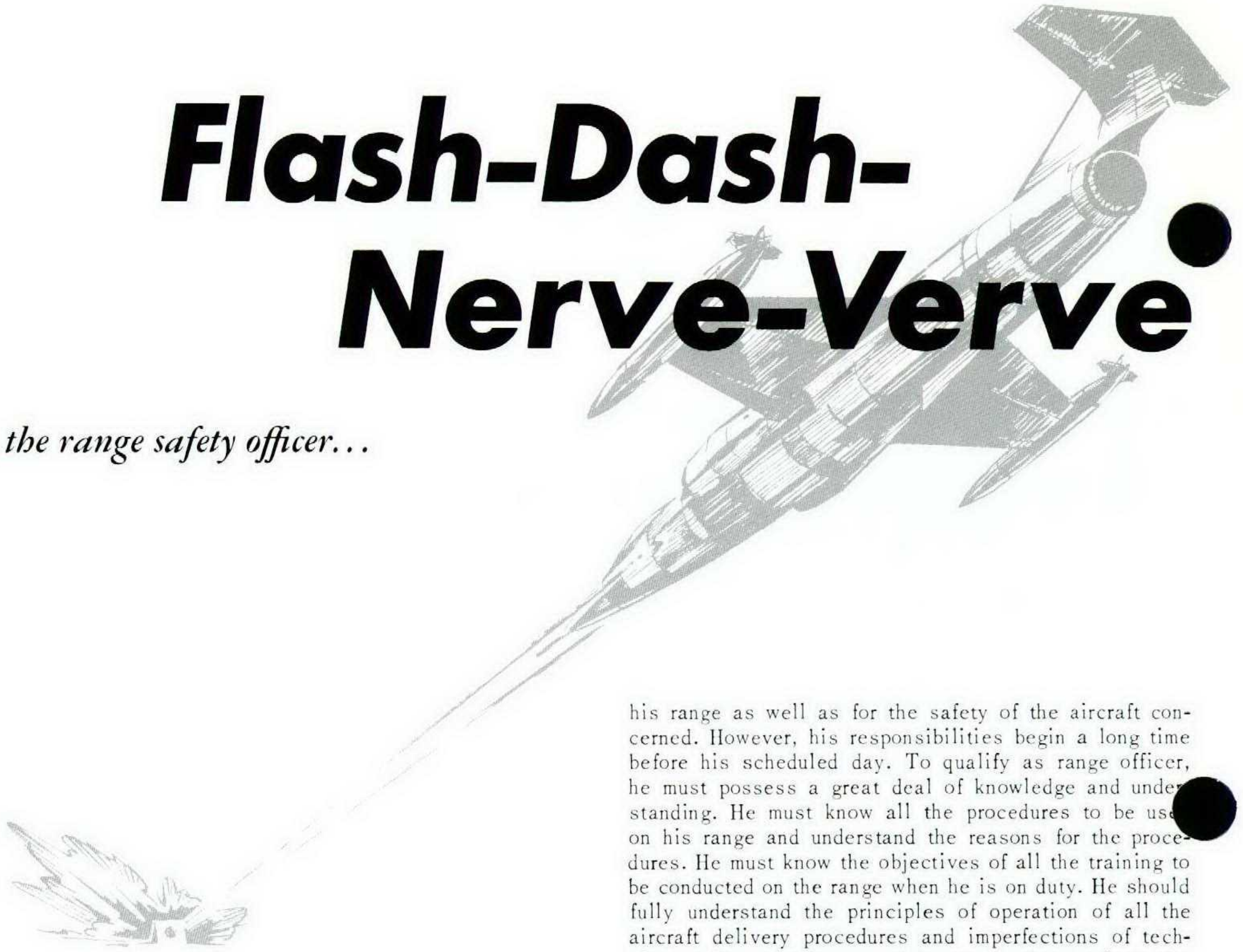
20,000 Letdowns

Capt Marcel Braun of CFB Bagotville reached a milestone recently when he handled Air Canada's Flight 380; it was his 20,000th radar controlled approach. A terminal controller in the Bagotville RATCON, Capt Braun is a radar veteran of 19 years, having previously been at Trenton, Summerside, Fort Nelson, Centralia, Ottawa, Marville, Cold Lake and North Bay.

Flight 380 Captain, A. Vance, congratulating Capt Braun.

Flash-Dash-Nerve-Verve

the range safety officer...



Not too long ago, whenever fighter pilots congregated, the old heroes, the glory and the excitement of F86 days were relived with vivid descriptions of the unforgettable hassles that took place somewhere over Europe. The stories were the inspiration of many a young pilot.

As the training on conventional weapons increases in the Canadian Forces and fighter pilots are once again required, experience gaps appear. One such gap is evident on the air-to-ground controlled range. Here fighter pilots dream of the perfect trip. They visualize scores that would have made the legendary William Tell proud. But, alas, they sometimes have to resort to elaborate excuses when unable to attain their aspirations.

On occasions when they do have that big trip however, they sometimes, in their personal elation, disregard a person who can contribute heavily to their success if he has insight and proper motivation. This is the often overlooked, sometimes misguided and seldom appreciated Range Officer on a controlled air-to-ground range. Just what is his role in the training process? How can he help to improve the techniques of others? What can he do to improve pilot's accuracy?

