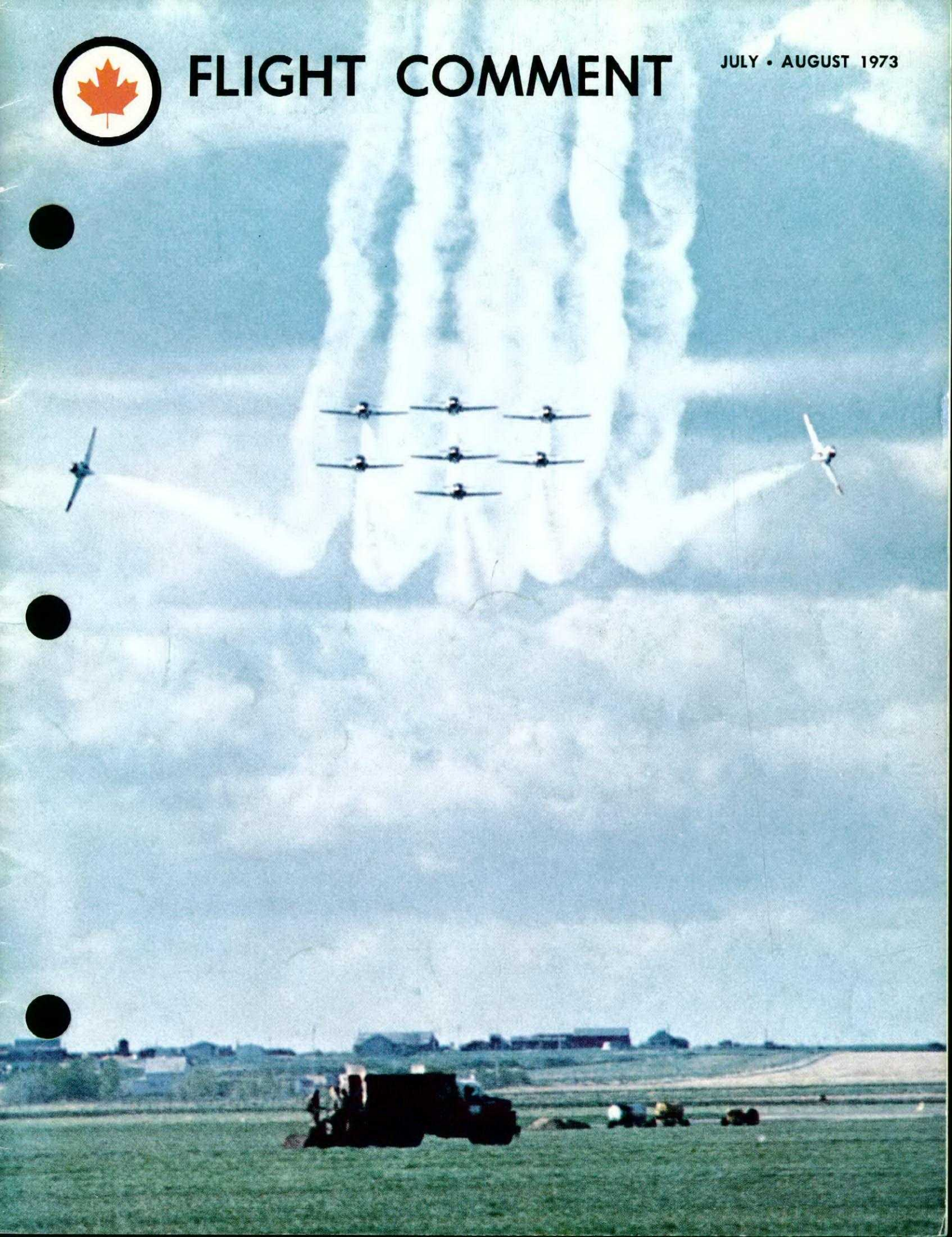
FLIGHT COMMENT

JULY • AUGUST 1973



Comments

Inertness is one of the features assumed by many, rightly or wrongly, to characterize headquarters. However, surveying "the field" from this vantage point over a period of time, one comes to realize that HQ has no exclusive claim to be so described. Case in point: When the door of a T33 luggage carrier came off in flight damaging the right elevator, the cause was clearly apparent and easy to fix – the latch assembly had been installed upside down so that only the safety pin was providing the locking function. Nor was it an isolated case as this particular "murphy" was found on several other aircraft. The urgency that this discovery would seem to suggest notwithstanding, the UCR and Mod Leaflets were not forwarded by the base until more than six months later.

One function pilots perform (inadvertently in most cases) on their cross-country flights is that of unofficial quality control monitor for contractor-supplied services at non-CF bases. To be effective however they must be aware of the services the contractor is required to provide. This information is available from your SOFS.

A growing source of FOD hazard in recent years has been the widespread use of plastic name tags, metallic command badges and slip-on rank insignia on flying clothing. To counter this trend a recent NDHQ directive states that only cloth name tags will be authorized and these must be sewn to flying clothing. Additionally, rank insignia is to be stitched to epaulets or sleeves, and no metallic badges or other metallic accoutrements are to be worn on flying clothing. So says CAO 57 10 May 73.

Front Cover *Snowbirds working up entry manoeuvre at Moose Jaw. Photo by Royal Netherlands Air Force pilot trainee O/Cdt Z.E. Kipke.*

NATIONAL DEFENCE HEADQUARTERS — DIRECTORATE OF FLIGHT SAFETY

COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

MAJ O. C. NEWPORT
Education and analysis

LCOL F. G. VILLENEUVE
Investigation and prevention

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Practising For an Accident

Not too long ago our basic training philosophy was to practise every conceivable emergency and operational procedure in order to be prepared for and capable of handling almost any situation.

There are many arguments in support of such a philosophy but, when human life is involved, we must always consider most carefully the training value of any particular practice or procedure. Before the advent of the simulator the list of such practices was limited only by the imagination of a zealous group of airmen and, in case you have forgotten, the following are a few of the more controversial that are still at issue in one way or another:

a. engine failures at critical stages of flight, particularly multiple failures compounded by the loss of other services;
b. minimum distance landings including maximum braking with or without anti skid systems;
c. aborting takeoffs at critical points;
d. practice relights in single engine jet aircraft; and finally
e. autorotations.

By now emotion must have entered the picture to some degree and I am sure your immediate reaction is that it's just not that simple. True–but in most instances a close examination of the procedure and a little common sense can pinpoint those practices that should be eliminated; or performed within very specific limitations.

In the last year or so a great deal of pressure has been applied to have operators critically examine emergency training, and other procedures, to eliminate unnecessary and unrealistic practices wherever possible. Much has been done but in my opinion we are still doing things without adequately considering the relationship between the accident potential of the training and the real thing. We must continually examine every aspect of our training programs: why are we doing it, how are we doing it, and is it saving lives and materiel.

COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

AMMIS

...aircraft maintenance management information system

AMMIS, standing for "Aircraft Maintenance Management Information System", is the name of the latest automated tool to be used for aircraft maintenance management in the Canadian Forces. AMMIS will be applied to most aircraft in the CF inventory, introduction presently scheduled for completion in March 75.

Capt H.E. Burch
NDHQ

The overall AMMIS program has been conceived in a basic three part project:

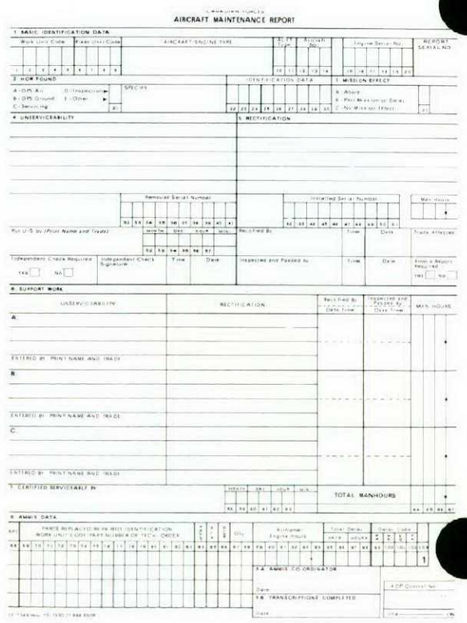
- **Revision of Data Product** This revision has now been accomplished, and encompasses the program of reworking the CF31A Data Product into a presentation giving senior and middle management an easily readable source of maintenance activity information. Trend lines are now being automatically computed, and activity rates are only shown for the top twenty systems, or parts of systems. Development and consolidation of the required input forms has been carried out during this phase as well.

- **Introduction and Implementation** commenced with the aircraft fleet at CFB Moose Jaw in April of this year. In August the CF101 and CF5 aircraft at CFB Bagotville will be converted to AMMIS, and by April 74 all aircraft presently on the CF31A Data System will be on AMMIS. April 74 to March 75 will see all the helicopters, Cosmopolitans, Falcons, Musketeers and T33s placed on AMMIS. The only aircraft presently not planned for AMMIS are the Dakota, CF100, and Otter. Introduction is carried out by a team composed of NDHQ and AMDU personnel who use a formal lecture approach followed by intensive "on job" support for the first days of using AMMIS. This approach has produced initial good results on the Tutor aircraft.

