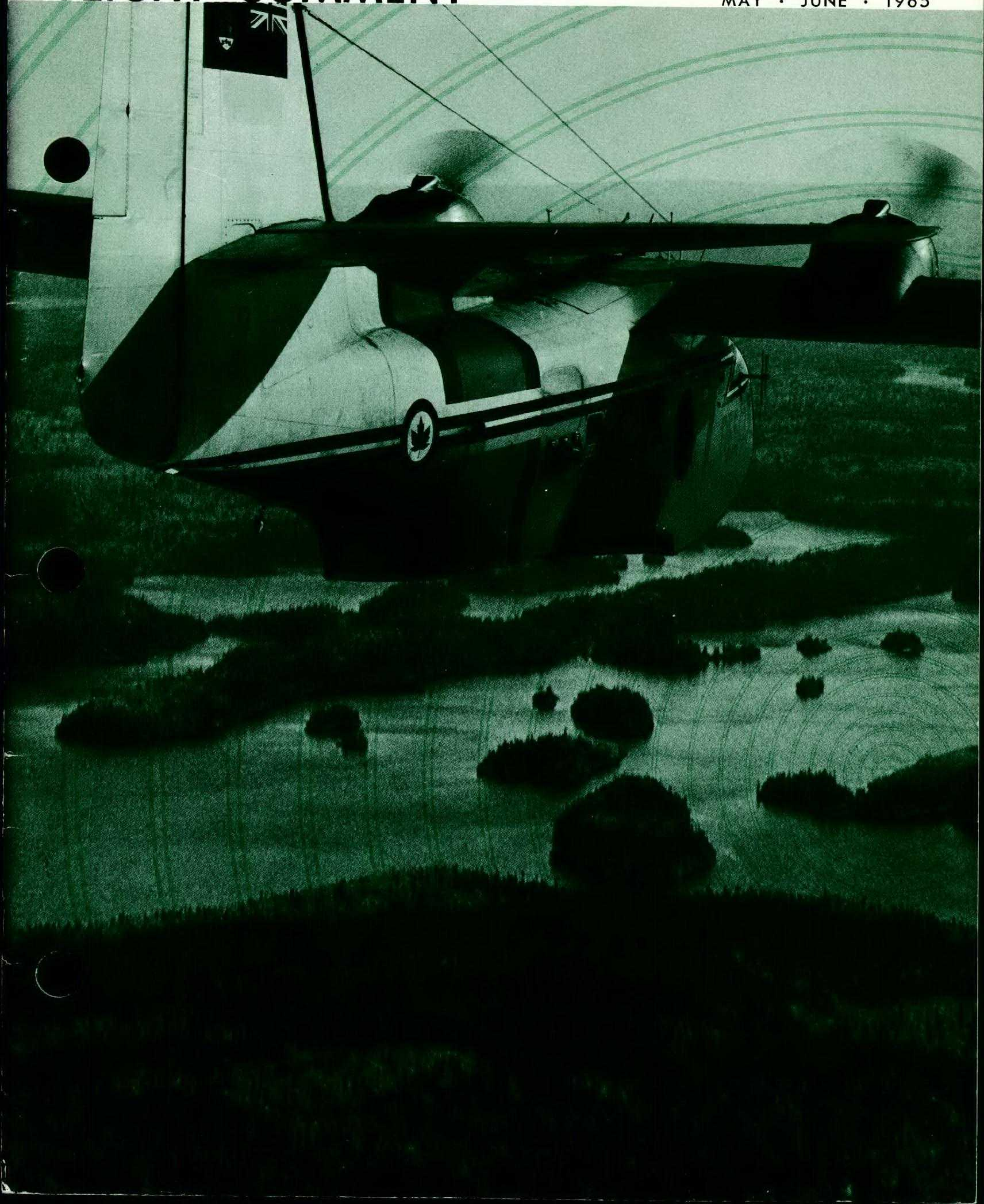
# FLIGHT COMMENT

MAY · JUNE · 1965



FLIGHT COMMENT

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FLIGHT SAFETY

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ACCIDENT INVESTIGATION

**In this issue**



CANADIAN FORCES HEADQUARTERS
DIRECTORATE OF FLIGHT SAFETY

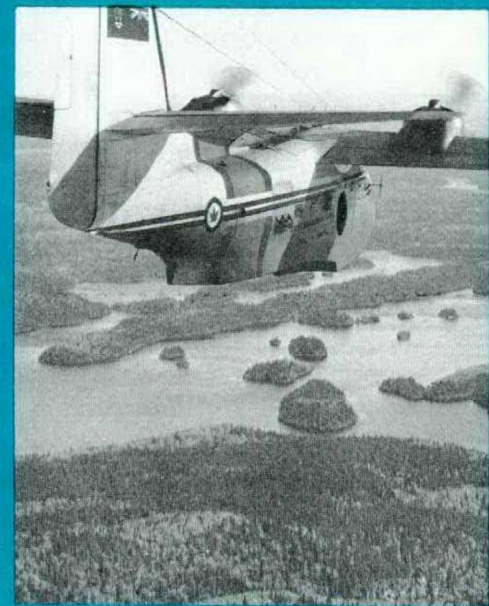
On occasion it may seem that regulations not only require us to report apparently meaningless trifles, but that we do so in an astonishing number of carbon copies. Besides, the forms always seem to require irrelevant information that is a lot of trouble to dig out. This takes time and we, so we think, have more important things to do. There may be other reasons for this reluctance to put it on paper but high on the list is that extra ounce of effort required to fill out a report—as a result, each year hundreds of incidents having flight safety implications go unreported.

A near-catastrophe a few years ago illustrates our point. An aircraft which had been recently brought into service developed an annoying but apparently harmless habit of shearing flap drive linkage pins. No one became alarmed; the shear pins were performing quite well—they were shearing as advertised. The pins were replaced but no reports were initiated. Inevitably, a flap linkage pin sheared on overshoot placing a large aircraft in a split-flap configuration. The alert pilot reselected the flap to original setting and prevented a major catastrophe. The extraordinary number of shear pin failures was caused by the flap drive system having been installed backwards. Let's ask a question and think carefully before answering. What caused the near catastrophe—the shear pin or the sustained silence of those who should have been firing off reports?

Many cases such as this are on file—material, training, facilities, errors, failures—all somehow contaminate the system. There is a form for every situation—for the sake of the next guy that straps in, if you come across something that is not as it should be—report it.

GROUP CAPTAIN AB SEARLE
DIRECTOR OF FLIGHT SAFETY

F/O Wayne Sled scope watching in Albatross



# Search and Rescue and Homing

F/O RJ Ross
121 KU, Comox

As most of us know, the fairer sex is about as dependable as a self-winding hourglass—many great men in history have lost their all, for placing their faith and trust in a woman. From the very beginning, when Eve gave Adam the forbidden fruit, the nemesis of man has been a woman; Samson had his Delilah, Mark Anthony his Cleopatra, and so on. RCAF aircrew have one woman who though she be ignored, abused, forgotten, and unloved, has yet to be unfaithful to her man, uh, men. Her name is Sarah.

Sarah is not beautiful, in fact she is short and dumpy, her complexion is terrible, and she has long gangly appendages. Though she rarely speaks she whines in a high-pitched, squeaky monotone. She weighs only about 4 pounds and has no hair. She goes all to pieces when not being used by one of her men (a total of five pieces, in fact). As women go, her life span is unusually short; when she is not being used she'll last six months but when on active service this is shortened to about twenty-five hours. If she is really abused by making her talk too much her life span is further shortened to five hours.

Sarah refuses to fulfil the normal functions of a woman; she won't cook, [illegible], love you or keep you warm. In fact, in cold weather you'd be wise to keep her warm; the warmer she is the more efficiently she operates. But if the time and place are right she can bring you comfort and solace; if treated as per instructions printed on her tummy she's even been known to save a man's life. Sarah, the woman of fiction, is in real life an efficient, compact emergency transmitter.

## The Transmitter

The prime requisite of a search and rescue detection system is to accomplish a rapid, economical search over a wide area in all conditions of visibility. It should also possess a positive, continuous homing capability. The equipment itself should be lightweight, easy to operate, and able to withstand extreme environments such as are experienced in present-day aircraft. Sarah has been hydrostatically tested to a depth of 50 feet, withstood temperature ranges from minus 50 degrees centigrade to plus 70 degrees centigrade, checked to an altitude of 60,000 feet and withstood forces up to 50G and came out working like a charm.

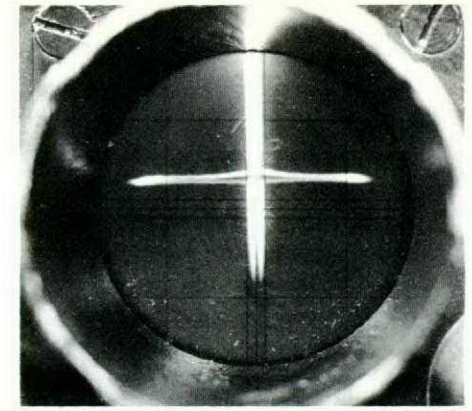
## The Receiver

Although the operator is unable to hear Sarah's enchanting melody, it can be heard, or rather seen, in a search and rescue aircraft carrying Sarah receiving equipment. The visual presentation appears on a scope as a horizontal blip on a vertical base line as in the photographs. Antennas on either side of the aircraft enable the receiver to sense the difference in signal strength received, causing the blip to be longer on one side of the base line than on the other. Turning the aircraft to balance the blips provides the homing direction. Sarah's refrain radiates from all around her antenna except for the very tip, creating a vertical cone of silence. When the aircraft flies into this cone, the scope goes blank. The location is accomplished.

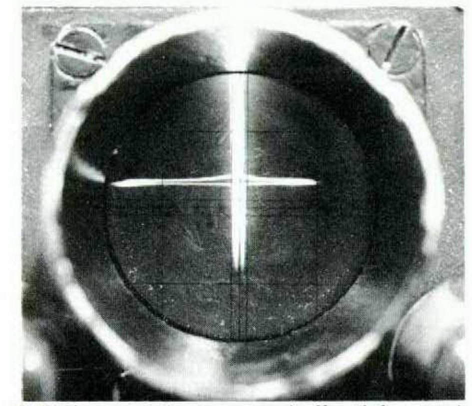
If the operator should start transmitting on TALK the scope becomes a maze of blips which blurs the image preventing the aircraft from completing the homing. Operators are advised not to break out into "Hey, I'm over HERE", until two passes have been made overhead.

To date 121 KU, Comox, has had three Sarah searches, all of which resulted in finding the downed aircrew in a very short time, resulting in a quick rescue and in all probability the saving of lives. Of the two more recent incidents, the one probably best remembered was that of a CF101B from Comox on Saturday 25 Aug 1962. At the time 121 KU was operating from Sea Island; it was a beautiful summer day in Vancouver when Comox tower advised the Rescue Co-ordinator Centre in Vancouver that a Voodoo had reported the loss of one engine on a flight from Comox and had disappeared from radar contact at 8:15 am local time. The RCC in turn advised the 121 Duty Operations Officer to alert the standby crew for a possible search. The Voodoo in question, piloted by F/L Dave Broadbent and navigator, F/L Vic Bartlett, had taken off from Comox at 7:30 am and had enough fuel for one hour and thirty minutes, so when nothing was heard from him by 8:30 am the 121 KU standby crew was called in and a full-scale search was organized. At 9:30 am 121 KU disptached Albatross 9306 carrying two pilots, navigator, radio officer, flight tech and a para rescue team in the event that survivors appeared to require any form of assistance. As radar had last painted the Voodoo approximately 80 miles east of Comox, the Albatross simply proceeded to Comox then turned eastbound. Only 50 minutes after departing from Vancouver, F/O Lorne Legear, the navigator advised that he had two Sarah contacts and several runs were made over the top.