The governing regulation holds the Range Officer responsible for the professional conduct of flights within his range as well as for the safety of the aircraft concerned. However, his responsibilities begin a long time before his scheduled day. To qualify as range officer, he must possess a great deal of knowledge and understanding. He must know all the procedures to be used on his range and understand the reasons for the procedures. He must know the objectives of all the training to be conducted on the range when he is on duty. He should fully understand the principles of operation of all the aircraft delivery procedures and imperfections of techniques. He must know and be prepared to enforce the published standard procedures for operation of the range and for the delivery aircraft. His capacity for helping the participants is greatly improved if the Range Officer knows the degree of proficiency of each pilot scheduled for the range when he is on duty. If he is aware of deficiencies in a pilot's ability he is then prepared and qualified to give extra assistance and supervision in these areas. Regardless of the level of proficiency, however, if a Range Officer sees less than perfection in the techniques or procedures used on the range, he should so inform the pilot.

The Range Officer should arrive for duty in time to: (1) have the range fully operable, (2) assure himself that support personnel are qualified and ready for duty. Although he is responsible for supervision of the entire range complex and support personnel for his tour of duty, his primary attention must always be given to the procedures, techniques and safety of the aircraft. Therefore, prior to the first mission, he should determine what "state of the art" his support personnel have attained and, if possible, provide guidance that will enhance the day's operation. For instance, timely and accurate information on dive bombing impacts must be transmitted to the delivery pilot as soon as possible after bomb impact. If this information is delayed, or is inaccurate, the pilot's attitude deteriorates and his effectiveness is impaired. Therefore, for this specific instance, if an airman in a slave tower is newly assigned, or is only partially effective in his position, ensure that a fully-trained, capable person accompanies him in the tower to provide on-the-job training while the mission continues. The value of each mission cannot be overemphasized; therefore, inadequately trained personnel cannot be allowed to adversely affect the accuracy of impacts and thus cause degradation of overall training effectiveness. (3) Ensure that the communication and safety equipment is operable, and that safe operating conditions exist. For instance, the ricochet problem periodically occurs, and consequently, the impact area surrounding the strafe targets must be constantly inspected and frequently "policed".

Many Range Officers feel that comments made on the air, while a mission is in progress, create an undue distraction. This is true to a degree, however, it is important that brief concise comments be made where appropriate during and after each pass. Many times, a pilot will get a good hit on a skip bomb target from a diving or climbing pass, and a brief comment of "skip hit" does not properly reflect the total effectiveness of that pass. The Range Officer can do much to increase the pilot's confidence and repeatability by a brief statement illustrating, for example, that his altitude at release was high but that his aircraft was in a slight dive at the time of release. In another instance, the same accurate impact may have been achieved from a pass which was low and with the aircraft climbing at release. Comments such as: "nice pass", "nice hit", or "lucky shot", should be critically analyzed and a few short, concise remarks should be transmitted to the delivery pilot as soon as possible. If this is an established procedure within your unit, these constructive remarks are accepted without rancor - and are appreciated. Unless there is positive communication, or "feedback", between flight leader, members of the flight and the Range Officer, the individual members of the flight can only realize a portion of the success that might otherwise be gained through a common understanding by everyone concerned. The critique by the Range Officer must be impartial and correct and full consideration must be given to his remarks in the flight debriefing.

In making his analysis, the Range Officer must monitor very closely from the time each aircraft turns onto the base leg until completion of the recovery manoeuvre. On the base leg some appropriate considerations are:

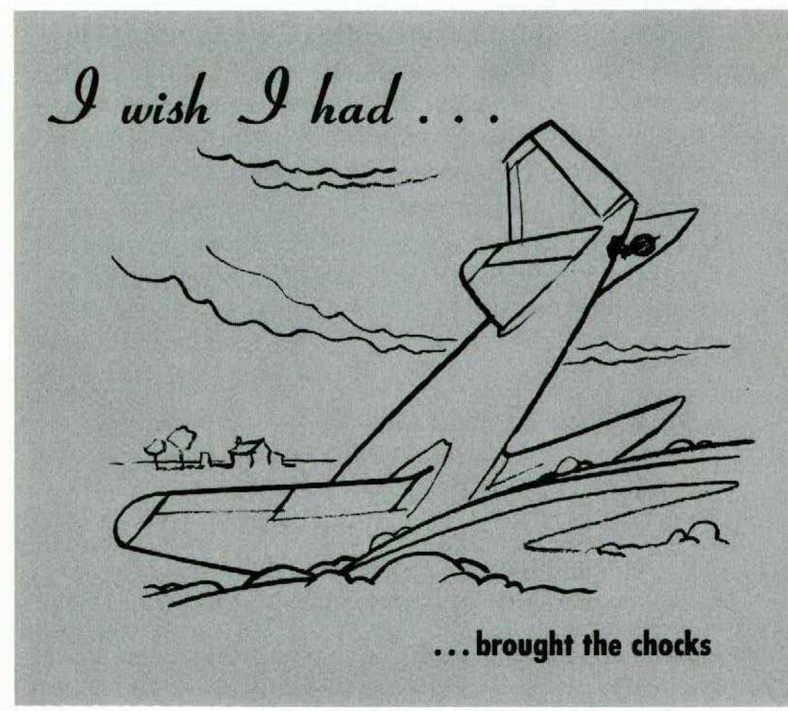
- Did the pilot establish his base leg in a position appropriate to existing cross-wind conditions?
- Has he established a consistent manoeuvre for "rolling in" on the target?
- Does the roll-in allow him enough time to establish a proper dive angle and an accurate approach to the target?
- Does it differ from the recognized best-approach to the training target.