- **Contractor Reporting and Data Product Evaluation** Studies are being carried out to determine the feasibility and practicality of placing aerospace repair contractors on AMMIS reporting. Another aspect being studied is the establishment of bench marks to cut down the data product size by printing only activities that become high rate exceptions to the accepted bench mark levels. An ultimate requirement will be a cost ranking system to construct a data product showing real dollar values of the various maintenance activities. An enlarged history retrieval system will also be developed during this phase. Target dates for completion of this phase have not been established as yet.

AMMIS is comprised of four new forms identified as CF/T349 *Aircraft Maintenance Report*, CF/T337 *Aircraft Maintenance Report (Support Work)*, CF/T349A *AMMIS Correction and Continuation Report*, and CF/T31A *Aircraft Maintenance Report*. These form numbers are identified by numbers that are very similar to existing form numbers, however, the "T" indicates they are of a "temporary" nature pending sufficient field use to allow for a thorough review of any possible shortcomings. Thus, after a year's use the identifying number will probably change. The following description applies to the forms:

CF/T349 Aircraft Maintenance Report is a combination of the presently used CF349 and CF31A to provide one form in lieu of two. An examination of the form will reveal very few essential differences from the original forms, and in some areas should prove much easier to use. A technician completing a rectification will now be able to do all the necessary paper work all on one form. At this time AMO 00-15-2 still applies for all the legal requirements of aircraft log set completion. The CF/T349 provides the basic inputs for aircraft maintenance action reports and provides the information that is printed out monthly in the Aircraft Maintenance Management Information report.

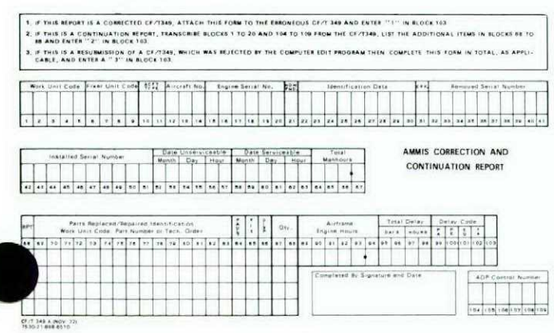


CF/T337 Aircraft Maintenance Report (Support Work) is a continuation of Part 6 of the CF/T349 and provides additional spaces for recording maintenance support action necessary to complete a rectification.

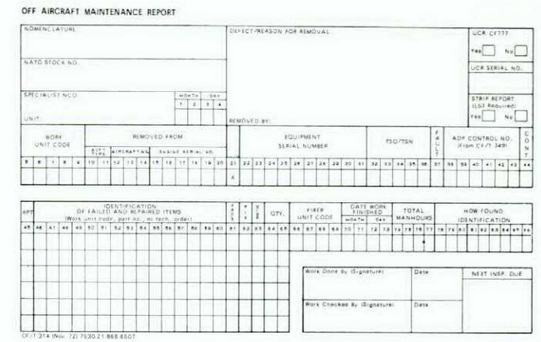
The CF/T337 is not an input for key punching, but the manhours listed on it are transferred to the original CF/T349 to provide the total manhours package which is fed to the computer.

CF/T349A AMMIS Correction and Continuation Report has three basic functions:

1. A Correction Report is submitted when amendments are required to a CF/T349 after the CF/T349 has been signed off and becomes a legal document.
2. A continuation report to detail additional information listed in part eight of the CF/T349.
3. A unit submitted correction report on request from NDHQ if a CF/T349 fails to pass the computer edit program.



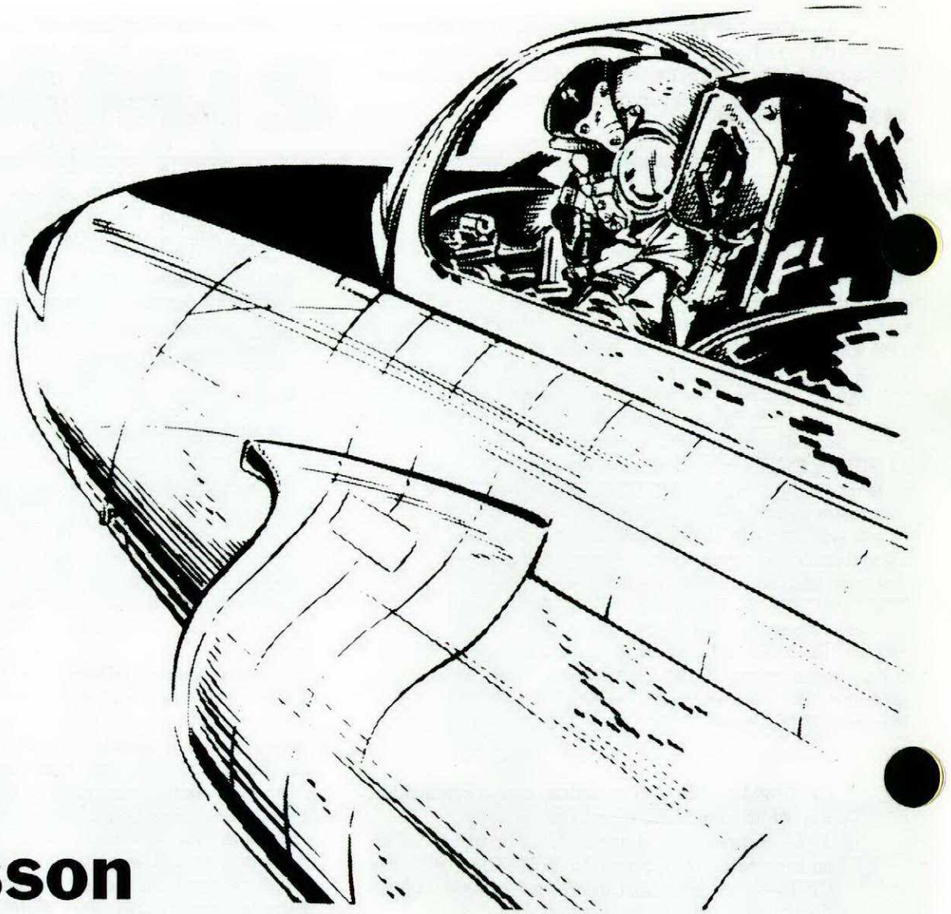
CF/T31A Off Aircraft Maintenance Report is used to submit all maintenance activity carried out in the various workshops of a flying unit. The input from this form provides the history background on failures, parts replaced and corrective actions taken to the various components, assemblies and systems of an aircraft. A further logical step is the use of the CF/T31A as a local work order between shops to control and record the various activities carried out on an item as it undergoes repair on a flying base or unit. The information computerized from the CF/T31A provides the necessary historical background that will be used by item technical managers. Any information required for component studies will be retrieved as required.



Thus, while AMMIS may initially appear somewhat complex, a careful look at the system will allay most misgivings. The inputs required from the technician are the same as presently called for in CF349 and CF31A completion, but the tying of the two forms into one main form should prove a very definite improvement. Limited experience to date indicates simplification of the AMCRO staff work load, and ready adaption to the new forms by the technicians on the floor. Aircrew will see virtually no change from present known CF349 Aircraft Card Practices. There is a very real promise that the combination of good information inputs from the field maintainers and the new data product format will give tangible management results in the near future. Forms can be changed if need be, and computers can be reprogrammed, but the greatest variable that requires the utmost attention and dedication of every man involved with aircraft maintenance in the Canadian Forces is the input and this means the correct and honest completion of the CF/T349 and CF/T31A.

Captain Burch joined the RCAF in 1948 as an Electrical Technician Aero and served eight years on aircraft maintenance duties followed by ten years of flight simulator and trainer maintenance. In 1966 he was Commissioned from the Ranks as a Technical Aeronautical Engineering Officer and spent the next three years in Maritime Command Headquarters as the Technical Staff Support Officer. This was followed by a three year tour in CFHQ in the Directorate of Aerospace Maintenance as the Officer responsible for technical management of Integral Systems equipments.

At present, Captain Burch is the AMMIS implementation and training co-ordinator in the Directorate of Aerospace Maintenance Resources of NDHQ. This includes the scheduling of AMMIS introduction on CF Aircraft fleets, the introduction of the system to the various field units, and the initial co-ordination (with Aircraft Maintenance Development Unit Support) of all field level indoctrination and training.



Lesson From a Swell Guy

(This story is a true one, but the author prefers to remain anonymous.)

He was a heck of a swell guy. You know, the type with a smile as inviting as a log fire in winter and the talent to make you feel like you must have known and liked him someplace before. He was a tremendous stick and rudder man, and he always used his head – except in that one fatal thing.

I was a sprog pilot when I met him and was timid and green in my first operational squadron. But when he picked me up in his flight he made me feel like a veteran, and I grew two feet taller through his respect.

On his wing in the weather, I was as secure as a chick under an old hen's feathers. When he'd spread us out so he could relax and have a cigarette, I could see him surveying his flight with satisfaction. He taught me a lot, that first flight commander, but the final lesson outshadows all the others.

It was an ideal day for a cross-country, and the three of us had already flown through a sparkling sky from the east coast to a field in Tennessee. I remember that we had filed, finished our preflights, and already strapped into the cockpits when he gave us a hold signal. With strong curiosity I watched him unstrap and climb down to the ramp. Then I watched him give an embarrassed shrug towards me and walk across the ramp to a canteen and buy a pack of cigarettes. As he walked back to the bird he put the unopened pack into his shoulder pocket, looked over at me, and patted the pocket lovingly. I suppressed the slight irritation that I felt. "Every man has his vices," I thought.