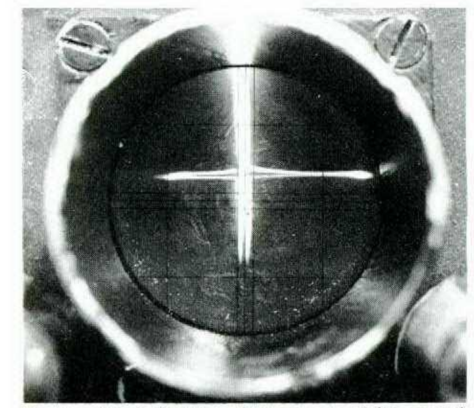
It may be noted that Sarah sets have four colour codes, denoting a slight difference in the pulse recurrence frequency. Since no aircraft carries two sets of the same code the blips from a number of sets from the same aircraft appear at different places on the



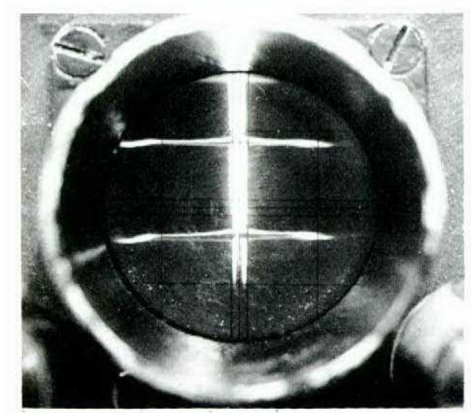
SARAH scope showing a strong signal directly ahead of search aircraft



SARAH scope with strong signal off to left—search aircraft must turn port to balance the blip and complete homing



Strong signal showing stronger on right—search aircraft turns to starboard to complete homing



SARAH scope depicts two signals of equal strength with different colour codes vertical base line thereby eliminating a possible confusion on the part of the receiver operator should more than one transmitter be operating. In the Broadbent search both sets were operating approximately a mile apart. The weather in the area was a broken condition topped at 7,000 feet; considerable orbiting was necessary before the Albatross could descend visually through a break in the cloud. Sarah contact was made at approximately 30 miles while flying at an altitude of 7,000 feet in mountainous country. On this occasion voice communications could not be established with Sarah.

As it turned out, both survivors were in a canyon on the edge of a glacier. One had a tinfoil reflector laid out and the other ignited a smoke marker, both of which were clearly visible from the air. Since neither of the survivors appeared to be in any difficulty the Para-Rescue team was not dropped from the Albatross. It was obvious that a helicopter would be required to speed the rescue. One of the 121 KU helicopters was busy rescuing a youth who had fallen down a crevasse and the other was in the barn, so a request for assistance was made to USCG Seattle. The Albatross remained in the rescue area awaiting the arrival of the helicopter. At 1:00 pm the helicopter was escorted to the scene of the survivors. The helicopter then completed the rescue and returned the survivors to Comox safe and sound.

The second incident concerned an S55 helicopter owned and operated by Okanagan Helicopters and was on a $3\frac{1}{2}$ hour flight from Wrigley NWT via MacKenzie River to Fort Simpson NWT on 2 Nov 64. At that time an Albatross from 121 KU was away, assisting 111 KU Winnipeg on a search for a light aircraft out of Fort St John BC. To prove that things can come in bunches, two other light aircraft were also reported missing in the same area; only the helicopter was carrying Sarah. The survivors of one aircraft walked to Quesnel BC after a forced landing, wreckage of the second aircraft was found by a Winnipeg-based aircraft, and the aircraft which precipitated the search in that area has yet to be found.

The helicopter was reported overdue at 5:55 pm 2 Nov 64 by Edmonton ATCC and the pertinent information was passed to the searchmaster in Fort St John with instructions to commence searching for the Sarah-equipped helicopter. Due to poor weather conditions no search was carried out that night but the Fort Nelson-based Albatross from 121 KU was dispatched the following morning. The Albatross departed Fort Nelson at 7:00 am and arrived over Fort Simpson at 8:25 am. He then proceeded up the MacKenzie River with the radio officer, F/O Wayne Sled, operating the Sarah receiver. Twenty-five minutes later a Sarah signal was picked up and in ten more minutes the Albatross was over the top of the wreckage. Sarah signals were picked up at 20 miles while flying approximately 1,000 feet above ground after the Sarah transmitter had been operating all night, and good voice communication was established with the survivors. In the first Sarah search conducted by 121 KU, a Sarah-equipped T33 was employed at 20,000 feet and contact was made at over 50 miles. Unfortunately very little information is available to the writer in regard to this search. Mountains have a very serious effect on the distance at which Sarah signals may be picked up, greater reception ranges can be achieved when the transmitter is operated on high ground. However, this was not advisable in F/L Broadbent's position since they would have had to climb out of a canyon onto a glacier.

You are strongly cautioned not to attempt contacting other survivors since the emergency equipment transmits AM and receives FM. Also, when located you should not attempt to contact the search aircraft until it has passed over twice. In the helicopter rescue the Albatross crew did not spot the wreckage until the third pass over the top. The transmitter should be operated with the antenna in the vertical and free from contact with any object since this could ground the antenna as a result in a useless power drain. Also, in cold weather the battery should be kept warm since cold tends to drain off the power more quickly.

It should be readily apparent that Sarah fulfils all the requirements of a good Search and Rescue system. Sarah's a typical woman—she's not much use unless she's treated right, and handled properly.

F/O RJ Ross has been stationed with 121 KU at Sea Island and Comox BC since 1961. He joined the Air Force at St John's, Newfoundland, in 1960 and graduated as a radio officer from ANS Winnipeg in 1961.



# T33 Canopy Break-Out

The first couple of blows breaks free a large piece

One blow from crewman in the rear seat removes several pieces

Note how close to the man's head is the front seat break-out area, and how smaller pieces have been punched out

F/L Parker emerges 18 seconds later

Remote though the possibility may be, T33 aircrew might have to abandon ship through the perspex. The breakout knife introduced a while back, has made the job certain and rapid. To prove just how rapid, we witnessed a CEPE trial breakout employing two aircrew strapped in a T33 in full aircrew clothing.

At the word "go", Flight Lieutenants CL Matthews and JF Parker as quickly as possible released their straps, connections, and parachute harnesses—this took about 10 seconds. The pounding then began. Eighteen seconds later the man in the rear seat had, in about 8 to 10 rapid jabs, knocked out more than enough perspex to climb out.

The front seat was a different story. There, the pilot has less room to swing and must attack the canopy almost directly above his head and at the sides close to his shoulders. The perspex should be first attacked furthest from the metal frame, working towards the more rigid areas near the canopy frame. Whereas the man in the rear seat had been able to knock out chunks over a foot square, the front driver had to be content with considerably smaller pieces. After much exertion the man in the front seat (in this case for test purposes was not assisted by his mate) took a full minute to extricate himself.

Tests on various aircraft in the USAF have proven what was again demonstrated in this test. If you punch out a small hole do not pick away at its edge, go for another area. In this way larger chunks will come free.

Both men held the knife in the prescribed manner, ie, one hand gripping the handle with the palm of the other hand against the flanged butt of the knife handle.

The test proved that under real conditions there would be little difficulty in breeching the 3/8 inch perspex canopy of the T33.

# Birds Bangers and Ballistics

F/L Q Wight
CFHQ/DArmEng

Time was, when the average aircraft had trouble keeping even with the average mallard. If, by chance, they did happen to meet coming from opposite directions, a few toots of the horn would alert the bird in plenty of time to relinquish a little airspace. Now, however, inventive man having strapped hot stovepipes to his wings and removed the seat of his pants from control of the aircraft, it has become increasingly difficult to proceed from point A to point B without encountering a little pinfeather cumulus on the way.

Naturally, the blame for the entire problem rests squarely on the shoulders of the pilot. Pilots are a notoriously picky lot. They had hardly been given wings to fly with when they were demanding large flat areas of ground to land on again. Everyone knows that large, flat areas of ground collect large, flat areas of water, and large flat areas of water collect birds. Not content with having been given somewhere to land, however, the pilots began demanding luxuries, like paved runways and trimmed grass. Now, a paved runway is a dandy place. On a nice hot day the thermal currents rise cosily from the asphalt and the enterprising seagulls soon found out that they could sail around there all day without moving a wing. Trimmed grass, too, is wonderful. Nasty things like foxes and cats hide in long grass, but in short grass a suburban quail housewife can see danger coming for blocks without ever having to budge from her split-level nest. Then too, short grass is lovely for insect hunting. Why bother poking about in the jungle when the grasshoppers are out in plain sight on the lawn? One picky pilot, and the next thing you know you're up to the neck in feathers.

Besides being picky, pilots are a suspicious lot. They look askance at things they suspect of occupying airspace without ATC clearance. The mere fact that the average avian aviator normally neglects to notify the tower fills them with horror. Furthermore, autopilots being creatures of habit, find it hard to cope with the idiosyncrasies of bird-brained guidance units. The net result of the whole mess is usually a mouth full of perspex and partridge.

Naturally, the cry went up "Get rid of those blankety-blank birds!" That was about 1910. The birds still remain in partial control of some airfields.

Now, there are many ways to get rid of birds. You can always shoot them, but birdshot in the tail doesn't do an aircraft any more good than it does the bird. You can turn an airfield into a complete biological desert—but not without paving the whole damn thing, and the birds will joyride on thermal currents anyway. You can put out acetylene bangers, but after a few days some species of birds will roost on them without batting an eyelash when they explode. You can even train falcons to chase everything else away—but falcons don't strike at night, and beside, there's something unnatural about having a big bruiser like that put the finger on a friend.

If you really wanted to be scientific you could watch the birds very closely to see what they did most. This has been tried. The seagull for instance, spends a lot of his time standing on the runway. Why? Well, a good reason might be that he wanted to keep his feet warm, since the runway is usually a few degrees warmer than the surroundings. To test this hypothesis several seagulls were caught and placed in special cages which had one half of the floor warmer than the other. The result?—scientific evidence that the birds didn't really care which half they stood on. (Face it; if you were designed to spend half your life floating in Arctic water up to there, you probably wouldn't care either). Actually, the non-scientific types know why the seagulls stand on the runway. If they stand anywhere else the grass tickles their tummies.

A good scaring device is a tape-recorded distress cry, broadcast over the airfield. To record the distress cry of a terrified seagull a group of researchers placed some gulls in a box, set up their recorders, then threw in a cat. Within minutes they had an excellent recording of the distress cry of a terrified cat! They finally obtained a cry by grounding a gull, and tickling it with an electric probe. The resulting squawk was excellent for volume, but the researchers are not certain whether the cry was from distress or ecstasy.

All is not lost however. Just a year or so ago, an ingenious Japanese decided that he ought to do something about the saki which was vanishing down birds' throats and leaving his house saki-less. Accordingly, he sat down and built himself a shotgun shell. Not an every-day bang-you're-dead shotgun shell, but a shotgun shell with a firecracker in it. When fired from a standard unchoked 12 gauge shotgun it hurled the banger unit right among the birds. When the banger went off, so did the birds.

This was fine. Birds went chattering off farms in all directions. They even left airfields in droves. There was just one hitch. Right around this time, a docker with a front-end loader was unloading a box of crackers containing a similar banger composition, at a dockyard. After they collected the pieces they figured out that he'd managed to drop the loader on the box. Some time later another man at an airport in Canada discovered that if the cracker portion of the shell had a short fuse, his shotgun would develop a suspicious bulge down the barrel followed by an absence of bang among the birds. When the RCAF stepped in and did some tests they found that, in addition, if one cracker went off accidentally there was a fair chance that some of the surrounding ones would go as well. These shells not only scare birds; they scare people too.