The recovery or escape manoeuvre is very important. Ensure that the pilot maintains safe separation distance and effects a normal recovery from dive bomb or rocket type manoeuvres. For strafing, enforce the requirement for firing from a proper dive angle and slant range while maintaining vigilance to avoid improper recovery. The recommended dive angles, minimum slant ranges and altitudes for strafing passes do not automatically preclude ricochets - a rapid smooth recovery must be made after firing. A proper comment following a strafing pass might be: "Proper pattern, 10° dive angle, fired from 2000' to 1600', concentrated burst on target." The pilot then knows that he not only had a good burst on target but that he accurately estimated his dive angle and firing ranges, and that he was in the "groove". Since pilots often feel that the proper dive angle is too steep, it is sometimes necessary to realign the "feel for the groove" by reassurance from an observer.

Pilots respect a professional critique from a competent Range Officer. It's a natural human desire to improve, and appropriate comments are means to that end. If, on the other hand, slighting or sarcastic comments are made, the enthusiasm and effectiveness of individual pilots will almost always be impaired.

Air-to-ground weaponry is one of the most enjoyable phases in flying, but is a deadly serious game. The objective of the mission is to destroy targets not to frighten with near misses. With the help of a competent Range Officer and proper briefings all pilots should quickly establish repeatability and develop the ability to recognize the desired cones of delivery by using familiar references on the air-to-ground range. Once this has been accomplished, the law of diminishing returns takes over and individual fighter pilots may, with suitable gestures and emotional comments tell other pilots the story of their perfect trip.

adapted from USAF Fighter Weapons Newsletter



On the Dials

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

Criteria for Instrument Approach Procedures Part II

In our Jul/Aug article, we presented Part One of "Criteria" based upon GPH 209 "Manual of Criteria for Instrument Approach Procedures". In this issue we will expand the topics that were introduced.

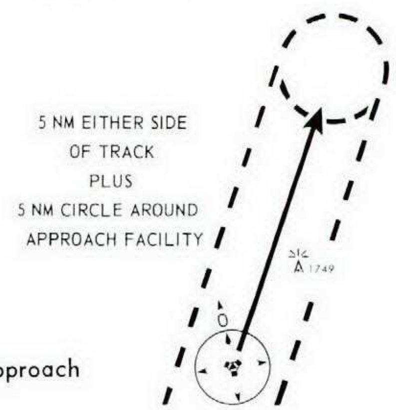
Reviewing briefly, we discussed approach procedure identification, aircraft characteristics, temperature effect and the units of measurement employed in the makeup of an instrument approach procedure. Approach procedures are composed of up to four individual segments:

- Initial Approach
- Intermediate Approach
- Final Approach
- Missed Approach

Let us examine the first three of these segments.

Initial Approach

Initial approach is that part of an instrument approach procedure consisting of the first approach to the first navigational facility associated with the procedure, or to a predetermined fix. The requirement to designate and publish initial approaches is governed by traffic flow volume. In a radar-controlled environment, for example, the controllers are provided with a variety of computed initial approaches for radar vectoring. These tracks are not shown on instrument approach charts.



Initial Approach

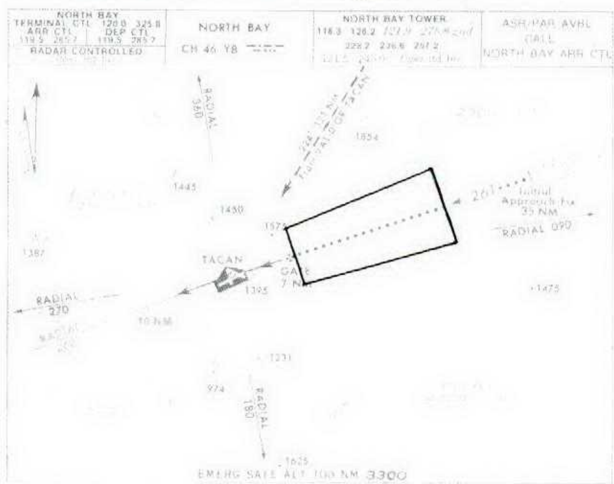
The initial approach encompasses an area extending 5NM each side of the designated track, plus a circle of 5NM radius centered on the facility or fix. A minimum clearance of 1000 feet is provided over the highest obstacle within the initial approach area, and the altitude is then rounded off to the next higher increment of 100 feet. It is never lower than the altitude for the intermediate approach. When no initial approach track is designated, the minimum sector altitudes apply for transition.