We lifted off the runway one by one, joined in the climb, and leveled at 32,000 feet. Reporting points slipped below us and his calls were crisp. Then, about 30 minutes into the flight, he moved us out into spread formation and we headed on towards Texas. The next reporting point required a 20-degree change of heading. As we passed overhead, I waited expectantly for the call and turn, but no call came and we bored on straight ahead. After 60 seconds I called him. "Zebra One, I show shrieveport at 6 o'clock." But there came no answer.

Suspecting radio failure, I moved in close on his wing and stared at his canopy. His head was down in the cockpit. "Zebra One, this is Zebra Two, over?"

At first there was no movement, and I fairly yelled into the microphone. "Zebra One, do you hear?"

Then the helmet raised slightly and stayed just long enough before it dropped again for me to see that the mask wasn't in place.

"Connect your mask! Go hundred percent oxygen" I called. I said it several times, but he never raised his head again. His aircraft dropped off slight on the right wing and began a wide, shallow spiral downwind.

We stayed on his wing down through six or eight circles, then broke away with minimum fuel for the nearest base. My last view of him as I dropped away was of silver wings slicing serenely against a deep summer sky.

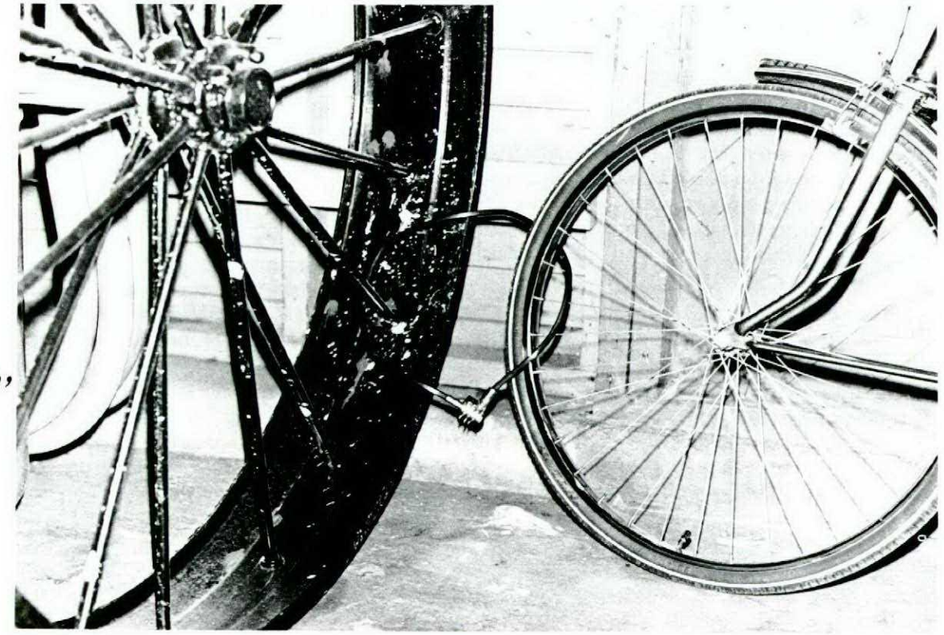
As we walked into operations at the divert base, the dispatcher was taking a call from a farmer who was sure an airplane had just dug a hole in his cotton field.

Of course, I didn't see the accident report until weeks later, but I'll never forget one item in it. After describing the almost total destruction of the airframe and relating the high content of carbon monoxide in the few bits of flesh that were recovered, it listed the personal affects that were found. Among them was an opened cigarette pack with two cigarettes missing.

He was a heck of a swell guy who taught me a lot. It's too bad that his last lesson cost him so much.

courtesy AIRSCOOP

"Yes Sir, we've solved the problem of people stealing our fire extinguishers!"



Good Show

Lt J.G. Pew

Lt T.L. Bashow and Capt T.J. Straub

Capt R.L. Johnson

Capt J.F. Mann

Mr. N. Gammie

LT J.G. PEW

Approximately 120 miles out of Calgary on a solo night trip to Comox the generator fail light illuminated in Lt Pew's T33. He immediately declared an emergency, turned off all non-essential equipment (UHF, TACAN, IFF, ADF, etc) and received clearance on his emergency UHF for a return to Calgary International airport. Since he was approaching Calgary from the Northwest he decided to save time by doing a straight-in approach to Rwy 16 rather than Rwy 34 which was the active runway. The weather at Calgary was 2 to 4 miles in snow with surface winds from the N.W. at 15 miles per hour. As the aircraft was descending, Calgary advised there was insufficient time to set up precision radar on Rwy 16, so radar vectors were requested for a visual approach to Rwy 10 which had strobe lights.

Lt Pew was now faced with a situation where he had been operating on battery power for 20 mins and was not sure how much longer he would be able to receive radar vectors. Radar was having trouble painting him due to the lack of IFF and he was using a flashlight to see his instruments. His main concern now was to get the aircraft on the ground as quickly as possible. When he finally broke out of weather 2 miles on final and saw the strobe light to Rwy 10, he elected to land rather than risk a circling approach to Rwy 34. He touched down with 470 gallons fuel on an 8000-foot snow covered runway, used maximum braking technique (raised flaps and canopy) and brought the aircraft to a stop 25 yards into the overrun. The overrun was covered with 10 inches of light snow and no damage was done to the aircraft.

Lt Pew was faced with a difficult situation at night, in adverse weather. He displayed outstanding airmanship, made correct and quick decisions and thereby averted an accident.

CAPT R.L. JOHNSON (USAF)

On attaining 100 feet and 55 knots during the demonstration of a normal transition from a hover, Capt Johnson's Kiowa experienced a total engine failure. The aircraft yawed, lost rotor RPM, and yawed again. Capt Johnson immediately entered an autorotation, declared an emergency and landed in a soft plowed field.

On the ground, technicians found that the engine malfunction was caused by the fatigue failure of at least one blade of the 6th stage of the compressor.

Capt Johnson's quick response to this emergency undoubtedly prevented further damage to the aircraft and possible injury to his student himself.

CAPT T.J. STRAUB AND LT T.L. BASHOW

Capt Straub and Lt Bashow were flying an instrument departure in cloud when a serious malfunction developed in the aircraft's attitude indicator system. Capt Straub, who was "under the bag" in the back seat, noticed it first when, during a 30-degree bank turn at 4000 feet, his attitude indicator began to show an increasingly steep climb and shortly thereafter toppled completely. Lt Bashow then took control but soon discovered that the front cockpit indicator was also giving false information. With the airspeed increasing and altitude decreasing, he immediately reverted to partial panel and was able to level the aircraft at 2700 feet, still in cloud. They then climbed to a clear area at 6000' where they burned off fuel after which Lt Bashow, with Capt Straub monitoring, flew a successful partial panel approach and landing.

Technical Investigation revealed that the attitude indicator malfunction was caused by a voltage drop in the instrument inverter, a particularly insidious malfunction since it was not accompanied by an inverter failure warning light nor by the warning flag.

Capt Straub and Lt Bashow demonstrated their professional capability in their reaction to this critical airborne equipment failure.

CAPT J.F. MANN

Capt Mann, an FIS instructor, was acting as student for a new Musketeer instructor. At 500 feet on the climbout from a touch and go, he was given a practice engine failure after takeoff. Capt Mann initiated a glide toward a suitable field and performed the normal checks. At 150 feet above ground he advanced the throttle to overshoot, but the response was a rough-running engine and only partial power. He immediately decided that it was impossible to clear the obstructions at the far end of the field with the power available and elected to force land. He landed the aircraft in a snow covered field with little damage to the aircraft and no injury to the crew.

Capt Mann's quick response and sound judgement under actual emergency conditions demonstrated a high degree of airmanship.

Cpl J.F. Grant Capt A.P. Jenkins Cpl J. Patterson

Cpl W.D. Fisher, Pte T.R. Wheatley, MCpl J.A. Daley

CAPT A.P. JENKINS CPL J.F. GRANT CPL J. PATTERSON

Captain Jenkins and Cpl Patterson were on duty in the control tower and Cpl Grant at the radar unit when three light aircraft were diverted to Summerside under rapidly deteriorating weather conditions. The three aircraft, from the Moncton Flying Club, were flying local at Moncton when a weather system brought below VFR limits to all airports in the Maritimes except Summerside. One of the pilots (the instructor) had limited IFR experience and the other two aircraft were piloted by students with no IFR experience. The weather at the time of the diversion was reported to be 300 feet scattered with visibility at 15 miles and forecast to deteriorate at any time. A PIREP from a local aircraft indicated that the scattered layer at 300 feet had now become overcast over the west end of the airfield at Summerside and the condition was rapidly moving eastward.

To add to the difficulty the instructor advised that he was experiencing radio compass difficulty and that one of the other aircraft had no artificial horizon. Capt Jenkins and his assistant, Cpl Patterson, vectored the three aircraft to Summerside radar coverage, and after consulting with the pilot of the lead aircraft Cpl Grant directed him for a radar approach. He succeeded in vectoring the three aircraft to the airport even though the three pilots had never flown a radar approach before.

The prompt response of the Air Traffic Control personnel was fortunate indeed as the ceiling and visibility dropped to 200 and ½ just as the aircraft turned off the runway. Capt Jenkins, Cpl Grant and Cpl Patterson demonstrated smooth teamwork in directing the three pilots to a safe landing.