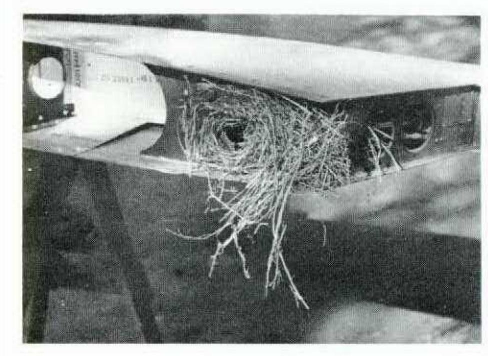
In the meantime the British and the Americans moved into the picture, and in the best Western tradition began copying the Japanese. To date they have produced only experimental cartridges, but RCAF experiments have shown that they are as promising as the Japanese in scaring birds. They still retain some of the disconcerting habits of the Japanese variety, in that the occasional misfit has a tendency to explode shortly after the trigger has been squeezed, but are considered safer in storage and handling. The British manufacturers have gone the Japanese one better and added a nice little flare to the back of the cracker portion. Not only does the bird have to face a large firecracker exploding in his face, but he can see it coming, trailing a stream of smoke and flame. The average bird finds this somewhat upsetting. Furthermore, since the trail of smoke goes back to a two-legged animal with a gun in his hand, the bird soon learns that the appearance of this vision means trouble, and legs it before the tumult starts.

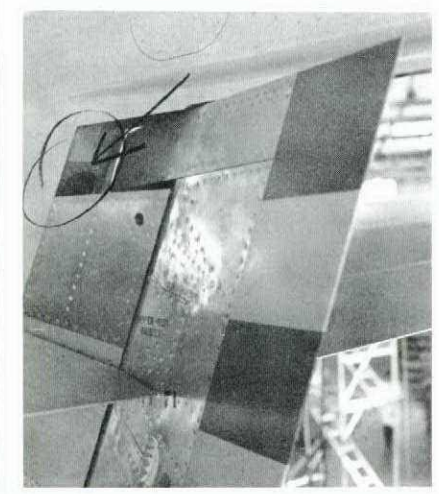
Further tests are being made to ensure that the shells are as safe as they can be, and that their continued use will help to clear airfields of birds. Two types will be required: the short-range crackers with smoke and flame, and the longer-range plain crackers to reach 'way over there' to where the shyer flocks are. In the meantime, if a box of shells arrives unaccompanied on a unit, please don't go charging off over the runways to scare birds. We said these shells scare people, and we meant it. There are regulations concerning their use. Wear safety goggles, fire from the hip and keep the muzzle up to avoid grass fires. Use them wisely, and they'll clear the air. Use them loosely, and you'll need more hair.

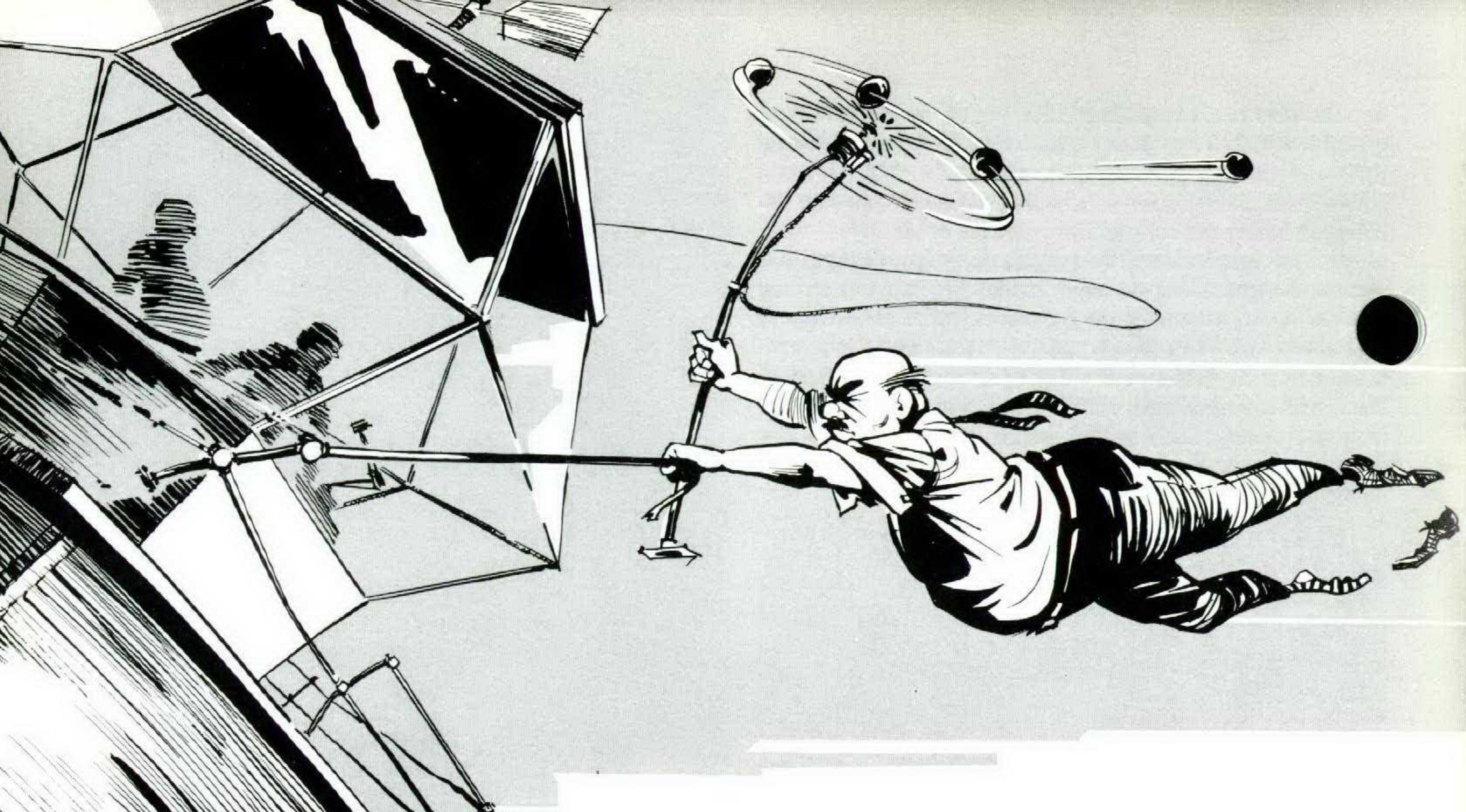
## Bird Nesting

The industrious bird who built this nest must have been surprised when he returned to find it had flown away. But imagine the surprise of the technician who discovered it—in such a spot—the fiberglass tip installation of the vertical stabilizer. The ingenious culprit had flown through the lightening hole which is exposed only when the rudder is out of the neutral position. The aircraft, a CF101 had been flown from Stn Bagotville to Bristol Aero Industries, Winnipeg, and was being dismantled for the CAIR program.

F/L DE Lamont
CEPE Detachment
Winnipeg







# Airport Winds

## A BLOW-BY-BLOW ACCOUNT

Vern Dingle
Forecaster, Stn Uplands

Vern Dingle is a forecaster at RCAF Stn Uplands Meteorological Section. After graduating from the University of Manitoba with an honours degree in Science, Mr Dingle served from 1952 to 1955 at Rockcliffe. He did a tour at Goose Bay from 1955 until 1958. Since 1958 he has been at Uplands in Ottawa.

AWAY OUT THERE . . . THEY GOT A NAME . . . FOR RAIN AND WIND AND FIRE . . . THE RAIN IS TESS . . . THE FIRE IS JOE . . . AND THEY CALL THE WIND MARIA.

Winds travel under many titles (some unprintable, no doubt) and although Maria is fictitious, some famous blows in the Old World carry well-known names. The mighty MISTRAL whips and whirls down the valley of the Rhone in France to cool the heels of madamoiselles clicking along the promenade at Cannes and Nice. The booming, boisterous BORA blasts its way down Alpine slopes to churn Adriatic waters. The Sahara Desert generates, of all things, a dry, dust-laden DOCTOR which brings welcome relief to those in the steamy, damp tropics. Numerous winds around the world bear curious names and are often part of the local folk-lore. Canada's only well-known wind, the CHINOOK of southern Alberta was dubbed in jest, by a Hudson's Bay agent using a local Indian tribe's name. With the advent of the National Meteorological Service, however, winds have been merely classified by direction and speed.

Technically speaking, winds are caused by differences in solar and terrestrial heat radiation producing temperature gradients which, in turn, produce gradients of atmospheric pressure. The intensity of the wind is basically a function of the pressure gradient. Complicating this general pressure gradient wind system are local winds produced by topography and convective processes.

Some airports in Canada have unique wind problems: Lethbridge with the CHINOOK, Winnipeg with a flow pattern parallel to the Red River valley, and Montreal with a circulation along the Richelieu or St. Lawrence rivers. Those airports most affected by wind systems due to convection are located primarily on the prairies where the nature of the terrain results in intense daytime heating which initiates the process for violent thunderstorms.

Locating a good spot for an airport requires a careful study of local winds—an airport located near cliffs, for example, will be subject to eddy currents and may create an undesirable environment for takeoff and landing. Runways are orientated, whenever possible, into the prevailing wind direction. Airport buildings should be located so that eddy currents in their lee do not disturb the airflow over the runways.

The vagaries of the wind around airfields are therefore due to three factors: topography, convective storms and eddy currents.

Airfields in Canada with a topographical wind problem are those located, for example, where two or more distinct winds cause extremes in gustiness due to a funnelling effect. A good example of this is Dorval airport at Montreal; its major runways are orientated into the prevailing westerly wind of the St. Lawrence River valley. On occasion, a southeast flow down the Richelieu River valley has caused wind gusts exceeding crosswind maxima of virtually all aircraft using the field.

The freakish winds associated with thunderstorms are too many to mention—basically, these stem from the scale of the thunderstorm relative to larger weather systems of which it is a small part. Locating a thunderstorm in a large storm system is akin to searching for the proverbial needle in a haystack. In order to do justice to the winds associated with these storms, an observing station in every few hundred square miles would be required. Radar meteorology is partially filling the gap in the weather observation network, and more knowledge is needed before thunderstorm winds can be interpreted accurately from the character of the radar picture.

Wind idiosyncrasies around buildings are due entirely to the eddy currents in their lee. An excellent example of wind whirlpools in and around airport buildings occurred at Uplands on 21 July, 1964. A thunderstorm cell moving eastward passed about five miles to the north of the airfield causing a brief period of gusty winds (42 mph). As it was a hot day, both doors of a maintenance hangar were open; the wind whipping through the hangar lifted a Dakota off its chocks and hurled it against an adjacent Cosmopolitan! A point that should be stressed here, is the virtual impossibility of predicting accurately, eddy current wind patterns. Hangar personnel should realize that enormous wind acceleration occurs when a wind whirlpool comes whistling around the corner of a building.

Dakota nose and Cosmo tail collide in hangar

Wind damage can occur during takeoff and landing as well as when taxiing or parked. Damage to aircraft has often been caused by high crosswind components and turbulence associated with eddy currents and gusty winds. Parking aircraft in the open presents another problem, and requires a knowledge of the direction of the strongest wind and the eddy effects in the vicinity of hangars.

It is a frequent practice to secure an aircraft, tail into the wind; this is done so that the wind strikes the upper surfaces of the wings and stabilizers and exerts a downward force. However, most aircraft control surfaces cannot withstand the force of strong wind coming from behind. As a matter of fact, strong gusts striking from the rear have done considerable damage to controls and their locks, while aircraft parked near-by into the wind have escaped damage. Thus, it would appear that it is a safer practice to secure aircraft into the wind, although this requires stronger moorings to overcome the lifting force of the wind.