Intermediate Approach

During this approach segment the aircraft configuration, speed and position are adjusted in preparation for the final approach.

Along a Track or Radial

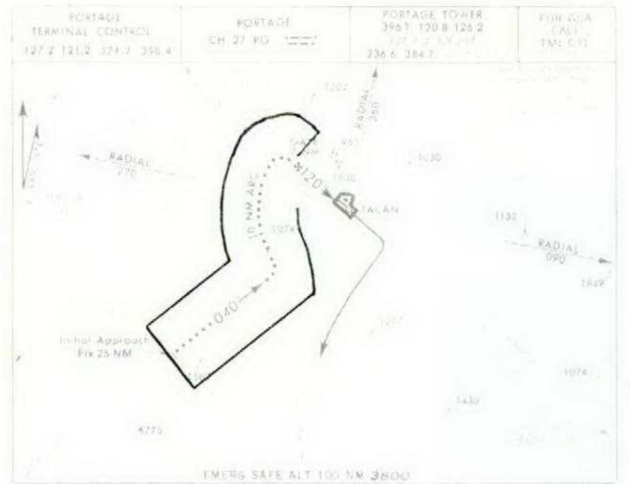
In this case the intermediate approach starts over a navigation facility or positive fix which identifies the start of descent, and aligns the aircraft with the final approach track. The area dimensions are 5NM either side of track at the starting point tapering uniformly to join with the lateral boundaries of the final approach area. The maximum required rate of descent is 250 feet per mile except for high altitude jet procedures where the maximum is 1000 feet per mile.



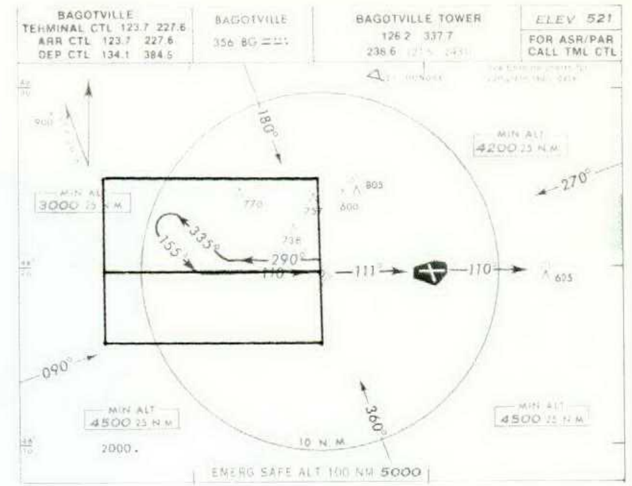
Intermediate Approach

Around a DME Arc

The DME arc selected for an intermediate approach should not have a radius greater than 30NM. Minimum radius is 7NM for low altitude procedures and 15NM for high altitude procedures. The area dimension is 5NM either side of the arc with the same descent gradient as the straight intermediate approach.



Intermediate Approach



Low Altitude Procedure Turn

Low Altitude Procedure Turn

When a low altitude turn is published the following information must be shown:

- the outbound/inbound tracks;
- the side upon which the procedure turn is to be performed; and
- the distance within which the turn is to be completed.

The area size is rectangular in shape and is based on a maximum TAS of 150K and one minute outbound flight from overhead the facility, prior to starting the turn. Variations to these parameters must be thoroughly explained on the approach chart, and the area length is increased in direct proportion to the TAS or by 3.5NM for each additional minute of outbound flight.

		ILS	VOR, NDBs, RNG
Length	*- measured along track from facility.*	*8.5NM*	*12NM*
Width	*- on procedure side.*	*5NM*	*5NM*
Width	*- on non-turn side.*	*3NM*	*4NM*

A minimum clearance of 1000 feet is always provided over the highest obstacle in any intermediate approach area, rounded off to the next higher increment of 100 feet. The altitude selected for an intermediate approach is never lower than the initial altitude of the final approach. This obstacle clearance altitude applies to both high and low altitude procedures.

Final Approach

Due to the many navigational aids which are used for final approaches, we will only discuss some basic considerations of the final approach. A later "ON THE DIALS" article will examine each type of approach and the missed approach.

Depending on circumstances, a final approach is designated as either straight-in to a runway or circling to an aerodrome. Positive track guidance is provided throughout the final approach.

Area dimension and obstacle clearance are governed by the type of navigation aid and the distance of the aid from the aerodrome. In all cases the final approach area terminates at the Missed Approach Point (MAP).

Any VOR, RNG or NDB located within 2NM of any portion of the usable landing surface is not considered acceptable for the designation of straight-in limits. This because these aids provide only azimuth guidance and the descent to minima must be completed with reference to elapsed time which relates back to the first passage overhead the aid.

An acceptable straight-in final approach is designated where the angle of convergence between the final approach track and the extended runway centreline does not exceed 30 degrees.

Circling Approach

The published circling limits for an approach are based on the highest category of aircraft which will normally perform that approach. Wherever the terrain has prominent obstacles located within a sector of the circling approach area, the limitation is thoroughly identified and depicted on the approach chart.