MR. N. GAMMIE

Mr. Gammie, an employee of IMP Aerospace Ltd in Halifax, was inspecting an Argus which had arrived on the DLIR program showing a slight oil leak on number four engine. In the course of his inspection he found a broken lockwire on an attachment bolt for the engine front section. He then found that the rest of the bolts, although lockwired, were untorqued. Eight of the bolts were extremely loose and some could be turned a full turn and a half before tightening. The fact that the lockwire was intact on all bolts but one (and even that one appeared to be securely locked) had allowed this condition to go undetected for a considerable period of time.

What eventually would have happened in all probability is that a severe oil leak would have developed under running conditions and that vibration damage would have ruined the front section beyond repair, as well as damaging the threaded holes in the main crankcase section to the point where major rework would be required.

Mr. Gammie's persistence in following up what appeared to be a minor engine unserviceability (the engines are not part of the DLIR work package), prevented major damage occurring to the engine and probably averted an emergency in flight.

MCPL J.A. DALEY, CPL W.D. FISHER PTE T.T. WHEATLEY

MCpl Daley, Cpl Fisher and Pte Wheatley were a load crew during a mass load of CF101 aircraft. After completing their armament load, MCpl Daley noted that the "Launcher Hot" light was on in the cockpit, an indication that something was wrong with the armament. He ordered the missile rails lowered and a close inspection of the missile showed that its forward and aft fuselage sections were completely separated. Since this problem could not be rectified on the flight line, another missile was ordered to replace the defective one. The crew had to remove the broken missile one-half at a time, an operation not practised in normal training. They loaded the new missile on the rails and still had their load complete within the prescribed maximum time.

An investigation showed that the defect in the missile had not been visible during the loading phase; the cause of the separation was a worn internal spur

and the forces involved in retracting the launchers proved enough to unlock the internal ring holding the two sections together.

The fast and professional appraisal of the situation by MCpl Daley and his crew and their cool handling of its rectification, prevented the possibility of an airborne mishap.

CPL N.T. HYDE

Cpl Hyde was carrying out an "AB" inspection on a CH113A helicopter. All visible and normally inspected areas of the engine were satisfactory, however, going beyond the requirements of the "AB" inspection, he also checked the engine mount for bearing wear and detected a faint rattle. Further investigation revealed six bolts missing from the power turbine flange on the upper side of the number two engine. Subsequent dismantling revealed the power turbine starting to rub.

Cpl Hyde's attention and thoroughness prevented a possible hazardous situation from developing. Further operation would, at best, have resulted in extensive damage and possible disintegration of the engine.

CPL O.C. DOREY

While performing a Periodic Inspection on a Musketeer, Cpl Dorey noticed a possible crack in an engine mount. Because there was some doubt, he repeated a dye penetrant check three times on the mount before finally convincing himself that it was in fact cracked. He then informed his Senior NCO and put a major entry on the aircraft.

Cpl Dorey's perseverance in a routine inspection brought to light an extremely difficult to detect fault in an engine mount. This discovery averted an in-flight failure of the mount and possible serious consequences.

CPL T.M. McGUIRE

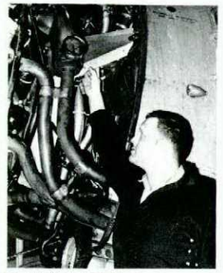
Cpl McGuire, an AETechnician, was assigned to rectify an oil leak snag on an Otter. After completing the job, which necessitated replacing the CSU oil delivery line, he conducted a general inspection of the engine during which he found a cracked clamp holding the top left forward inner panel assembly to the top left power unit support. When he removed the clamp he found that there was an excessive freedom of movement in the engine mount support. On further investigation he saw that the upper left power unit support assembly was completely fractured. The entire assembly required replacement.

The thoroughness of Cpl McGuire's inspection eliminated the possibility of a serious hazard developing later on.

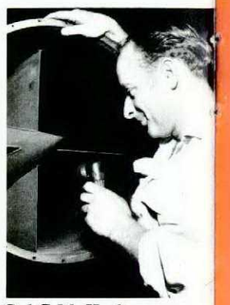
Cpl O.C. Dorey

Cpl N. T. Hyde

MCpl R.E. Gibbons



Cpl T.M. McGuire



Cpl G.W. Hudson

MCPL R.E. GIBBONS

MCpl Gibbons was preparing to carry out the AB check during a 707 quick turnaround. As the aircraft taxied into the "slot", he noticed that the trim tab on the right inner aileron was fluttering. Suspecting an irregularity, he checked the trim tab on another aircraft and found that the tab did not flutter. He then went to the engineering orders which indicated that the flutter was probably the result of the inner bearings of the trim tab being worn beyond limits. An examination of the trim tab confirmed this and the aircraft was placed unserviceable.

Although the ailerons are examined visually before and after each flight, the fluttering condition would not likely have been noticed with the aircraft stopped and no airflow over the wing. MCpl Gibbons demonstrated keen observation in discovering the malfunction.

CPL G.W. HUDSON

Cpl Hudson had just completed a fuel line repair and was conducting a pre-start walkaround prior to an engine test runup. While checking the tailpipe, he detected what appeared to be a damaged area ahead of the turbine blades. Crawling up the tailpipe, he confirmed that one of the nozzle guide vanes was bent beyond acceptable limits.

Spotting a defect of this nature from the back of the aircraft is extremely difficult. Cpl Hudson's thorough inspection averted the onset of more serious engine damage.

My Nose Knows

by Captain G.B. Bennett

Old Chinese riddle: Why does it smell when we break wind? To warn the deaf.

Aircrew are members of the animal kingdom. Some aircrew are occasionally referred to as animals in their more relaxed moments! And as members of that large group they are equipped with the senses of sight, hearing, touch, taste and smell. The uses to which we put sight, hearing and touch are multitudinous and obvious. Taste and smell are pretty well variations of the same sense, but it's the smell part of it that I would like to talk about. My remarks are made with a flying background almost exclusively gained in "no mask" aircraft types and my last seven years have been spent on the Argus.

You should smell an Argus!

The normal smells include rubber (on the floor), electrical gear (all over the place), ozone (when the Jezebel detection system is in use), toast, coffee, oranges, frying steak, mushrooms, bacon, garlic, and various smells of human origin including the occasional aroma that accompanies advanced cases of airsickness. But even with that sort of "background noise" assaulting my smell sensor I have found that in many cases the first indication of something going wrong in the aircraft has been the detection of an anomalous smell. For example a smell of burning paper before starting up was later found to be coming from the landing gear warning horn in the hopes of burning out; a sudden onslaught of hydraulic fluid smell on climb out was traced to the nose wheel well, where the top of the oleo leg had cracked; a smell of burning insulation warned of a searchlight amplifier going berserk. If we get a whiff of fuel before start up it usually indicates that the second flight engineer did a thorough pre-flight inspection and was standing downwind when he checked the fuel contents with a dripstick.

One thing that is important to bear in mind is that some stinks are also downright dangerous. Most electrical insulation these days is made of plastic, and when it burns it gives off fumes that can cause dizziness, unconsciousness and in high concentrations, even death. Quite a few Argus operators have had a windshield wiper resistor burn up and can vouch for the toxic nature of such fumes. And a plane full of toxic smoke at 50°N 30°W can ruin your whole outlook for a minute or two!

Now it seems to be sad but true that we can only identify a smell by recognition; we have to have been exposed to a particular smell at least once in order to know what it is on subsequent occasions. We don't have a "Critical Smells Recognition Course" in the Canadian Forces as far as I know except of the OJT variety. And another complication we must cope with is what I'll call "smell overkill". By this I mean the phenomenon which occurs when you get a good whiff of let's say fuel fumes and from then on for quite a while you can't tell whether it's still there or it's gone away. Your smeller seems to tune out that frequency in self defence.

A quick analysis points to three methods by which we use our noses to troubleshoot aircraft problems:

a. for Initial detection;
b. as Corroborating Evidence;
c. as Confirmation of Previous Warnings.

As examples I submit the following little scenarios from Argus operations:

(a) INITIAL DETECTION

Pilot: *"Phew! Hydraulics. Anybody else getting that stink?"*
Co-Pilot: *"We just left Lajes. It might be the snails in garlic sauce you ate last night."*
Flight Engineer: *"Stand by, pilot. I'll get the second FE to check the artificial feel unit".*
Second FE: *(after a short tour in the nose crawlway) "Yeah pilot, one of the lines is dripping hydraulic fluid on to the tray down there, and the sight gauge shows damn near empty."*
Pilot: *"!*?+!*"@."*

(b) CORROBORATING EVIDENCE

Flight Engineer: *"Pilot, number four TRU is drawing away too much power, and the other three show almost zero amps."*
Tactical Navigator: *"Pilot, there's a terrible stink back in the Tac compartment. I think it is electrics."*
Pilot: *"Engineer, trip off number four TRU."*
Flight Engineer: *"Roger. Tripped."*
Tactical Navigator: *"That stink seems to be going away now, pilot."*
Pilot: *"Roger. Keep me advised."*

(c) CONFIRMATION

Pilot: *"I sure enjoyed those garlic snails last night!"*
Co-Pilot: *(Opening fresh air vent) "Thanks for the warning."*
Rear Lookout: *"Phew!"*

In all these quite typical scenes the sense of smell was an important input into a logical diagnosis of a problem. I suggest that all of us should be able to detect and recognize the smells of:

a. fuel;
b. hydraulic fluid;
c. burning rubber;
d. burning plastic insulation;
e. boiling batteries;
f. overheated brakes;
g. anything peculiar to our particular bird that can be critical.