Normally, predicting winds around airfields is not a forecast problem because most weather systems are relatively weak and the associated winds may be classified as light. However, with a rapidly deepening low, wind speed and direction become difficult to predict. Four weather parameters must be assessed before a wind forecast can be made: pressure intensification, timing, acceleration, and direction of motion of the developing storm. The interaction of these variables in many cases makes accurate wind forecasting extremely difficult. Superimposed on this complex situation, an intimate knowledge of the surrounding terrain is a must, if the forecaster is to determine the eventual wind direction and speed.

The present state of our knowledge and understanding of weather enables us to produce reasonably accurate wind forecasts, valid for 12 hours, on an approaching storm. Unfortunately, local airfield winds associated with convective thunderstorms are by far the most difficult to predict and often the most destructive. The problem is mainly one of the unknown. Not only do thunderstorm cells grow and die quickly but most of them are not even seen or reported by official weather observers due to the sparseness of observing stations. Thus, most of the time, weather radar is the only aid available to assist in predicting thunderstorm winds.

The intensity of the radar echo and the known pressure gradient are interpreted to provide assessments of the most probable wind speeds associated with each cell. Secondly, the future course, and duration of the storm must be accurately determined before an intelligent estimate can be made of the probability of gusty winds. An excellent example of this problem occurred at Ottawa in May 1959. An active squall line developed over southern Ontario on May 11 and was picked up by radar early in the afternoon. A few hours later, the radar echoes located some violent cells along the line. At approximately 1800 EDT, one of the most severe thunderstorms on record passed over Ottawa; the wind indicator at Rockcliffe Airport went off the dial (over 100 mph); the official Ottawa airport wind was recorded at 84 mph. Two Dakotas took off without their pilots and flew backwards over a parked T33 for a distance of 300 feet! The wind forecast for the Ottawa terminal with the expected thunderstorm was 2230+50; this estimate was based on statistics of thunderstorm wind occurrences over Ottawa but turned out to have been somewhat of an understatement!

All pilots are concerned with winds around airfields particularly on landing, with the crosswind component and gusts uppermost in their minds. A point, sometimes overlooked, is that official wind recording equipment may be installed atop a building, and therefore records the increased gustiness of eddy currents around the building. The actual gustiness over the runways is therefore usually less. At RCAF stations this situation is gradually being eliminated by the relocation of the anemometer to a position on the airfield where representative wind measurements over the runways can be recorded.

Maintenance personnel are interested in the wind as it affects aircraft parked on the ground. The chief concern is how the aircraft reacts to the eddy currents in the lee of buildings and the minimum wind speed at which various aircraft must be moored. The time at which an aircraft parked outside should be secured can be obtained from the wind forecast or severe weather warning; prior to this time however, wind gusts due to eddy currents around buildings could exceed mooring minima. It is during this period when most wind-caused ground accidents occur. To alleviate this problem, groundcrew supervisors should be acquainted with the regular issues of aviation forecasts which always include predictions of wind speeds below those requiring the issue of wind warnings particularly in view of the vagaries of eddy currents.

The current philosophy of wind prediction in aviation forecasts is "The surface wind direction and speeds will be averages expected to be representative for major portions of part-periods, exclusive of brief periods of higher or lower speeds". However, "peak winds in gusts and squalls will be stated when expected to be operationally significant". The term "operationally significant" is too vague to cover the wide variety of aircraft in use today. Perhaps a better understanding of the wind forecast might be obtained by issuing terminal wind forecasts on the basis of average wind direction and speed, coupled with average gust speed. In addition, the forecast should employ a wider use of remarks giving the variability of the wind direction along with the peak wind gusts. An example: 3025+35 OCNL 3235+50. This would mean that wind directions vary from 300–320 with speeds 25 to 35 mph and occasional peak gusts to 50 mph.

Forecasting extreme local wind conditions is often difficult and therefore may be on occasion, inaccurate; under these conditions persons responsible for care of aircraft around airfields should bear this in mind. Pressure pattern prognosticators are peerless, but not perfect!

> If you are in any way responsible for ground handling of aircraft you have a "need to know" the wind conditions around your airport. It can get awfully embarrassing when the question is asked: "Did you ensure that adequate precaution had been taken with regard to possible wind conditions?"
>
> If you are one of these people, have you access to this information? If you are not happy with the weather warning pipeline to your office check with the SFSO.
>
> Let's take an example of this problem. A unit on a station has just had one of its aircraft damaged by winds from an approaching storm. The wind warning had been issued and (to quote from the D14): "just prior to the accident LAC ________ on desk duty, during a telephone conversation with the Flight Planning Centre to obtain information concerning an arriving aircraft, learned that a wind warning was in effect. However, he had no sooner hung up the telephone when a strong wind struck and the damage was done". The moral is self-explanatory. With winds gusting to 62 mph with 60° direction changes, no wonder the aircraft was damaged.
>
> Another aircraft was damaged under similar conditions; the account appears in the Mar-Apr 65 issue of Flight Comment. With the able assistance of our "peerless prognosticators" wind damage accidents can be avoided—the rest of course, is up to us.

## Focus

Twice last fall, smoke was noticed coming from the cockpit of T33s parked innocently by themselves on the line. Fortunately, both times, the smoke was noticed before any serious damage occurred.

In one case the leather cover around the canopy ejection hose was smouldering and in the other, the plastic lining inside a pilot's uniform cap stowed behind the rear seat. In both occurrences, the sun's rays were focused by the curved canopy sufficient to cause combustion.

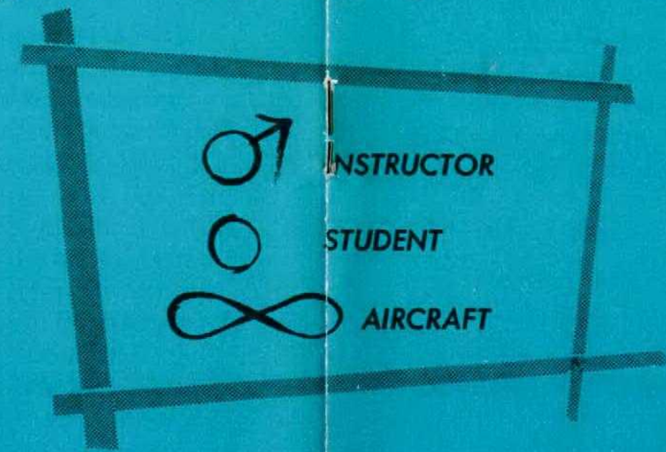
Admittedly, this doesn't happen often, but the hazard has been recognized for some time; we even have an EO on the subject (EO 05-1-2 AW 14 Mar 58). Curved transparent canopies are here to stay but shaded parking areas will never be—about the best we can do is not to leave combustible articles such as maps, paper, plastic, etc, where the sun's rays can focus on them. Also, aircraft parked in the sun should be watched for FOD—Focusing Optics Damage.

## Does THIS Look Like THIS?

Two experienced pilots (the captain with nearly 6000 hrs) were preparing for takeoff on an IFR cross-country from an uncontrolled airfield. They planned to take off VFR and file IFR when airborne. On the tarmac check, incredibly *both* pilots set their own altimeters at 1132 ft instead of the 132 ft (airfield elevation) that they had intended. A cross-check between the two altimeters gave approximately the same altimeter setting, of course, and the error went undetected. Once airborne the crew requested their airway clearance and an altimeter setting. After some delay, the ATC clearance came through but the altimeter setting was omitted; the crew did not repeat their request. The crew entered airways at what they blissfully thought was their assigned altitude—they were, of course, 1000 ft too low. Eventually, a close shave with opposite direction traffic showed that someone was not at the proper altitude; the two pilots aghast at their error, set their altimeters correctly, and climbed to their proper altitude. *This incident occurred in an area of high-density airline traffic.*

Our present altimeters are far from perfect—this is not the first (or last) time they'll be misread. Some day we'll have a foolproof altimeter, but in the meantime, give that altimeter the special attention it needs.

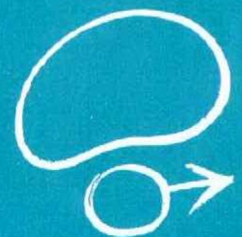
# Squiggles





New course

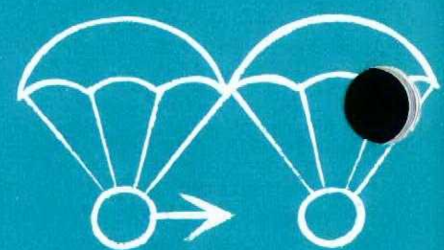

Like it or not, you're stuck with me for 18 weeks


OK! OK! You can go solo

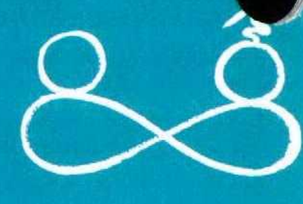

First solo


If you trim it right it flies by itself

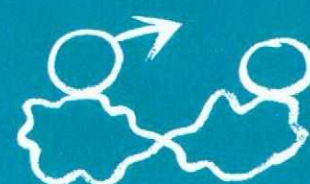
The CO just walked in the back door

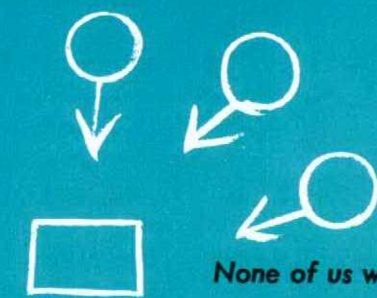

This will call for a re-ride, Smedley

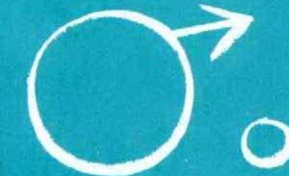
Canopy down . . . watch your head, sir!




Big party last night, eh, Smedley? Let's do aeros today


A little too much "G" there but otherwise it was OK

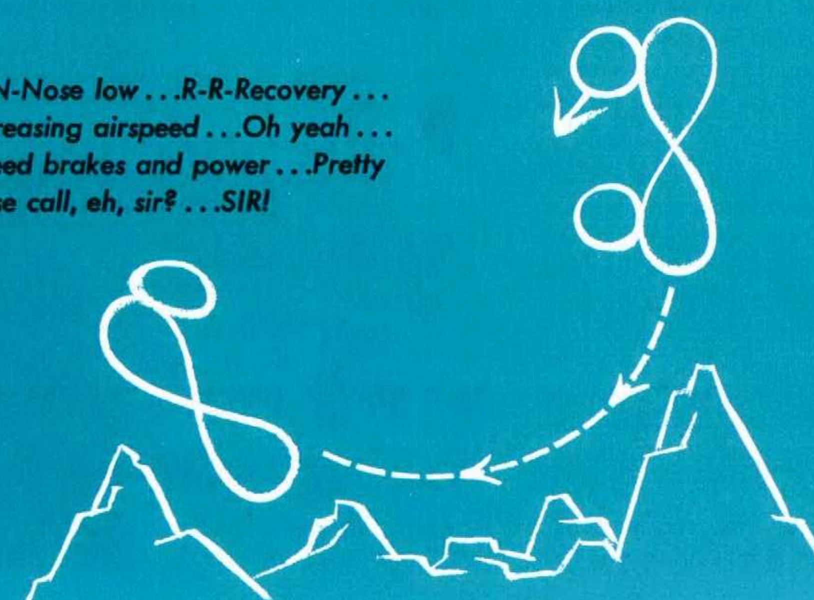

None of us want you


Poor show up there today

Today gentlemen. . . Smedley!

This is a roll . . .

N-N-Nose low . . . R-R-Recovery . . . Increasing airspeed . . . Oh yeah . . . Speed brakes and power . . . Pretty close call, eh, sir? . . . SIR!



# Turnabout

Fixed wing pilots are all too familiar with the theory that as bank angle increases there is a corresponding increase in stalling speed. Since helicopters don't have the same stall characteristics as fixed wing aircraft it is doubtful that helicopter people are as familiar with the theory as their fixed wing brethren.