Examples: ▸No circling north of aerodrome
▸No circling southwest of Rwy 12/30

cont'd on page 24

Gen from Two-Ten

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

BUFFALO, BRAKE FIRE The aircraft was on a pilot training flight practicing takeoffs, landings and emergencies on a 4000-foot civilian field. After the first landing using reverse thrust to stop, the pilot turned 180 degrees and returned to the button.

At 40-50 knots on the takeoff roll the instructor chopped the power on the starboard engine to simulate a rejected takeoff (RTO). The pilot at the controls went through his emergency procedure and had the aircraft stopped with a third of the runway to spare. Again he back-tracked to the button.

On the second takeoff roll the instructor once more cut the power and the abort procedure was repeated. This time, as the pilot began his one-eighty, a loud bang startled the crew; both starboard tires had blown and the brake assembly was burning furiously. The instructor's decision to carry out two successive rejected takeoffs allowed insufficient cooling time between the periods of brake use. The brake assembly had begun disintegrating on the second one, dropping fragments as far as 300 feet back along the runway.

The instructor immediately advised the tower, requested fire fighting equipment and shut down. Then the crew evacuated the aircraft, but having no dry chemical fire extinguisher on board (a UCR submitted in Feb 69 was *still* being processed), they could only stand by and watch - *and wait;* the local civilian fire team took approximately ten minutes to reach the scene.

Following this accident CH[illegible] directed that on future Buffalo training flights:

- Rejected takeoffs (RTO) be limited to one per mission.
- Runway length must be 7000 feet or greater for practice RTOs.
- Brakes not be used until the aircraft has slowed to normal taxi speed.
- If a brake overheat is suspected, the brakes must be given a 1-hour cooling period and inspected for damage before further operation.

In addition, Buffalo aircraft have been prohibited from flying unless modified to carry a dry chemical fire extinguisher.

OTTER, INADEQUATE LUBRICATION An Otter was flying a photo mission in Northeastern Ontario. After approximately 4½ hours the oil pressure began fluctuating between 30 and 50 PSI (minimum cruise is 50 PSI). After declaring an emergency, the Captain landed safely at North Bay about 15 minutes later. No oil showed on the dipstick when it was pulled and nine gallons were required to top up the system (capacity is 10¼ gallons of which 9 are usable).

The pilot then did an engine runup and having found no obvious sign of an oil leak decided to do an *airtest.* After the tower controller reported heavy black smoke from the exhaust on takeoff and during a fly-past at cruise setting, the pilot landed and put the aircraft u/s. Later a second unit pilot performed another engine runup to confirm that it was unserviceable. At high power settings heavy black smoke again provided the confirmation.

A more detailed examination of the engine revealed that the front spark plugs and the engine induction system were coated with oil, the result of a leaking seal between the main crankcase and supercharger case.

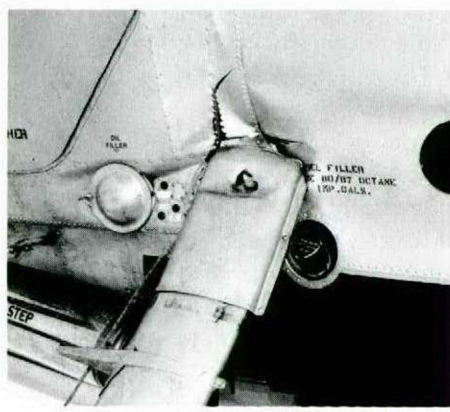
The accident potential in flying an aircraft which has possibly sustained engine damage through inadequate lubrication is clear. Pilots have been reminded that when there is any doubt as to the serviceability of an aircraft, technical advice is to be obtained before any flight tests.

OTTER, HEAVY LANDING The pilot encountered whiteout conditions when he arrived to pick up a search party from a frozen lake. After reviewing the situation he decided that he would have to use a modified whiteout landing technique to get his aircraft safely onto the relatively short lake.

The standard procedure is to begin the descent from 200 feet AGL using climb flaps and adjusting the power to maintain a 200-FPM rate of descent. Flying the modified procedure, the pilot approached visually to tree-top level at 65-70K with power off. In this way he hoped to keep ground coverage to a minimum during the initial approach and ensure adequate room to apply the whiteout technique from approximately the height of the surrounding trees.

When he raised the nose at 50-75 feet and applied some power, he found that it was not enough to check the excessive rate of descent. His reaction was to raise the nose further, and the next thing he knew, he had a stalled aircraft. At this point he applied additional power, hoping to cushion the descent through the last few feet. (Dropping the nose for a normal stall recovery he felt would risk digging the ski tips into the snow.) The distance to the lake surface turned out to be considerably greater than a few feet, a fact shortly confirmed by the jolt of a heavy landing on the left ski, resulting in B category damage.

This accident demonstrates once again that the Otter, while considered to be a relatively easy aircraft to fly under normal circumstances, continues to trap unwary pilots, without respect for their experience, when conditions are less than ideal.