I am a firm believer in the ability of my schnoz to tell me things, and when it does I pay attention. It has seldom given me duff gen.

ABOUT THE AUTHOR Capt Bennett is the deputy chief instructor for pilots and engineers on 449 Maritime Training Sqn at Canadian Forces Base Greenwood. He was previously a Crew Captain on 404 Sqn at Greenwood, and prior to that instructed on Harvards at FTS and FIS.

Aircrew Information File

How do you reach that proverbial ten percent of the population who, for reasons obscure never get the word? This long-standing and wide-spread problem is particularly serious in the flying environment. For aircrew, not knowing certain information can result in situations ranging from mildly embarrassing to catastrophic. The return from annual leave is a case in point: A couple of weeks and a few "well I'll be damned!s" later you finally piece together the procedures changes and so on that have come about in your absence. Many similar examples can be cited. In response to this problem Training Command recently introduced a system for disseminating information called the Aircrew Information File (AIF).

Present methods of spreading the word to aircrew such as formal briefings, and sign as having read orders have failed to achieve 100% dissemination. How then can this new fangled idea be successful? Well, read on and see.

First, let us admit to believing that no system yet devised will succeed unless there is a genuine effort exerted to make it successful. Also, the AIF system (like any other) will readily become a catch-all and thus lose its effectiveness unless firm control is exercised over content and operation. Having identified these possible Murphy-prone areas we hasten to add that the AIF system appears to have better potential for achieving the desirable 100% coverage than any other method we know of.

CONSTRUCTION

The system consists of a display board of sufficient size to accommodate at least six AIF items (standard 8-1/2 x 11 size). These are hung from hooks on bulldog clips so that they can readily be removed for reading. Incorporated, or attached, is an aircrew acknowledgement board and a storage file. The acknowledgement board is constructed using a Remington Rand Kardex file drawer (NATO no. 7460-21-806-6575) from which every second card has been replaced with the AIF cards. (The Kardex file can be employed in a number of ways to suit individual unit requirements). A colour block at the bottom right corner together with a plastic slide functions as an alerting system; the slide is used to cover or expose the colour block as required.

All valid AIF items not displayed on the board are retained on the storage file for future reference. The storage file is a "Whirl Board" wall file (ROTO file).

OPERATION

An AIF card is prepared for each aircrew member engaged in regular or occasional flying duties and the card is placed on the Aircrew Acknowledgement Board. TOS sign-in procedures for all new aircrew (staff and students) includes the preparation of an AIF card and a briefing on the operation of the system. Groupings by squadrons and flights provides a natural sequence to the file and also facilitates supervision.

Information for AIF entry is passed directly to the AIF controlling agency. This agency screens it for suitability, assigns an AIF number, and records the item in the master AIF file. The item is then placed on the AIF Board, preferably by an individual (designated) responsible for the AIF Board. Any items pertinent to other units, such as Test Flight, are duplicated and sent to those locations. The AIF number includes the year and the specific item number, i.e. 73/6.

When an item is placed on the AIF Board, the number assigned to it is posted on the "Latest AIF block" (Fig 1) and all individual marker slides on the acknowledgement board are moved to the "red" position. As items are removed from the board they are placed in numerical order on the storage file.

A glance at the AIF display prior to going flying informs a pilot of his status regarding latest gen. Similarly, supervisors can be instantly appraised of who has and who hasn't seen a particular piece of information. If the red marker is showing on his card, a new AIF item(s) has been posted which the pilot has not seen. After reading the information, he marks the AIF number(s) on his individual card, initials as having seen the item and moves the marker slide to cover the "red" marker.

In the event that an information item is disseminated to aircrew through briefings and so on, the AIF Board then provides a record of those who received the briefing and noted the AIF. Conversely, it provides the means for informing those who missed the original briefing, thus ensuring that they too are up-to-date before their next flight.

Anyone away from flying for any lengthy period will have his marker on red through all subsequent AIF item postings. Upon his return he can update himself on all items posted subsequent to his last signature.

A periodic review of the AIF display by the controlling agency ensures that outdated AIF items are removed.

IMPLEMENTATION

An AIF display Board is located at each operations center at which base/unit aircraft are allocated and dispatched. At units where more than one aircraft type is involved some redundancy may be encountered. Acceptance of this minor factor, or a local adjustment is necessary. Where a very limited number of aircrew are involved, a much abbreviated version of the AIF might be more suitable, for example, a roto file only to hold the AIF notices and the acknowledgement cards; the AIF Board can be dispensed with.

The controlling agency should be headed by an officer who has operational authority and control such as the B Ops O, squadron commander or a flight commander. BFSOs are not recommended for this position. The controlling agency should, of course, guide the AIF implementation process.

An education program is required to introduce the system. All aircrew have to be thoroughly familiar with the AIF operation, its potential for improved communications, and their individual responsibility for regularly referring to it for new information. During the early stages of the AIF operation close monitoring and supervision will be required until procedures become familiar.

CONCLUSION

A functioning AIF system supplements and improves the dissemination of vital information to aircrew.

No one is claiming that the AIF system is the complete solution to the problem, however as we pointed out at the outset, it appears to have a better potential for achieving the desired results than any other method we know of. Additionally, those setting up the system have the advantage of the experience gained by the USAF with their Flight Crew Information File (on which the AIF is based). The following examples show how the system can be misused:

- Employing the Information file as a catch-all and a means of self protection.
- Including in the file items that require lengthy study in order to absorb, items which should have been prepared as hand-outs.
- Messages placed on the file without first having been edited to ensure that the text is clear and accurate.

The introduction and implementation of the AIF requires a positive and co-ordinated effort, but once in operation, it provides an effective communications system, facilitates supervision, and yet requires minimal maintenance. Bases and units will no doubt be required to make some adjustments to suit individuals and/or local needs, but the AIF nomenclature and the aircrew acknowledgement card has to be standard.

AIRCREW INFORMATION FILE (AIF) SYSTEM

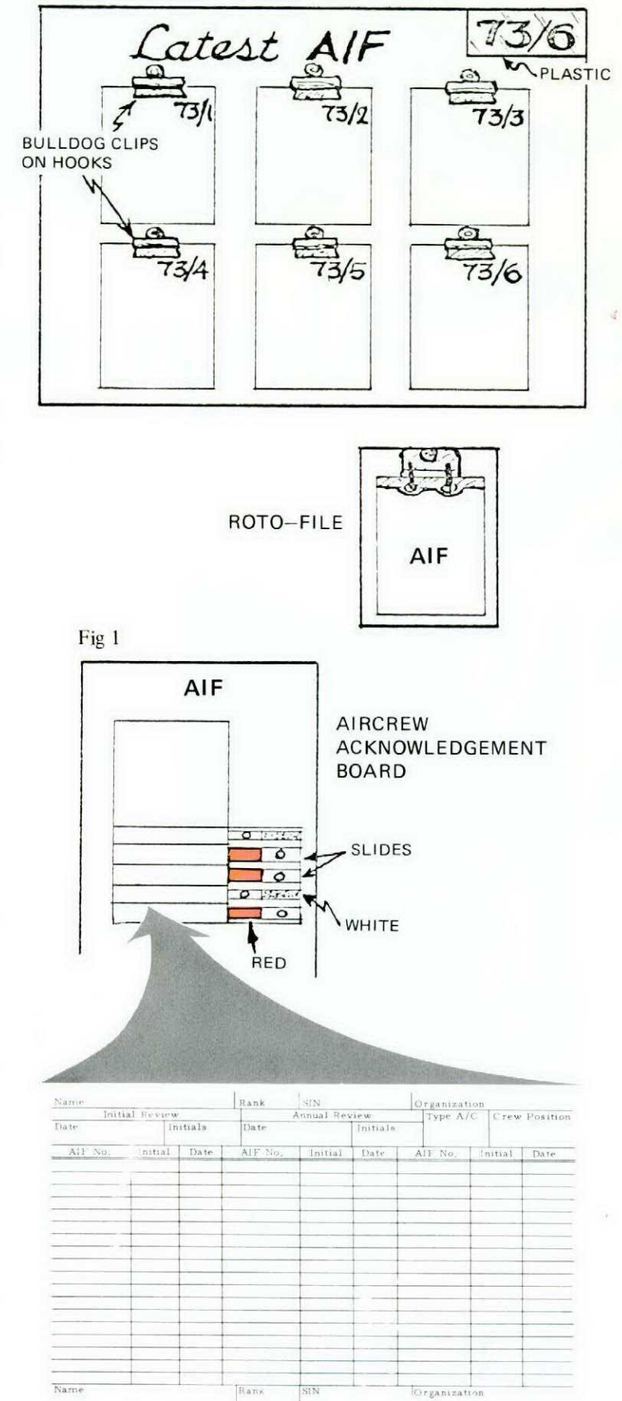
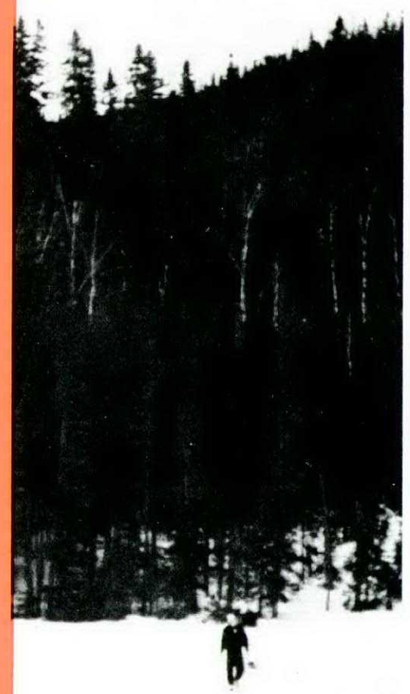


Fig 1

Aircrew Life Support Equipment

...what's new

A report on the current status of design and procurement of aircrew life support equipment.