Load factor or "G", however, increases with bank angle in a helicopter in exactly the same way it does for any other aircraft. Correspondingly, the power required to hold airspeed in the bank without losing altitude, increases. If the pilot doesn't come in with that extra power at the precise moment it is needed he further complicates the power problem and he either begins to settle or lose airspeed. If he holds airspeed he will settle, if he holds altitude he will lose airspeed. If he is heavily loaded he may not have the extra power to spare and if he is close to the deck he will undoubtedly succumb to the urge to come in with collective. The story from here on is all too familiar to helicopter pilots—another loss-of-turns accident.

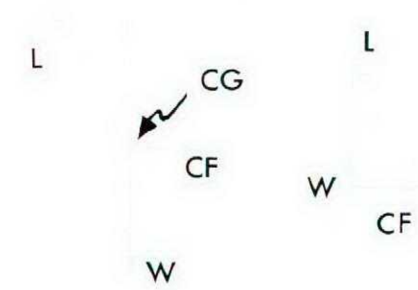
Helicopter pilots should be just as familiar with the important numbers associated with bank angles in their particular machine as fixed wing pilots are. Ask any jet driver what percent increase in stall speed is generated in a clean 30-degree bank over the break in his bird and he can probably tell you. But ask the average helicopter pilot what percent increase in apparent gross weight is generated in a 30-degree bank for his bird and the odds are that he can't tell you.

The load factor and hence apparent gross weight increase in banks up to 30 degrees is relatively small. But even so, under the right set of adverse circumstances such as high density altitude, gusty air, poor pilot technique and high gross weight, a power deficit could easily be induced. Above 30 degrees of bank the apparent increase in gross weight soars. At 30 degrees of bank the apparent increase is only 16% but at 60 degrees it is 100%. We all know that the bank limitation on most helicopters is 30 degrees, but we know too that helicopter people are famous for ignoring this limitation. Perhaps if they were familiar with the numbers involved they would have more respect for the limitation.

There are other problems associated with the mechanics of the banked turn in helicopters such as retreating blade stall and structural stress at high gross weights. The most pressing problem from the accident prevention point of view is power management. We have a good idea of how many helicopter power management accidents there have been. What we don't know is, how many of our tired old birds have had their guts nearly pulled out when the pilot induced a power deficit in a low speed steep bank and was lucky enough to get away with it. We can't help but wonder how many of these same birds were later involved in engine failure accidents.

Approach

EQUILIBRIUM TURN FORCE DIAGRAM




Load Factor = L/W = 1/COSϕ: for ϕ = 30° COSϕ = 0.866:

LF = 1.16

Load factor developed in a turn could be limited by the following:

Limit load factor of structure.

Power available to maintain altitude and airspeed.

Blade stall.

A rough load factor breakdown on some of our helicopters at various angles of bank. Included is the apparent weight increase over a given gross weight in straight and level flight.

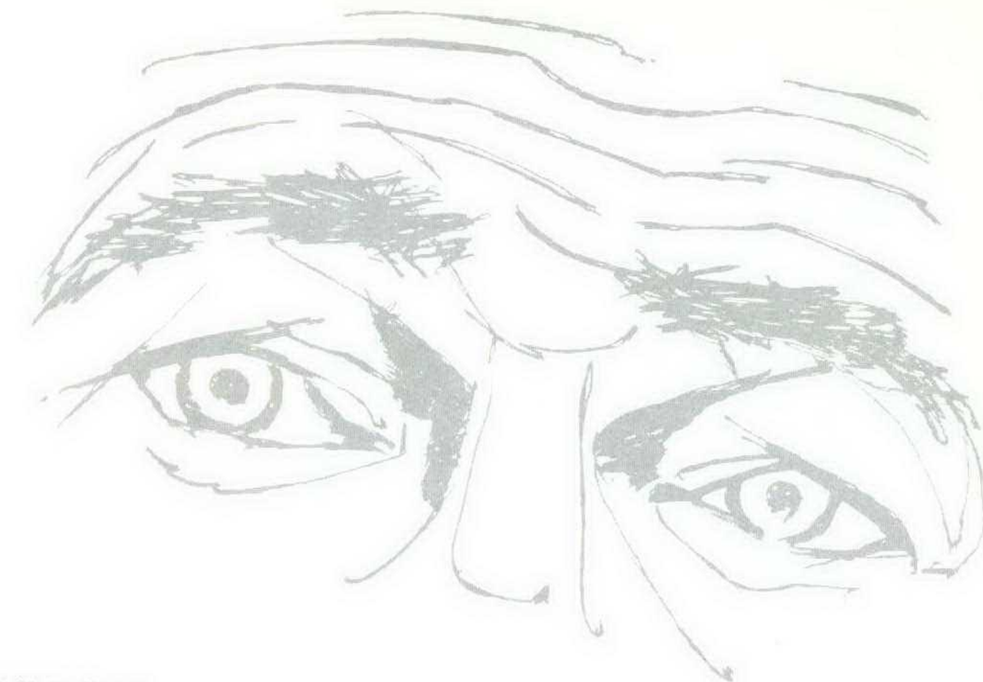
APPARENT WEIGHT INCREASE OVER INITIAL GROSS

| BANK | LOAD FACTOR | H34 | HUP | H19 | H21 | CH113 | INCREASE |
|---|---|---|---|---|---|---|---|
| 10° | 1.02 | 226 | 106 | 150 | 270 | 380 | 2% |
| 20° | 1.06 | 678 | 318 | 450 | 810 | 1140 | 6% |
| 30° | 1.16 | 1808 | 850 | 1200 | 2160 | 3040 | 16% |
| 40° | 1.3 | 3390 | 1600 | 2250 | 4050 | 5700 | 30% |
| 45° | 1.42 | 4750 | 2225 | 3150 | 5670 | 7980 | 42% |
| 50° | 1.55 | 6200 | 2900 | 4100 | 7425 | 10,450 | 55% |
| 55° | 1.74 | 8370 | 3900 | 5500 | 9790 | 14,060 | 74% |
| 60° | 2.00 | 11,300 | 5300 | 7500 | 13,500 | 19,000 | 100% |

H34 loaded initially to 11,300 lbs
HUP loaded initially to 5300 lbs
H19 loaded initially to 7500 lbs
H21 loaded initially to 13,500 lbs
CH113 loaded initially to 19,000 lbs



# How's Your Stress Response?



S/L IH Anderson
Flight Surgeon, 1 Air Div

If you ask yourself "Am I fatigued?" you will have considerable difficulty in giving a valid answer unless you feel obviously rundown. Occasions arise when aircrew ask themselves this question, find an answer, and act accordingly. This short article will assist you to arrive at the correct answer, and we hope, decrease the possibility of your ever having to answer "yes".

To define fatigue, an adaptation of Brisbin's is as good as any: "Fatigue is a bodily state manifest by a stress response, primarily dependent upon the sheer duration of an activity but augmented by physical or purely psychic and emotional stresses". Chopping wood and flying are both tiring but they obviously produce a different kind of fatigue. There are therefore, different varieties: physical, static or skill, and chronic cumulative fatigue.

## Physical Fatigue

Pure physical fatigue rarely concerns the aviator; it is the warning signal that muscular activity must be discontinued to allow restoration of body energy reserves. It is completely relieved by adequate rest or sleep.

## Static or Skill Fatigue

Static fatigue is frequently seen in skilled tasks such as flying and is not related to physical fitness. The symptoms can appear in the absence of chronic fatigue, but on the other hand, it is seldom absent in a person who has chronic fatigue. Its main causes are boredom, prolonged concentration, attention to details (especially when associated with responsibility), the need for constant alertness, mild hypoxia, noise and vibration. The condition results in carelessness, complacency and an insidious progressive lowering of performance standards. This in turn leads to loss of attention, and preoccupation.

Static or skill fatigue is a relatively simple phenomenon to discuss because deterioration in the performance of a complicated and prolonged task can be accurately measured. A well-known work is the Cambridge Cockpit Study carried out during the last war. It will do no harm to review the findings of this study. As fatigue develops—

- timing of complex actions suffers more and more.
- the pilot becomes increasingly willing to accept lower standards of performance and accuracy.
- there is an increasing tendency to fixate on one or two instruments instead of maintaining a full-panel scan.
- a tendency for attention to fall off to dangerous levels when the end of a mission is in immediate sight.

Although these consequences have been known for nearly 25 years, aircrew and aircraft continue to be lost because the pilot fails to guard against the abnormally rapid onset of a dangerous fatigue state; secondly, and more frequently, he fails to recognize that minor errors and omissions mark the early stages of a fatigue state. The first is intimately associated with chronic fatigue and will be discussed later. The second is linked with levels of attention and deserves further mention.

In an important paper headed "Accidents and Weather" (see Flight Comment Nov-Dec 63) Trumbull emphasizes the importance of maintaining high levels of attention at all times when flying to guard against the demonstrated tendency of the individual to lower his attention level when no hazards can be foreseen. When conditions are ideal he will "tune out" personal thought inputs; static fatigue will produce the same effect, in which case, the man tends to ignore occurrences that are out-of-keeping with his pre-envisaged flight plan until fear dictates urgent action. At this point the brain is suddenly flooded with inputs which could lead to a fatal panic reaction or a wrong decision.

Aircrew must monitor themselves for tell-tale signs of static fatigue; the small mistake or omission is your cue to increase your level of attention. Lowering cockpit heating, instituting verbal checks for mental ones, enlisting the assistance of a co-pilot in large aircraft or an airborne colleague in single-place aircraft are all effective measures.

Almost every driver can remember a static fatigue situation caused by "pressing-on" when unnecessary haste, foolish pride, or unfavourable weather precluded the necessary rest interval. Some will have even experienced the hallucinations that occur commonly in advanced states of fatigue. In a car it is possible and indeed essential, to stop. One should not be flying an aircraft, of course, in an advanced state of fatigue but if you recognize the early signs you can call upon all available reserves until it is possible to rest.

### Chronic Cumulative Fatigue

Chronic cumulative fatigue is primarily psychological and results from the continual strain of trying to adjust to stressful occupational and domestic demands. The classic signs of this kind of fatigue are tenseness, irritability, frustration, lassitude, loss of confidence, greater awareness of physical discomfort, depression, loss of appetite and insomnia. It can also manifest itself in clinically recognizable diseases such as peptic ulcer, skin rashes, asthma, and susceptibility to upper respiratory tract infections.

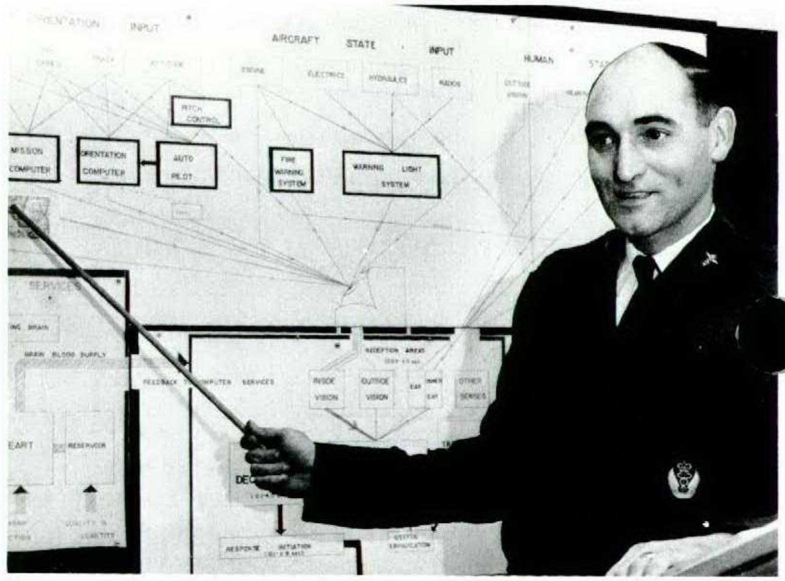
Your level of chronic cumulative fatigue will determine the rate of onset of static or skill fatigue. As the name implies, this state can be built up slowly when a given rest period does not compensate for the stress involved. An uncomplicated example is the fatigue involved in crossing time zones. Transport aircraft crossing time zones expose the crews to a disorganization of bodily functions such as sleep, bowel habits and appetite causing an accelerated onset of chronic fatigue. If adequate rest periods are not taken on such flights observable decrements in performance occur, and bodily changes appear which can actually be measured in the blood. The birds learned this lesson thousands of years ago and never cross more than four time zones in migratory flights!