VOODOO, STATIC ELECTRICITY FIRE When scrambled on an exercise, the pilot was unable to start the left engine and quickly summoned technicians to change the starter. As the fuel line was disconnected from the starter, a fire suddenly broke out which quickly enveloped the starter and spread to fuel on the tarmac. Prompt action by the maintenance crew prevented any damage to the aircraft, however a technician received minor hand burns.

The engine master switch had been selected off prior to the fire and no tools were being used; working against time, the crew had not however, grounded the aircraft for this "quick fix".

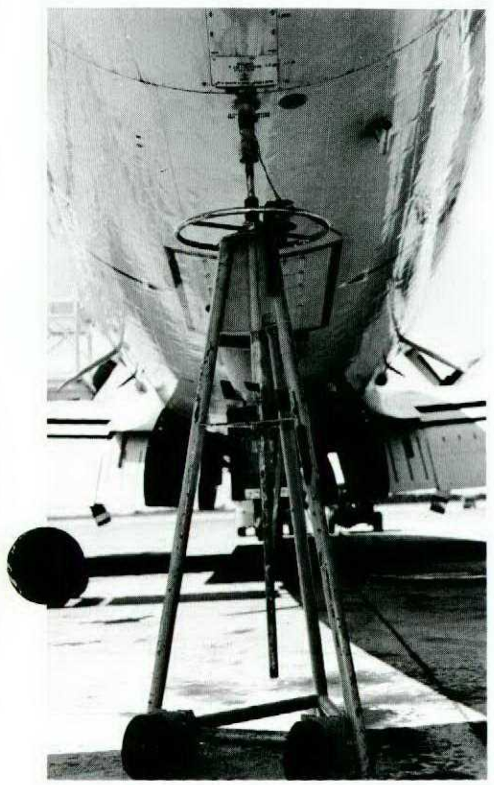
The apparent source of the fire was static electricity, created by the combination of an *unauthorized civilian windbreaker,* high in synthetic material content, being worn by the technician removing the fuel line, and a humidity reading of 26 per cent - unusually low for May.

In spite of the well-known static electricity hazards associated with synthetic garments, the technician's supervisors apparently were unconcerned; he had worn it on previous occasions while performing the same task.

FALCON, HARD LANDING During a local training flight, a hard landing occurred on a touch-and-go with simulated runaway nose-down trim. Tower controllers reported to the crew that they had seen pieces fall from the aircraft when it struck the runway and subsequently a formating Yukon crew identified the damage as a fractured oleo strut on the starboard landing gear.

Runway foaming was requested and the aircraft landed safely, coming to rest between the runway and parallel taxiway.

This accident illustrates the fact that unrealistic and dangerous flight situations can unwittingly be introduced by emergency training practices which presuppose the failure of both a primary and a backup system. Accidents have happened during emergency practice with alarming frequency in recent months.



correctly positioned tail-steady

ARGUS, SEE-SAW As is usual on Armed Forces Day, aircraft on static display were very popular with the visitors. In fact, one Argus was so full of rubbernecks that it moved up and down - due to nose oleo compression - as the visitors moved fore and aft.

Some time later, it was discovered that the tail steady *had been improperly positioned,* and had punched a gaping hole, four inches forward of the mating socket.

Crews have since been briefed to ensure the proper installation of this assembly in the future.

DFS staff change

Recently we said goodbye to Capt GH Collison of the Education and Analysis section of DFS, on his retirement. His replacement, Capt RL Chercoe, brings 12 years pilot experience to DFS, having formerly been on 427 Sabre Sqn, an instructor on Harvards and Tutors at Moose Jaw, a CF104 pilot on 439 Sqn, and most recently BFSO at Lahr.

Capt Collision (left) and Maj JG Joy, head of the Education and Analysis section.

Col RD Schultz, Director of Flight Safety, welcomes Capt Chercoe.

Comments to the editor

Pine Trees and Whiteout

In reviewing your Nov/Dec 69 issue I note the many common winter problems which we inevitably have to re-learn each year. In particular the article, "Snow Illusions" caught my interest.

With modernization we have experienced a subtle change in the use of a very functional item for combatting snow illusions. I speak of the small pine trees which used to line our runways to assist our depth perception under whiteout conditions. Look for them next time you land somewhere - you'll be surprised how few airfields still use them. They are disappearing, obstensibly no longer required. The change apparently went something like this:

Initially used only for depth perception, the trees did double duty with the advent of runway lighting, serving as markers to prevent the lights from being pulverized by snow clearing equipment. Then some enterprising individual developed a re-usable plastic marker for the lights (cost effectiveness). The trees, no longer needed as light markers, were discarded, their original purpose having been lost in the shuffle.

As winter approaches, and we re-learn how to operate under winter conditions, I suggest that everyone responsible for the maintenance of airfields be reminded of the invaluable assist given by trees in whiteout conditions.

LCOL C.L. Viger
CFB Bagotville

Agreed, providing that the tree size conforms to regulations.

STBT-B FOD-Gobbler

This odd looking piece of machinery is known as the "SYNCHRONIZED TRANSITIONAL BIFURCATED TIME-PHASE FOD-GOBBLER". When not FOD-gobbling, it serves as the cabin pressure regulator in the CF101. Unfortunately, after it has gobbled FOD it no longer regulates.