TROPICAL WX FLYING SUITS Trials of these suits have resulted in a generally favourable response. Acquisition of the suits is pending approval of the National Defence Committee on Dress and Clothing.

AIRCREW KNIFE Many problems were encountered in the development of a satisfactory switch-blade knife, the main ones being the poor quality of construction and an unacceptably long blade. A promising new knife featuring a sliding blade has been developed and is about to be trialed.

PYROTECHNICS The pencil flares contained in the survival packs are being replaced by new rocket flares with an altitude capability of 1000 feet.

FLYING GLOVES The standard CF flying gloves will continue to be used. Of interest, the USAF are in the process of changing from nomex to a combination glove similar to what CF aircrew have been wearing for many years.

IMMERSION SUITS Two suits (the Frankenstein Mark 10 and the Hansen) are being evaluated. Additional purchases have been approved and a decision on the follow-on type to be purchased will be forthcoming shortly. Both suits undergoing tests are made for constant wear, i.e., when dry the suit "breathes" and when wet becomes waterproof.

AIRCREW SHIRT A long-body, roll-neck sweater will be on user trials this summer. The sweater (dark green) has long sleeves and will be worn with flying suits. If approved, it will be available through the usual outlets.

PERSONNEL LOCATOR BEACON (PLB) The system of life support equipment is expected to be in the field late next year. New technology in the form of lithium-type batteries has produced a real breakthrough in providing reliable cold weather operation. The new PLB will feature 2-way voice communication.

SURVIVAL VESTS In the planning stage is a bright fluorescent survival vest, to be worn by aircrew of helicopters and ejection seat equipped aircraft. The vest will carry all the signalling devices normally contained in the seat pack, thus ensuring that crewmen are not without a means of directing searchers to them in the event the seat pack is lost.

LIFE VESTS Single chamber vests will continue to be used. Automatic inflation valves are now being installed for jet aircrew. An improved version with a higher inflation pressure and better compatibility with a QRB is now being evaluated at DCIEM.

AIRCREW TOQUE By the time the snow falls again, a new rifle green, ***non-shrinking*** (if you follow the laundering instructions) toque will be on sale.

DOUBLE-FLOOR LIFE RAFTS The new life rafts are being manufactured. Included are ten-, twenty- and single-man sizes.

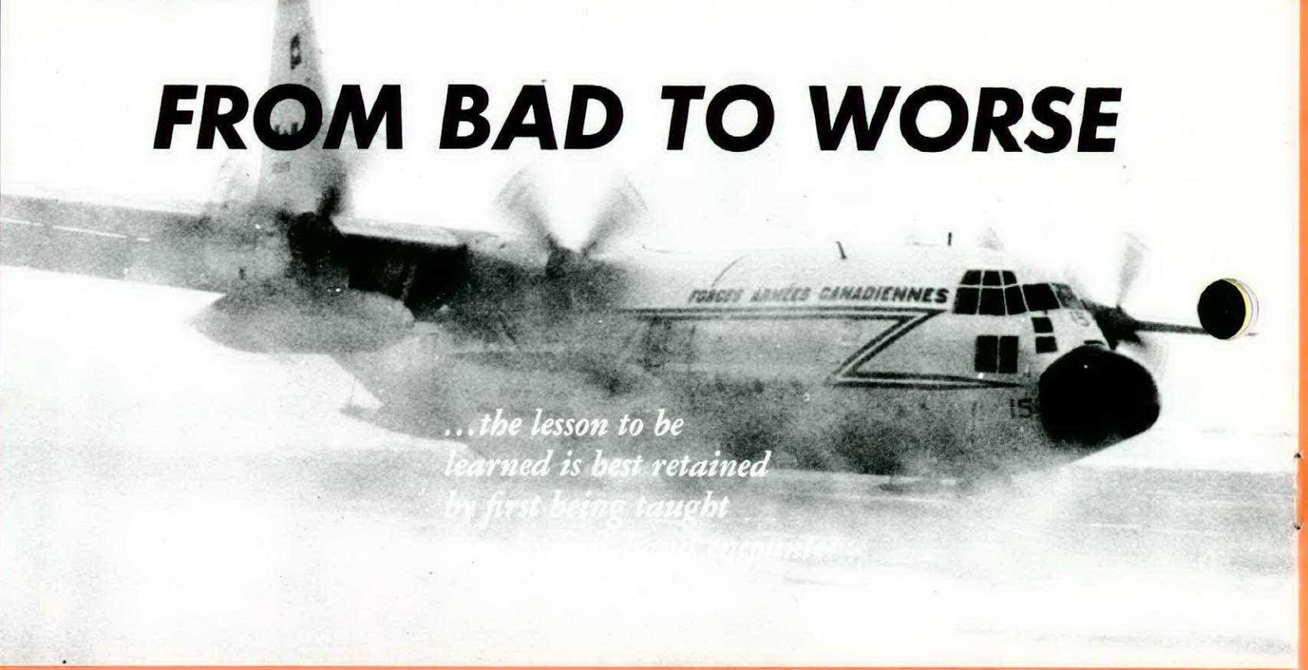
RPI LAPBELTS The first 200 were delivered in June of this year.

PILOT'S CLIP BOARD A new version, as a result of previous trials, is now being evaluated by command ALSEOs. Hopefully, it will be the "final solution to the clip board problem."

HELICOPTER ESCAPE SYSTEMS The Canadian Forces are closely following U.S. developments in this field. The main effort centres on developing an effective means of getting rid of the blades and extracting the crew members.

TINTED VISORS Pilots flying low level roles, particularly in helicopters, have found the present tinted visor too dark. In response DCIEM has acquired a number of variable tint visors for trial. These visors are untinted at the bottom and become progressively darker towards the top. Initial reaction by users has been favourable.

FROM BAD TO WORSE



...the lesson to be learned is best retained by first being taught

"Phase One conditions are in effect", crackled the HF radio as the weather sequence from Thule Airways was reported. Surface winds are variable 40-60 degrees off the runway and gusting to 35 miles per hour. The surface visibility is variable from one-quarter to one mile in blowing snow!

The crew eyed the plume of fuel spewing from the Number One Engine dump mast, warily watching it vapourizing just under the hot turbine exhaust pipe. An engine shut-down was inevitable shortly because of the fuel leak and the decision point was rapidly approaching. The landing approach would have to be flown on three engines and the destination weather was deteriorating quickly. In addition to the usual crosswind landing problems, those gusty winds would cause moderate to severe turbulence on the approach. The surrounding high terrain of the ancient fjord always did that. Thule was close to being closed.

The alternate aerodrome was holding up well, but fuel reserves left little option over the legal minimum requirements. As happens so frequently, when one problem arises, so do others almost automatically. Troubles come at least in pairs. The tension in the Hercules crew rose increasingly as the aircraft commander approached his decision point.

None of the problems were difficult individually if nothing changed for the worse. But in combination they forecast trouble! The number of alternatives open to the aircraft commander was rapidly decreasing.

by Maj D.A. Davidson

The Hercules was on route from Winnipeg to Bardufoss, Norway with a fuel stop necessary at Thule, Greenland. On board were members of an advance party of land forces personnel with some of their vehicles and equipment necessary for participation in a NATO Exercise on Europe's northern flank. This kind of trip is routine to the long range crews of ATC, but northern flying itself is seldom routine.

Arctic flying is fascinating, but challenging! The terrain is spectacular. Landscape, scene after scene of unbelievable grandeur is presented to the aircraft crews. Few people in the world are so fortunate as to see the eerie beauty of the north. However, for the aviator, such conditions sharpen his need to use all his skills, experience and caution. The aviator normally lives with caution and alternatives. Regulations require specific fuel reserves and alternate aerodromes. These rules, however, are only applied common sense. Most aircraft commanders mentally plan two alternates, sometimes more. In the north facilities are often basic, alternate aerodromes hundreds of miles apart, weather reporting stations sparse and weather changes rapid. At very low temperatures minor changes in the atmospheric moisture produce far-reaching and hard-to-forecast weather changes. An open lead in the pack ice, for example, may cause ice fog that extends for great distances. Airfield ceilings and visibilities can be forced below sensible landing limits in a very short time.

Add to the weather variables the usual kinds of airplane malfunctions that occur, then the theme that troubles come in bunches is well supported. It is often stated among the unpublished lore of Air Transport Command pilots that if one aspect of the trip develops difficulties then other problems are sure to follow to compound an awkward situation. This relationship may not be proven factually, but experience has shown that the conclusion is valid.

The trip began with no hint of difficulties. The airplane functioned smoothly and the "How-Goes-It" situation was developing according to flight plan. Estimates and actual arrival times stayed close together. As the place names below passed muster, the litany of English names followed by French and Indian names fading to Eskimo names that often mark a trip south to north in Canada went by. The destination weather sequences for Thule and the alternate weather reports for Resolute Bay and Sondrestrom were forecast suitable and were remaining satisfactory. At Flight Level 210 the Hercules flew above the weather in a sparkling blue sky. As the rather hackneyed saying goes, "God was in Heaven and all was well with the world".