### Standby and Shiftwork

More complicated in origin and more insidious in onset is the chronic fatigue state that can slowly be built up when shiftwork or standby schedules must be maintained. This is combatted by ensuring that the same shift extends three months or more; industry has long recognized the economic necessity of such a move and some major concerns engage personnel to work definite shift hours and only change these on promotion or re-organization of the production line. But most military organizations often have insufficient people to program shift and alert crew rosters in such a way that our "physiological clocks" can compensate.

The nature of military operations and the scarcity of manpower in the present "economic war" situation dictates that shift changes be made frequently. Here's a typical situation: a group of alert crews or Air Traffic Control personnel, work a carefully pre-planned shift system for three months. The system was designed to provide enough flexibility to compensate for temporary losses, and to provide for a nearly normal work week (in terms of hours on duty) and as many normal two-day weekends as possible. At the end of three months, however, several minor personnel problems arise. The crews and their wives are a bit short-tempered, individuals are late for duty, minor sickness increases, domestic details become important beyond their weight, and secondary duties become a real chore.

S/L IH Anderson completed his medical training in Aberdeen Scotland in 1952, where he also received flying training with the RAFVR. After two years in the RAF he transferred to the RCAF and spent four years at RCAF St Hubert. After a year at Harvard University studying Industrial Hygiene and Aviation Medicine he was transferred overseas. He is presently the Regional Flight Surgeon for 1 Air Division in charge of the 1 Air Division Aviation Medicine Unit at 3 Wing, Zweibrucken, Germany.




The result is usually an all-level conference within the group and it is agreed that they formulate their own program: as redesigned, the system has traded some of its flexibility in favour of four or five-day breaks following many consecutive work days. The group has concluded that the longer rest period is of much greater benefit than the previous two-day period. In doing this, however, they have built in a higher probability of skill fatigue and have merely delayed the onset of chronic fatigue.

### The Professional Approach

The rate of onset of fatigue is closely related to a professional attitude to the task. It can be shown that chronic fatigue reactions in aircrew occur in the highly-professional individual only if he is subject to extreme stresses. The man who is immature or has a poor professional attitude has a much higher incidence of reactions; he cannot place minor anxieties in their true perspective. It is necessary, therefore, to enlarge our concept of chronic fatigue: it is not caused simply by the exposure of a group to "X" amount of fatigue-producing factors, it is the exposure of an individual with a resistance of "Y", to X number of stresses.

To answer the question "Am I fatigued?" it is as important to solve for Y as it is for X. To solve for Y it is necessary to ask yourself such searching questions as: Am I convinced of the importance of my job? Do I obtain self-recognition by achieving the standard I have set for myself? Am I clear in my mind where I divide my loyalty between my family and my work? Am I working for a wage or is my work the wage of my existence? Am I indulging in self-pity? Philosophical questions perhaps, but very important ones.

Another factor on the Y (resistance) side is the normal cycle of mild depression and optimism, which is one of the body's psychological "clocks". The frequency of the cycle varies with the temperament of the individual; day-to-day stresses may coincide with, and so augment the depression segment of the curve. A final factor is the effect you allow the group to have upon you: Are you allowing your own standards to be affected by the behaviour of the group? If your answer is in the affirmative then you are actively participating in lowering the morale of yourself and the group. Remember, we often see and hear only what suits ourselves.

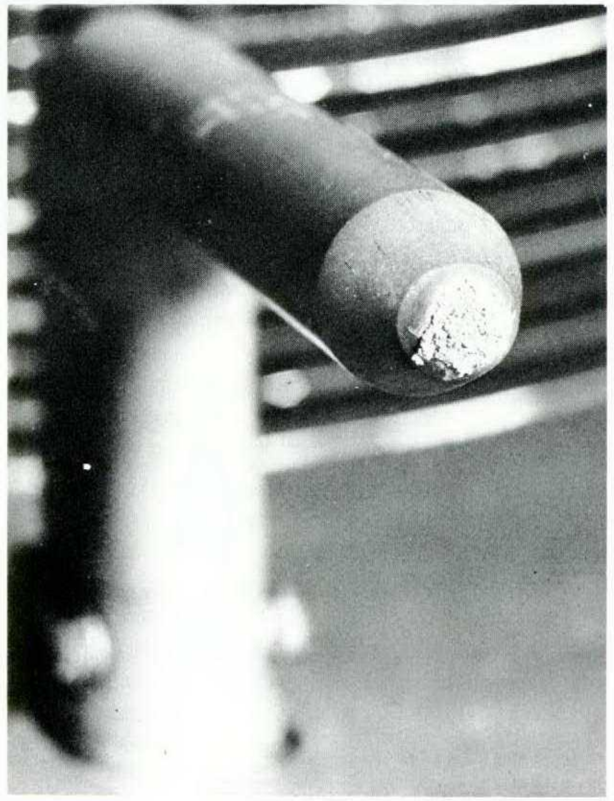
Have you shown any of the signs of chronic fatigue mentioned above? Minor worries and anxieties are an essential part of our lives and serve to stimulate our minds; it is the onset of fatigue that indicates something is wrong. You must place the various stresses of life in their proper perspective.

"Are you fatigued?" It might occur to you to ask this on a day when nothing seems to be right. Make a mental note of all those distressing details that follow you like a shadow. Bringing them into the open will automatically raise your resistance to them. The vicious circle can be broken—this may be best done by a visit to the Flight Surgeon, or perhaps by taking home a bunch of flowers to the long-suffering wife!

## Wasp Waste

**At first it looked like a subtle attempt at sabotage. The mud that was neatly packed in the pitot tube could not possibly have got there by itself—it must have been put there. The thorough AFP investigation gave no leads until it was decided to analyse the mud. That solved the case; the mud had been deposited by wasps.**

**Springtime, and especially June, seems to be the time when this hazard is most prevalent. This case happened last year in June at 4 Wing; exactly one week later a similar case was discovered at 3 Wing—both to CF104s. Wasps are very industrious types, so it's a good idea to put on the pitot covers whenever an aircraft is parked. Just the length of time between a normal turn-around might be sufficient for a wasp (or colony of wasps) to plug the tube. And wasps aren't only peculiar to 3 and 4 Wings.**



# FROM AIB FILES

## YUKON

### Accident Data Recorder — Crash Position Indicator

The airborne ADR/CPI trials mentioned in the Nov-Dec issue of Flight Comment have now been completed, and action is underway to finalize the specification requirements and obtain approval for fleet fitment.

### Main Landing Gear Uplock Actuators

Investigation into the causes of failure or partial failure of MLG uplock actuators has resulted in approval of a modification to re-equip the Yukon fleet with uplock actuators terminally lifed to 900 landings. Modification 05-155A/6A/335 will cover fitment.

### Supercharger Disconnect — Spill Switch Modification

Several failures of the supercharger drive quill shaft have been attributed to inadvertent selection of the switch while the quill shaft was stationary. If the disconnect switch is inadvertently selected with electrical and hydraulic pressure available, and with the engine not rotating, the cut-off wheel will be driven against the shear-neck which can result in weakening and subsequent failure of the quill shaft. To guard against this possibility a switch guard incorporating a lead seal witness wire has been authorized for installation in one aircraft on a trial basis. If the prototype proves successful, all aircraft should be equipped in the near future.

## ARGUS

### Main Landing Gear Uplock Actuators

As a result of failures of uplock actuators on CL44 and Yukon aircraft, a modification has been approved for replacement of MLG uplock actuators terminally lifed to 900 landings. Mod 05-120A/6A/676 will cover fitment.

### Constant Speed Drive Disconnect

The recent trials on the disconnect installation have been completed, and a strip inspection of the associated components have proven the system satisfactory. Action is presently underway to obtain approval for fleet fitment.

## COSMO

### Emergency Escape System — Escape Chute

A pre-production model escape chute has been delivered and will be fitted for demonstration and evaluation. If this escape system proves successful, fleet fitment should follow.

## C119

### Propeller Control Malfunctions

As a result of recent cases of prop control malfunctions, two of which terminated in unscheduled landings, CEPE were requested to review the EO procedures and to carry [illegible] airborne trials. The outcome of the CEPE study and t[illegible] will be reflected in AOI amendments.

### R3350 Engines — Power Recovery Turbine Failures

Investigation has revealed that some PRT failures have been initiated by faulty automatic mixture control bellows. It is believed that this type of failure can be prevented by early detection of bellows malfunction, and that this can best be detected by pre-flight and in-flight carburetor serviceability checks carried out by the aircrew. Action has been taken to amend AOIs as required.

## L19

### Weight and Balance — Possible Fixes

As operators know too well, the L19 is now loaded close to permissible limits, creating a critical C of G condition. The "A" model is the one most affected by the gross weight problem, and a possible modification which would increase the maximum permissible weight of this model to 2300[illegible] is being explored—however, we are not yet sure that [illegible] proposed fix is practical. In the meantime the balance problem is to be solved by fitting a removable tail weight. The correct use of this weight will keep the C of G within limits and should certainly improve the handling characteristics of the aircraft. Perhaps you have other thoughts on this problem—we would appreciate your comments and suggestions.

## CHSS-2

### Engine Ice Ingestion

The possibility of the Sea King's T-58 engines being damaged by ice ingestion is a known problem, and a restriction has been imposed on the aircraft by prohibiting flying into known icing conditions (not a very satisfactory solution from an operational viewpoint, we agree).

Tests have been conducted by the USAF using a removable [illegible]le arrangement installed in an S61R. The results were encouraging although some power loss was experienced; the Sikorsky company are now working on adapting the device to the SH3A (Sea King). This is not the type of fix that can be accomplished in a week, but work seems to be progressing satisfactorily.

## CF104

### Flight With a Failed Nozzle

The CEPE report on flight with failed nozzle is available now to all units in Air Division and ADC. We think it is an excellent report even though it may contain some controversial statements that could promote argument amongst 104 drivers. Nevertheless, if you are familiar with the contents of this report, and if you ever find yourself in the unhappy position of being unable to rectify an open nozzle condition you should be in a good position to make a rational decision to eject or "have a go". With all the effort that has gone into improving the ENCS we hope you will never be faced with such a decision.

### Emergency Nozzle Closure System Modification

All CF104 pilots should by now be familiar with Mod EO 10B-10C/6A/48. This mod introduced a servo dump valve and accumulator bleed valve in the emergency nozzle closure system to eliminate a lag in lock operation which can occur with aerated oil. The failure of the ENCS system to function as intended, due to oil loss, has been of great concern to everyone connected with the program, and this modification has been designed to overcome the problem.

Kits are being shipped at the rate of 15 per week (initial deliveries commenced mid-December) and mandatory completion date for this mod is established now as 15 Sep 65. In the meantime, all aircrew when "signing out" an aircraft for flight should know whether or not this mod has been completed.

### Modifications with Flight Safety Implications

You should already know about these mods; if not, we suggest you look them up NOW:

EO 05-165A/6A/243—Installation of Spring-Loaded Stretch [illegible]ds on MLG aft doors. This one has been issued to improve [illegible]ability of MLG retraction and eliminate the necessity for sensitive adjustment of aft door actuating rods.