The aircraft that housed this particular "FOD-gobbler" had three successive write-ups for cockpit pressurization problems; NIL WRITE-UPS FOR COCKPIT FOD.

Maintenance Research is working on a model that will eliminate the TIME-PHASING and allow the apparatus to gobble and pressurize at the same time.

cont'd from page 21

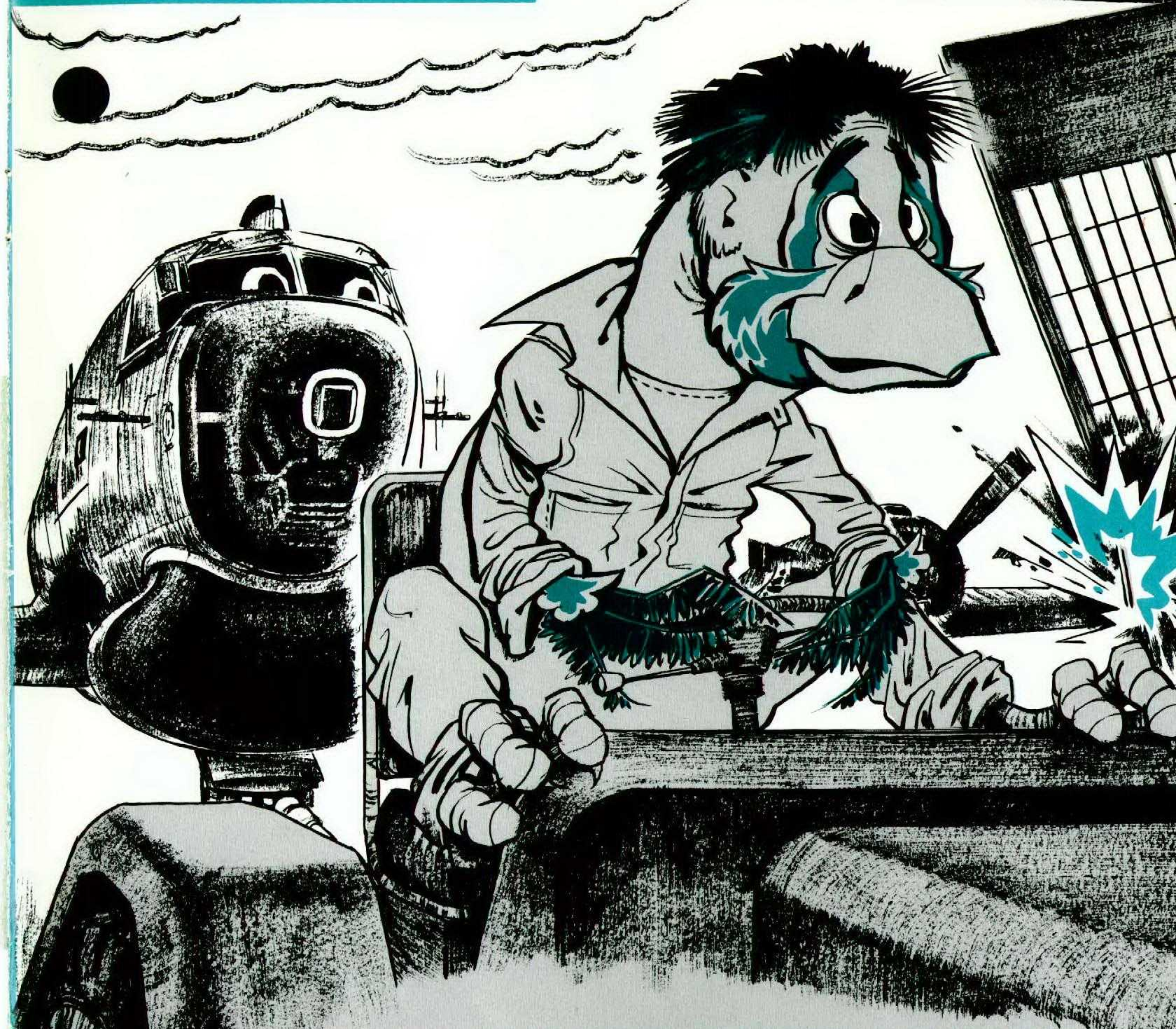
When no runway satisfies the straight-in requirement the circling approach final track is normally aligned on the centre of the landing area.

Area dimensions for circling approaches are determined by an arc which depends on aircraft category. The arc is drawn from the centre of the threshold of each usable runway. Fig b. The following table illustrates the area, obstacle clearance and visibility required for each aircraft category:

AIRCRAFT CATEGORY	ARC RADIUS	OBSTACLE CLEARANCE	MINIMUM VISIBILITY
A	1.3NM	300'	1
B	1.5NM	350'	1
C	1.7NM	400'	1½
D	2.3NM	450'	2
E	4.5NM	500'	2

The minimum obstacle clearance outlined above is provided over the highest obstacle within circling approach area. This figure becomes a circling Minimum Descent Altitude for the approach as shown in the circling minima block.