Interspersed with the developing routine of flying the airplane, the aircraft commander, copilot and flight engineer were discussing the details of the airplane's electrical system. Verbally simulating malfunctions, they were going through the unending learning and review process that is the responsibility of the aviator. Their discussion was interrupted when, during his scan outside the cockpit to the left wing, the aircraft commander saw a startling sight. From the drain mast below Number One Engine a rooster tail plume of fuel was spraying out in a feathery fan. The fuel plume was vapourizing just as it passed beneath the hot turbine pipe. What it added up to was a fuel leak somewhere in the engine fuel system, although the engine continued to operate smoothly. After some juggling with fuel flow paths and a reselection of fuel boost pumps, the flight engineer was able to reduce the fuel spray almost to nothing. Since everything was safely stabilized and the flight time was about the same to destination as to return to the starting point, the flight continued. As part of the exercise a detachment with suitable repair capability was located at Thule so it was logical under the circumstances to carry on for the remaining three hours of flight.

As the flight progressed, the pilots and the flight engineer analyzed the problem, evaluating all the possibilities. When descent was to be started for an approach, the changing airflow about the engine would possibly draw some of the vapourizing fuel back closer into the vicinity of the tail pipe. Consequently, the engine would have to be shut down prior to descent. Secondly, the limitations on the use of the fuel boost pump meant that a main outboard fuel tank would not supply fuel properly. Progressively the airplane would get more and more out of trim laterally, thus producing an awkward landing problem in a crosswind with one engine shut down.

Two hours out, the crew received the Thule weather report. A change had occurred. The surface winds were increasing significantly above forecast and the visibility was lowering as the snow began to blow. The ever lurking katabatic winds were beginning to blow from the Greenland Icecap. One hour out, the crew received the discouraging details that the weather had deteriorated further. The surface visibility was varying about minimum landing limits and the crosswind was exceeding aircraft landing gear limits from time to time. The experienced Arctic hands amongst the crew knew that the turbulence would present some control difficulties during the final part of the approach. Couple these difficulties with those presented by the fuel leak and the crew's problems were indeed being compounded.

Upon receipt of the last weather information, the aircraft commander made an immediate decision – divert to Sondrestrom. He and the navigator had planned for this eventuality, consequently the navigator had ready a new heading and set of estimates. One and one-half hours to Sondrestom. The copilot filed a new flight plan, then received an IFR clearance from Sondrestrom Area Control Centre for the route. The engineer re-checked the fuel figures and confirmed the "How-Goes-It" plot with the navigator. Functioning systematically, the crew laid out the revised trip quickly and professionally. One thing was clear, they were committed. With Sondrestrom selected there was insufficient fuel to reach any other aerodrome. The fuel reserves were reaching that point which is still sensibly safe but causes the concern level to rise in the crew as the safety margin for error vanishes.

Sondrestom weather reports remained good, although it too is subject to katabatic winds which cause severe turbulence. At top of descent the aircraft commander shut down Number One Engine, and no serious trim problems developed from the unbalanced wing fuel. The pilot requested the crash rescue crews to follow the Hercules closely on landing in case fire broke out as the airplane slowed. The aircraft touched down smoothly, completed its landing roll and fortunately no fire broke out behind number one engine.

After shutting the engines down on the ramp, the crew relaxed. Tension had been building up for hours, first imperceptibly, then more starkly. It now broke. The usual friendly crew banter broke out again on the flight deck and the navigator chided the pilot for "squeaking" the wheels on landing. The experience was over.

It is said that reinforcement is a necessary function of learning. The lesson to be learned is best retained by first being taught and then by first hand encounter. As the aircraft commander of this crew, I had several lessons well brought home. The special lessons of Arctic flying have taught me caution for years, but sometimes the specific precautionary needs of northern flying become remote because nothing goes wrong. Practical requirements such as carrying two alternates seem redundant after a period of uneventful trips. The fact that problems seldom come one at a time fades in one's mental reality. Sometimes one seems to be following regulations mechanistically without purpose.

Then, vividly, a series of events such as experienced during this trip brings reality to the need for caution, life to common sense rules. I, personally, relearned the lesson that earlier experience has taught me is to be learned and respected. The prospect of encountering manifold difficulties on any flight, the fact that problems usually go from bad to worse, became reality again. I am a better, safer aircraft commander because of the experience.

Raw Data vs Computerized Data on Glide Slope

The Flight Director depends on computerized information which enables the pilot to know which way to direct his aircraft, with a minimum of effort, when it is below or above the glide slope. However, this does not mean that he is on the glide slope when the Flight Director says he is. It merely says he is going in the right direction. Actually, even though thinking his position is okay, he may be below the glide path heading for a barn! It is easy to get led into this habit. There may have been a number of near-misses without the crews realizing it. So don't depend solely on your Flight Director – continuously *cross-check into the raw data*.

Flight Safety Facts and Analysis

safety matches...

No Safety in Numbers

The pilot of a Musketeer decided to relax with a smoke during the course of an instructional trip with a student. Although he had three packages of matches in his pocket, they were not easily accessible because the pocket was held down by the lapbelt. Eventually he succeeded in pulling one free only to hear the sound of one of the remaining packages igniting. Reacting swiftly he grabbed the pocket and squeezed until the fire was extinguished, a move that averted damage to himself or his flying suit.

The point of this seemingly minor occurrence is that it marked the second time (that we know of) in the last three years that a pilot has inadvertently ignited a package of matches as a result of the striker pad on one package rub against the matches of the other. While the lesson here has been inexpensively obtained, either incident could easily have been the subject of a sadder tale by far.

Tool Rule

Did you know that cadmium plated tools and titanium parts can be a dangerous combination? The tools leave small deposits of cadmium on the titanium components, which when exposed to the high temperatures of engine operation, combine with the titanium making it a brittle alloy. This causes stresses in the titanium part which could cause the affected part to crack or even fail.

AMDU Trenton recently conducted a study to determine the extent, if any, of the problem in the Canadian Forces. Their survey, while showing the CF situation to be satisfactory, nevertheless revealed that there were loop holes through which cadmium plated tools could be introduced into the system. Thus, technicians should be able to recognize cadmium plated tools in the event that any do turn up.

One of the tech orders reviewed during the ADMU survey referenced the Canadian Government Specifications Board which revealed that a number of hand tools could have a cadmium plated finish. For example:

Wrenches – handles, and attachment, bolt and nut, socket

Wrenches – open end and box, bolt and nut, non-adjustable

Pliers and Nippers

As a result, one of the AMDU study's recommendations was to have the Canadian Government Specifications Board examine the requirement for Cadmium plated tools, and have the cadmium option deleted from the specifications if no requirement exists.

Fortunately, a built-in feature serves to minimize the likelihood of widespread introduction of the tools; although less expensive to produce, cadmium plated tools are less attractive, thus manufacturers lean heavily on their eye-catching chrome- or nickel-plated counterparts.

Would you recognize a cadmium-plated tool?

On the Dials

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

Questions and Answers

In the past few months there have been numerous changes to the CFP 100 and CFP 148. Complete this quiz to check your knowledge of the changes.

1. You are flight planning to CFB X in a TACAN only equipped aircraft. The latest NOTAM information states that CFB X's TACAN is inoperative. There are published ASR/PAR minimums for CFB X. Weather is forecast VFR for entire route and time of flight. Which of the following statement(s) is (are) true?
   a. You may not file IFR to CFB X because there is no published approach available.
   b. You may file IFR to CFB X provided positive aircraft position can be established within 25 miles of CFB X terminal radar by use of a nearby operative TACAN.
   c. You may file IFR to a nearby TACAN fix then VFR to CFB X.
   d. None of the above statements is correct.

The usable landing minima for CFB Y are 300 - 1/2. Which of the following weather forecasts ***do not*** require an alternate for a fixed wing aircraft on an IFR flight plan of 3 hrs or less?
   a. Ceiling 3000 ft AGL, visibility 3 miles.
   b. Ceiling 3500 ft AGL, visibility 2-1/2 miles.
   c. Ceiling 3500 ft AGL, visibility 3 miles.
   d. Ceiling 1000 ft AGL, visibility 3 miles.

3. You are flying a Canadian Forces fixed wing aircraft landing at X AFB in the United States. Published PAR information is as follows:

PAR	RWY	CATEGORY	DH/RVR	HAT	CEIL-VIS
	35	ABCDE	1011/16	100	(100¼) GP 2.6°
	17	ABCDE	999/24	100	(100½) GP 2.6°

You are flying a PAR to RWY 35, latest weather observation is M1 ⊕ 1/4. Which of the following statements is correct?
   a. You may ***not*** start the approach because the weather is below CFP 100 weather minima of 200 feet and 1/2 mile.
   b. You may fly the approach to the published DH then execute a missed approach if runway environment is not sighted.
   c. You may fly the approach to a DH of 1111 feet.
   d. None of the above is correct because CFP 100 is not applicable to flight in United States airspace.