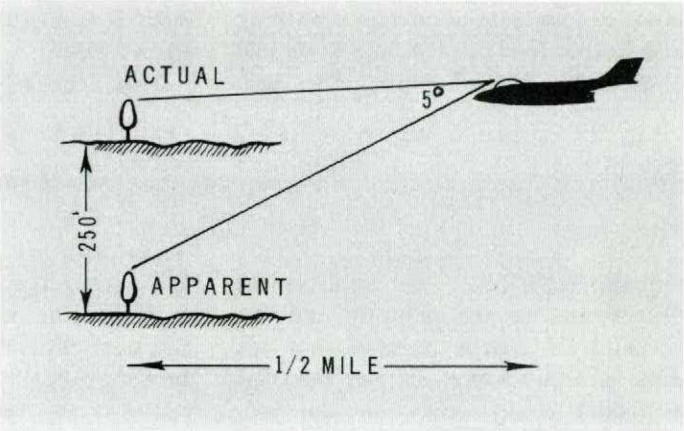
EO 05-165A/6A/251—MLG Electrical System. Issued to prevent inadvertent opening of MLG forward doors during flight.

EO 05-165A/6A/256—Replacement of Wing Flap Selector Switch. Flap selector failures should be eliminated by incorporation of this mod.

# Flight in Rain

Low-level flying at very high speed is an exacting task. From that very first time, probably dual in a Harvard, every pilot gets a thrill from the great sensation of speed that low flying conveys. But also on that first flight it is obvious that the closer the ground or the higher the speed, the less room there is for error.

And since there is so little room for error it is well to keep in mind that when flying in rain in addition to the reduced visibility there is an error in vision due to refraction. This phenomenon will cause objects ahead of the aircraft (trees,




hills, etc), to appear lower than they really are because the reduced transparency of the rain-covered windshield creates an apparent horizon below the true one. Also, the ripples on the windscreen cause objects to appear lower. The two can combine to make an error of approximately 5°.

Thus an object one half mile ahead can appear 250 feet lower than it really is. Reaction time of pilot and aircraft being what it is, this phenomenon is something to watch out for. And for those who do not normally fly low level, this could be a hazard during a circling approach or on final approach to landing.

# ARRIVALS and DEPARTURES

HERCULES, UNLOADING While off-loading a CF104 wing from a Hercules the trans tech could not make the ramp lower using the manual hydraulic system. (The equipment was serviceable but the ramp would not lower because the ADS rods were installed.) In spite of adequate warning and instructions printed on a plate just above the control valve, the tech turned on the auxiliary pump while the valve was in the number 4 position. This caused the ramp to rise rapidly and to jam the CF104 wing against the top of the ramp door. The ramp door was damaged, the leadingedge of the 104 wing buckled, and the pressurized skin of the wing was punctured in two places.

This accident was the result of the trans tech operating controls with which he was not completely familiar. His training course on this equipment had been three years previously. The supervisors must also share the blame because of inadequate instructions pertaining to authorization and competence of personnel employed on such duties.

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CF104, TOWING A replacement CF104 was needed urgently and the corporal in charge decided that his crew of three (since no one else was available) could safely do the job. Another CF104 having a wheel changed was partially blocking the neck of the button but the corporal thought there was just enough room to get by. After assuring himself that the right wheel was on the hardtop, he stationed himself at the left wing to ensure clearance with the other aircraft. Once the wingtips were clear, he directed the driver to turn sharply left. However, the turning radius of tow vehicle plus the long tow bar was too large; the right wheel ran off the side of the hardtop and sank axle deep. There was only slight damage to the starboard pylon but a crane was required to get the aircraft out.

Although this accident might appear to be simply an error in judgment on the part of the corporal, closer examination shows that actually, it resulted from a conscientious attempt to meet an urgent operational requirement in an environment where the slightest error could cause an accident. Although the old adage "haste makes waste" is evident here, the real cause of this accident was inadequate parking and servicing areas.

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CF104, $0^2$ ACCESS DOORS Twice last fall, and at the same wing, CF104s returned to base with the oxygen access doors missing. In both cases the doors had not been fastened prior to flight. Fortunately neither of them went through the engine (perhaps it is surprising that they didn't) but it brings to mind a CF104 that was lost last spring because it ingested a "piece of aircraft skin". Whether it was in fact the oxygen door is not known but the door was highly suspect.

It's too bad the manufacturer didn't hinge these doors at the front rather than the top, but since he didn't the consequence of taking off with it undone can make the difference between flying home or walking home.

Obviously the door must be checked before flight. These two incidents have sparked an amendment to the d[illegible] seven to spell out specifically [illegible] groundcrew's responsibility to ensure such panels are fastened. And pilots—it's worth your while to give the areas ahead of the intakes special attention on the external check. You're the one who'll have to do the walking—before and after.



EXPEDITOR, TOTAL ELECTRICAL FAILURE The weather was 2,500 feet overcast in light rain. The Expeditor had pre-takeoff check complete, the windshield wipers on slow, and all ready to go. The aircraft began to roll on takeoff; everything seemed normal but oddly, the windshield wipers began to slow down and finally came to a stop. Once airborne the gear was selected up but the red undercarriage light was off. It didn't light on "push-to-test", nor did the green light. A further check of the cockpit revealed a complete electrical failure.

By this time the aircraft was in cloud; they had no choice but to level off at the clearance altitude. The situation was now a bit dicy—the flight was over mountainous terrain near Vancouver with no radios or nav aids, and nothing working but the standby compass and the vacuum and pressure instruments. To carry on the flight as filed, navigating by dead reckoning, and then let down at destination by guess would be too hazardous. Fortunately, someone spotted a hole in the clouds and a visual descent and landing was made without further incident.

This "hairy" episode was caused by the pilot. After starting, he neglected to return the starter selector switch to the central or "OFF" position. During taxi and takeoff, rainwater had leaked behind the instrument panel, shorted the starter switch and caused the port engine starter motor to operate. The starter, having no fuse, overheated and burned; this in turn shorted out the batteries. When they failed, the generators took up the load but the shorted starter overloaded the generators and caused the 105 amp circuit breakers to blow. And so, a total electrical failure.

Water leakage in the Expeditor windshield area is not uncommon. Although AOIs state that the starter selector is to be switched OFF after starting, most Expeditor pilots have at one time or another left it on. But a total electrical failure in cloud is a most unhappy situation to say the least. That little starter selector switch might be worth adding to your own "personal" vital actions check before takeoff—just to be sure.

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TUTOR, CRACKED WINDSHIELD During a letdown at Saskatoon in a Tutor, the pilot noticed ice accumulating on the windshield and turned on the windshield de-icer. After overshooting and on climbing through 18,000 ft on the way back to Moose Jaw, a crack started in the left-hand windshield panel. The pilot immediately descended to below cabin pressurization altitude and was able to land at Saskatoon without further incident.

A straightforward case of pilot carelessness? In a way it is, because the pilot simply forgot to turn off the de-icer while being preoccupied with the overshoot procedure. But on the other hand, it is a very understandable error. It seems that the corrective action should be to modify the system rather than to try to eliminate pilot forgetfulness. Otherwise we are bound to lose canopies, or even aircraft. If it can happen to this A1 category instructor, it certainly will happen to student pilots unless the system is modified.

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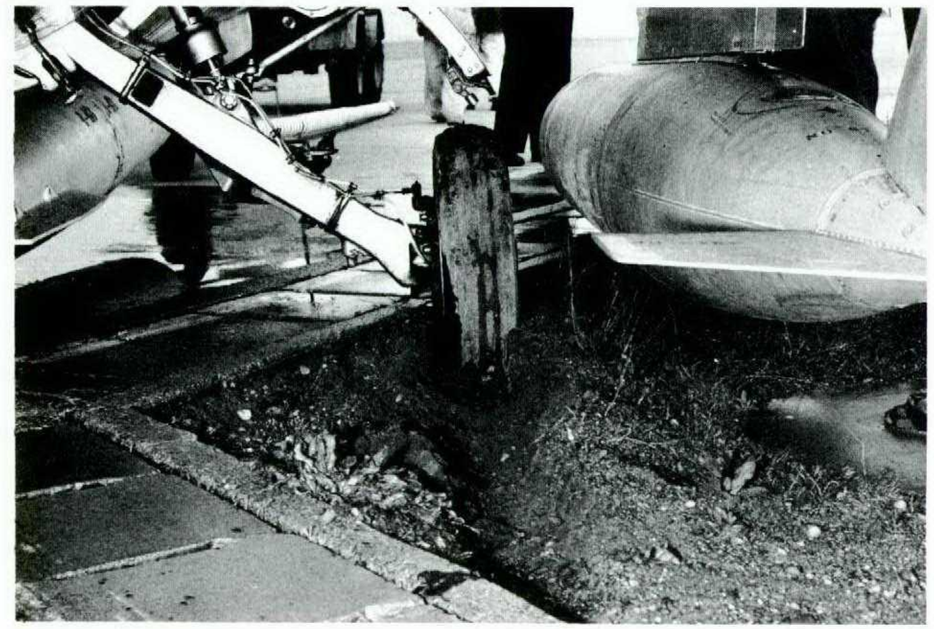
CF104, TAXIED INTO THE DIRT Taxiing out for takeoff the pilot noticed another aircraft behind him with an earlier departure time, and pulled off to one side. This manoeuver meant taxiing around an angled corner in the taxi strip. The pilot misjudged and ran his starboard wheel into the dirt damaging the starboard pylon tank.

This incident raises a question whether such a sharp angle constitutes a hazard. While it can be argued that any pilot running his aircraft off the taxi strip is to blame, the design of airfields still often takes no cognizance of the inevitability of aircraft running off these corners. The photograph strikingly illustrates the point.



**T33, COCKED NOSEWHEEL** At 75 kts during takeoff at North Bay in a T33 the pilot noticed a sudden tendency for the aircraft to turn to the right. This was readily corrected however, and disappeared at 95 kts when the nosewheel lifted off the runway. When safely airborne, the gear was retracted but the nose gear would not indicate locked up. A reselection was tried but the nosewheel still indicated unsafe. The weather at the Bay was poor so the pilot decided to land at Ottawa, his planned alternate. Approaching Ottawa, a pilot in another T33 was vectored in and confirmed that the nosewheel was cocked about 45° to the right.

When fuel was down to a safe landing weight, the pilot made an approach to the runway, holding his airspeed about 10 kts higher than normal so that he could touch the nosewheel down momentarily in an attempt to straighten it. (This technique has the advantage that if the cocked wheel did not straighten, the pilot could overshoot and land on a strip of foam.) In this case, the wheel appeared to have straightened and a normal landing was made.

The cause of the cocked nosewheel could not be positively determined, but was probably unserviceable shimmy dampers. The T33 nosewheel is fairly reliable but USAF experience indicates that a combination of weak shim dampers and puddles on the runw might cause the nosewheel to cock. In most cases the technique used by this pilot will straighten the wheel for a normal landing.

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**ALBATROSS, UNDERCARRIAGE** On the approach to Port Hardy in an Albatross, the pilot selected undercarriage down as usual. All three wheels checked down and locked by the light, the horn, and the three indicators. However, the flight tech, LAC JJ Cryderman, on doing his inspection, noted that the right gear was not locked down in spite of the correct indications. The pilot overshot and reselected the gear. This time all three wheels locked down and a normal landing followed.

The undercarriage system in the Albatross has two limit switches for each wheel; one to limit up-travel, the other down-travel. In this case, when the gear was selected up, it retracted normally but the "down" limit switch for the right wheel remained stuck in the down position. However, the "up" limit switches acted normally and all three wheels indicated up. When the undercarriage was lowered, the nose and left wheels locked down before the right wheel. Since the right "down" limit switch was already sensing "down", the system erroneously sensed all were down and locked, and removed the 3000 psi hydraulic pressure before the right wheel locked down.

In addition to revealing that the Albatross undercarriage can indicate down and locked when it in fact is not, this incident demonstrates the value of having a conscientious flight tech like LAC Cryderman on board to detect just such a possibility. His alertness this instance probably averted a seri accident.