BIRD WATCHERS' CORNER

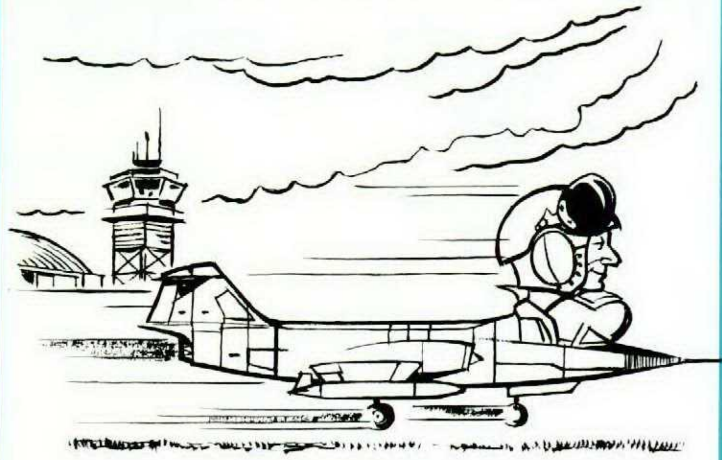


WING-DINGING BARN BASHER

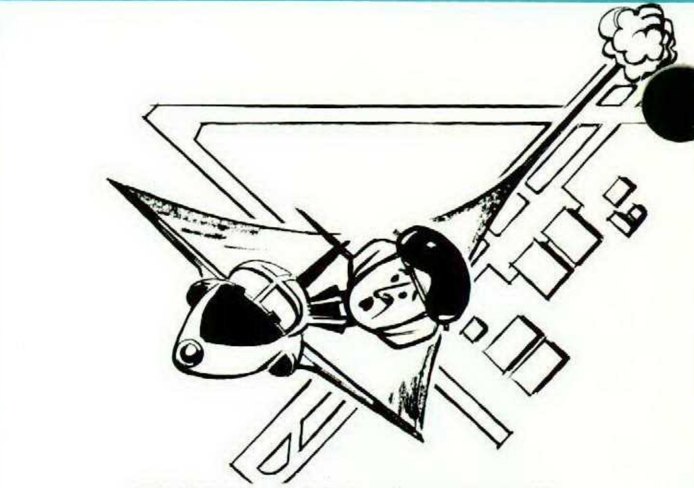
This ground dweller has the unintentional yet uncanny knack of rendering victims unfit for flight and demolishing their nests—all in one barn-banging motion. Found in large numbers around Sanctuary Seeking Supervisors, the Basher has a compelling instinct to do things himself or to obey ridiculous orders which often lead to destructive outbursts, unhampered by the annoying imposition of on-the-job overseeing. Thus, poor briefings and lack of adequate assistance combine with a tendency to take things for granted ("it went through O.K. last time") to create regular metal-bashing crunches. As the din subsides, his vacuous birdsong becomes audible:

IDUNNOWHYTHEWINGHITSTHEDOOR—EVERYTIMEIDOTHISCHORE

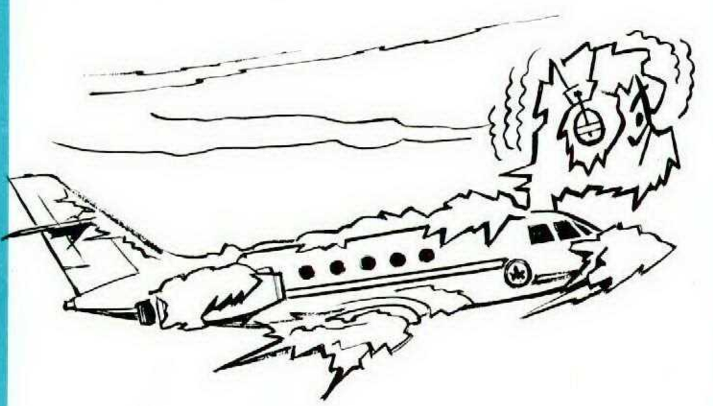
HAZARDS OF WINTER FLYING



HIGH IDLE POWER



SHORT TAKEOFF - STEEP CLIMB



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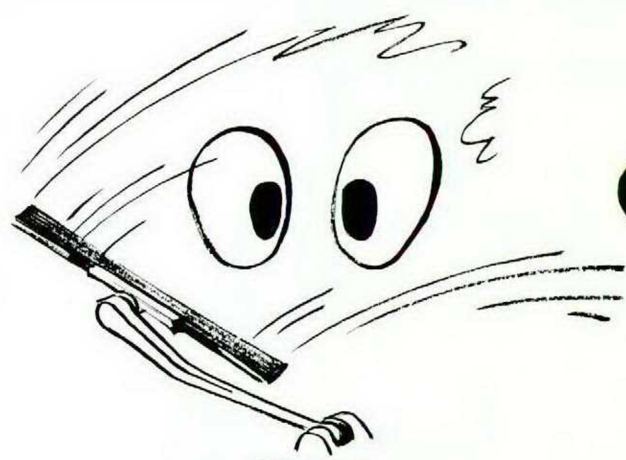

POOR VIS

POOR BRAKING

FESTIVE SEASON