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**T33, FUEL LEAKING** The T33 was on a routine formation trip flying with the fuel gangloaded. However, at 252 gallons indicated on the counter, the fuselage tank low quantity warning light began flashing. The pilot checked that the fuel was in fact gangloaded—it was—and began an immediate ADF letdown. As he selected speedbrakes, his number two reported fuel pouring from the speedbrake well. And later, as he lowered the wheels, fuel dumped out from that area too. Fortunately there was no spark to ignite the fuel and the aircraft landed without incident.

Strangely, in spite of the obviously large amount of fuel that had leaked out, the aircraft was "ground checked serviceable"! All fuel line connections were tightened and the aircraft was test flown, and remained serviceable for the next sixteen and a half hours. Then, on another formation trip when speedbrakes were selected, fuel again poured out. Luckily the aircraft was again landed without incident although strong fuel fumes filled the cockpit.

The leaking fuel was occurring only on gangload (during formation flying) and this provided the clue; fuel was found to be leaking out of the leading edge booster pump. During the intervening flights the leading edge tanks were not used long enough to leak out a noticeable amount of fuel. Replacing the pump solved the problem.

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**DON'T BE A HERO, MR MAINTENANCE MAN**

Someday it will happen to you. Someday you will be handed a job that is just a bit over your head. It may be a job you have never done before. Or something you helped with two or three years ago and haven't touched since. Perhaps it s covered in that course you took on systems, but that was k when they got the new equipment. So you are not at all rp on this particular job, but it has been given to you. Well, don't be a "hero".

We were recently reminded of this hero business when a friend mentioned an accident that occurred a few years ago. It was a maintenance accident, an avoidable accident in which many people died. It was set up when a mechanic accepted a job he was not qualified to do, and it was triggered when he blundered ahead without telling anyone he needed help. He might have made out, but he never opened the Manual.

It is hard for us to understand this rushing in to save the day—this "hero" bit. It takes more guts to say you don't know than to clam up and hope no one discovers it. Actually, no one expects you to know all the details of a complex airplane.

It is much easier to use the help available—the manual and the experience of others—than to stumble along alone. Why take the hard way?

No bravery is required to gamble with the lives of others. If you want to bet your own life, OK, try drag racing or highway driving on a three-day weekend.

We have great compassion for the "heroes". They're sadly mistaken and not too bright. They are afraid to confess their weaknesses to themselves. Probably they don't sleep very well.

Don't be a hero. Be a professional.

FSF Mechanics Bulletin

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. . . the positioning of men will be left to the discretion of the NCO i/c who will ensure maximum coverage against possible damage. EO 00–50–19

# Open Cockpit Flight

There was a time when perspex canopies and closed-in cockpits were just a gleam in an inventor's eye. Today, however, flying in an open cockpit, particularly if it's a Voodoo, can be a chilling experience.

In this case, a Voodoo was at altitude in a maximum rate turn to attack vector, when ". . . the aircraft entered the buffet. Negative G, loud slipstream noise, dust and dirt in my eyes were all instantaneous". The canopy had fired, and for a moment the shaken pilot was uncertain whether he still had his navigator on board. The aircraft returned to base minus canopy but with a real cool crew. We are happy to report that the crew suffered no injuries and the whole thing was a straightforward operation—but it could have been otherwise.

This case brings to mind an earlier accident in which a T33 was abandoned in flight after an inadvertent canopy jettison. Following the unexpected release of the canopy one crewman ejected assuming a catastrophic explosion had occurred. The other man ejected from the rear seat, uncertain of the aircraft's condition. The canopy jettisoning cost us one T33.

Coming back to this Voodoo incident, the navigator can[not] remember in what way he activated the jettison lever. But it occurred during the period of negative G caused by the aircraft being bunted by the automatic stick pusher (to prevent possible pitch-up). High on the list of likely possibilities is that the watchstrap snagged on the handle since the navigator was NOT wearing gloves.

Situations like this only demonstrate that disasters and near-disasters are often caused by the smallest, apparently inconsequential, detail.

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# *Comments*

## TO THE EDITOR

Dear Sir:

The US Navy flight safety magazine "Approach" has a column (Headmouse—Anymouse) wherein personnel in the field ask questions, and the experts at headquarters provide an answer—provided of course the question is reasonable. Many of us in the RCAF, remote from headquarters are wondering "why don't we do this, or that?" Such a column could be very interesting and informative. Here's my "Why don't we?" in the event that you think it might be a good idea for Flight Comment.

GCA controllers in the USAF, tell the pilot how many feet too high or low the aircraft is. Although it can be argued that they cannot read their scope accurately enough to give such exact figures it is still, nonetheless, very useful information to the pilot. It gives an indication of the amount of correction required to regain the glide path. The RCAF system of the controller suggesting a rate of descent is often meaningless. . . As an alternative it has been suggested that GCA should give the altitude the aircraft should be passing through, much as is done on a surveillance approach but continue to give high or low on the glidepath as well. I have some reservations on the merits of this combination "precision-surveillance" GCA but think it worthy of consideration and some actual trials.

In any case, there is one point that we should definitely adopt now: GCA should at some place during a precision approach, state the altitude that the pilot's altimeter should be reading. Perhaps this could be at glidepath interception altitude or maybe closer in would be better so that higher accuracy could be achieved. Anyway, GCA should closely monitor glidepath interception and if it is intercepted at any distance other than where it is supposed to be, then GCA should query the pilot on his altitude. This last point alone would probably have saved the Bristol that crashed near Marville in 1963.

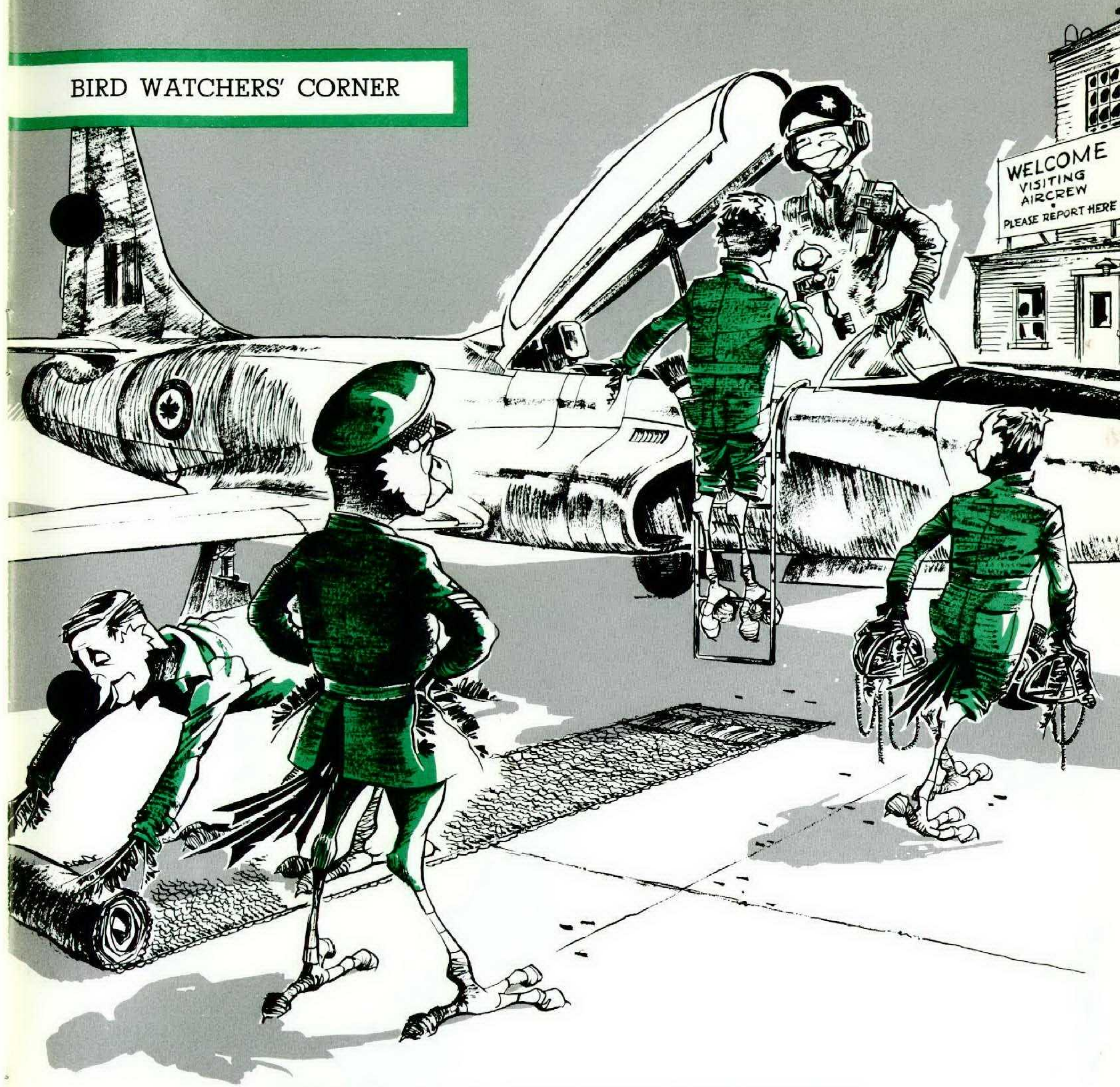
F/L RE Pridmore
Stn Uplands

Your suggestion is a good one—actually, we have been hoping our "letters to the editor" column would take on this flavour. Often, the cause of Flight Safety can be promoted by answering your questions and parrying your thrusts. Our previous issue contains two articles (Don't Colour Me Orange, and Somewhere Over the Rainbow) which are in this vein.

The appropriate CFHQ directorate had this to say about your "Why Don't We?". "This problem was discussed after the Bristol crash and also at a CICP conference last November, and TCHQ has been commissioned to carry out trials. Under evaluation will be: controller workload, altimeter error (true altitude versus indicated altitude which is based on standard atmospheric lapse rate) plus normal instrument position error, pilot reaction to conflicting information ("on glide path, but altimeter does not check out"). On the basis of this evaluation decisions will be made on the several proposals for amending GCA procedures now under consideration."—Ed



BIRD WATCHERS' CORNER




# CRESTED GUEST-NESTER

(Hospitabilis Superiorum)

To bird watchers a bird is known by the nest he keeps; migrant birds, particularly, look forward to observing this species of guest-nester in action. Unfortunately, Hospitabilis Superiorum is not found at all nesting areas in Canada; being a sensitive bird, this Nester can be driven to despair and indifference by poor treatment or a dearth of nest-building materials. A properly-developed specimen, however, is cherished for his cheerful chirping and accommodating manner towards his favourite feathered friend, the Itinerant Ibis. Ibises, sometimes sceptical and pessimistic when setting down in the nesting areas of others are delighted with the Crested Guest-Nester's efforts. At the end of a flight its characteristic call is indeed welcome:

**CALL: COMEINTOOURNEST ANDWE'LLDOTHEREST**

# FOD

Recent increases in engine failures on all types of turbine engines are most disturbing despite continual FOD-vigilance campaigns in the RCAF. Maintenance personnel are continuing to disregard the costs of FOD.

Perhaps it's because so much has been written on this menace that the simple crux of the matter has been overlooked:

- aircrew and passenger lives can be lost through engine failure; and
- enormous amounts of money and time are wasted (the exact costs cannot be released) but consider that one jet engine nowadays can cost a quarter of a million dollars.

Particularly has this FOD problem been noted in the T33 aircraft. The NENE has proven particularly susceptible to FOD, and locking wire clippings are prime suspects.

The photographs show the objects removed from the plenum chamber of a T33 and a damaged component from ingestion of FOD.

Those FOD posters on the wall mean something: continued carelessness can no longer be tolerated.