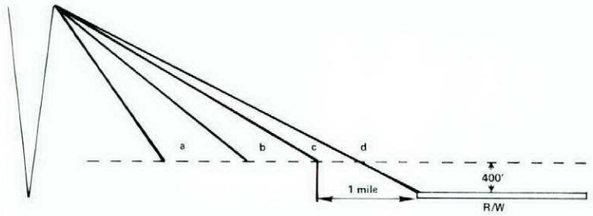
4. The airfield you are considering as an alternate has the following published TACAN approach minima and PAR minima. You are flying in a TACAN only equipped aircraft and PAR is available:

		DAY	
		MIN ALT	CEIL VIS
RW 36	STRAIGHT IN	1183	400-1
	CIRCLING	1683	900-1 1/2

	RWY	END ELEV	MIN ALT	CEIL-VIS
PAR	36	777	977	200-1/2

Which of the following weather forecasts at ETA is the ***minimum*** acceptable to permit use of this airfield as an alternate?
   a. M 5 ⊕ 3
   b. M 8 ⊕ 1-1/2
   c. M 9 ⦶ 3
   d. M 8 ⦶ 3

5. Which of the four profiles for final descent, facility to field, do you consider the best? There is no glide path, you are doing a straight-in approach and the minimums are 400 feet and 1 mile.



   a. Rapid descent to minimums, then fly at minimums to field.
   b. Gradual descent so as to reach minimum altitude prior to minimum visibility mileage from the field.
   c. Gradual descent so as to reach minimum altitude at minimum visibility mileage from the field.
   d. Gradual descent calculated to provide a constant vertical speed from the FAF to threshold.

ANSWERS TO "ON THE DIALS" QUIZ
1. - b,c
2. - c
3. - c
4. - d
5. - b

There Will Be No More...

Recent failures have been due to isolated causes which have been overlooked by the contractor but should now decrease.

The Flight Safety Committee

One-Wand Worry

(or, how do you signal stop with one flashlight?)

In a letter which appeared on the "Comments-to-the-Editor" page of the May-Jun *Flight Comment*, Cpl W.C. Abbott of CFB Chatham suggested that the CF Marshalling Signals Charts should include action to be taken in the event of failure of one wand during night-time marshalling.

Lest anyone think that the action required is so obvious that common sense would take care of such an eventuality, the following should be instructive. This account, which appeared in *Flight Comment* a few years ago, clearly illustrates the hazard potential Cpl Abbott had in mind.

"The Yukon pilot was taxiing into a tight spot that night – to his left a hangar and to the right a small helicopter which had been parked uncomfortably close. The captain wisely called for marshalling assistance; one of the three marshallers actually climbed up on the helicopter and signalled the aircraft to move forward. This marshaller hoped that the wing would pass – admittedly very closely – over the rotor hub and attempted to give the captain visual indications of this clearance. With only a few feet to go it became obvious that there was no clearance . . .

"But how do you signal a stop (crossing the wands) with only one wand? The answer's in the photograph – you don't. This wand was checked out with new batteries and a new bulb and found intermittent – a condition it had been in for some time. If ever there was a need for a serviceable flashlight (value: a few bucks) it was in the moment just before the hapless marshaller leapt nimbly to safety. The pilot unwisely accepted one-wand signals, thereby adding the remaining ingredient to the accident.

"A senior officer commented that '. . . a high risk factor in the loading ramp and taxi area should have increased vigilance and made crews and supervisors more aware of the importance of such things as correct marshalling procedures. Instead, it seems to have had a reverse effect and lowered the standard. The deviation from correct marshalling procedures . . . resulted in a costly accident'."

Aircraft Runup Preparation

The subject of preparation of helicopters for runup was discussed by the committee. There exists little clear direction in maintenance orders concerning this subject but it was the concensus of the committee that helicopters due to their nature should be brought to a "flyable" condition in so far as flight related components are concerned. This does not mean that the aircraft must be serviceable for flight but simply that the aircraft engine, drive system, and flight controls and so on, can be operated for purposes of the runup without abnormal risk of accidents or damage.

The Flight Safety Committee

Thermal Runaway Response

...one unit's answer

Mention of nicad batteries invariably leads to the topic of their susceptibility to thermal runaway and, in turn, to what to do about it. From the pilot's point of view, declaring an emergency, landing as soon as possible, and turning off the battery switch as soon as practicable are the primary requirements. Once the aircraft is on the ground, the battery is cooled using CO_2.

Normally, the fire department responds to a thermal runaway emergency, fully equipped to cool the troublesome battery and remove it from the aircraft. One unit however, has developed it's own response capability in the event that a hitch develops in the normal response. One of the squadron personnel stands by fully equipped to deal with the problem just in case.

The equipment needed is relatively basic:

Cabinet
Protective Hood (8415-21-865-3475)
Normal Work Gloves (8415-21-103-8426) Oven mits (or the equivalent) are mandatory if for any reason it is necessary to remove the battery from the aircraft before cooling.
Fire Extinguisher, 15 lb (obtained from the Fire Hall)
Distilled Water (in plastic one-gallon jug – to wash spilled electrolyte from skin)

Two more pilots who can attest that birds fly at night. . . . .and their visors were down!

ROTORWASH

You hear certain expressions used during "shoptalk" sessions and here are four that are often confused:

- **Settling with insufficient Power**
- **Settling with Power**
- **Vortex Ring State**
- **Power Settling**

Which term accurately describes the condition of flight you have encountered? Unfortunately these terms have been used synonomously by many helicopter pilots when describing two undesirable conditions of flight for which the recovery technique is different in each case.

The four expressions really only refer to two situations or conditions of helicopter flight. First, **settling with insufficient power** sometimes referred to as **settling with power**, is simply a condition of forward flight or in the hover where the pilot has reduced power for a descent or is using less power than that required for maintaining height. The helicopter then begins to settle and it could be that the pilot finds himself in a condition where insufficient power is available to recover due to gross weight, high density altitude, light wind, or single engine flight conditions. In any case, he must alter some of the contributing conditions through four possible courses of action:

a. lighten the load by jettison of external cargo or fuel;
b. if possible, select a landing site at much lower elevation;
c. carry out a running landing; or
d. increase airspeed if below the area of effective translation lift.

If the pilot handles this situation badly, he could end up in a worse condition: **vortex ring state**, or **power settling**; both essentially the same thing.

In Fig. 1 we see a typical induced air velocity distribution pattern across the rotor disc during hovering flight. If the total power available is insufficient to maintain the desired altitude, the helicopter begins to settle at a rate equal to the loss of lift created by the relative airflow. This may occur when the helicopter is at a low airspeed, out of ground effect, or in a descent with some power on.

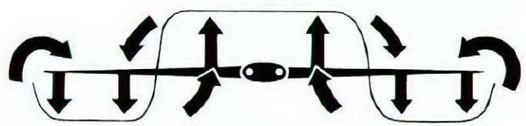
Gessow and Myers, in their internationally recognized reference **Aerodynamics of the Helicopter**, use the term **vortex ring state**. They define this condition as being characterized by the absence of large recirculating airflows. It occurs in descending flight where the resultant airflow through the rotor disc is downwards due to large induced velocities, but the flow above is upwards. This conflict of airflows in a vertical descent results in rotor roughness and decreasing control. Gessow and Myers state the limits of the **vortex ring state** are: hovering when the rate of descent is equal to twice the average induced downwards velocity at the rotor.

In plain language it means that **vortex ring state** is present to some degree during vertical descent; it is of small magnitude during a slow controlled descent and of serious consequence during a fast desc where most if not all the flow pattern is upwards (2).

FIG. 1

Induced velocity distribution along blade span during hovering flight

FIG. 2



Induced Velocity distribution along blade span during VORTEX RING STATE

Some authorities like to define **power settling** as the condition of flight nearer the troublesome li where application of more power by increas collective pitch further aggravates the **vortex ring** state to the extent that there is a net loss of lift. It is also recognized that **power settling** can occur in conditions of flight slightly different from, but related to pure vertical descent.

Operation in the **vortex ring state** is a transient stage since the sink rate of the helicopter increases very rapidly; reaching as high as 3,000 FPM with a corresponding increase in up flow until the flow becomes unidirectional. At this stage, the rotor is in the **windmill brake state** where a lower rate of descent will eventually be experienced and autorotative recovery to a safe flight condition can be carried out. Unfortunately, because of the high rate of descent experienced while in the **vortex ring state**, considerable altitude will be lost before an autorotative type flow is achieved and therefore it will be normally necessary to use another technique to recover.

If the condition was entered with a low pov (collective) setting, recovery may be accomplished rapidly increasing power. However, the higher the sink rate, the greater the power required to recover. Hence, power application must be made in the very early stages of descent in a regime where **vortex ring state** may not be recognized. If insufficient power is available, recovery is most easily effected with minimum loss of altitude through increasing airspeed.

This is best accomplished by displacing the rotor disc with cyclic and diving out of the condition (if control of the helicopter has not already been lost) and only then should full power be applied. Finally, as previously mentioned, recovery may be accomplished by entering autorotation but with a greater loss in altitude. Correct recovery from a full vortex state may require excessive height; ironically it is at low tudes that the danger is most likely to arise.

It is important to bear in mind that **settling with insufficient power** can progress to the extent that **vortex ring state** is encountered, particularly if the airspeed is allowed to drop to within the range of 0-15 knots.

In summary then, **settling with insufficient power** is normally the method used to conduct hover landings and to initiate normal descents. **Vortex ring state** occurs anytime the helicopter rotor disc experiences a relative airflow in direct opposition to the induced airflow it is creating. **Power settling** is virtually synonomous with **vortex ring state** but generally refers to flight conditions where the **vortex ring** conditions are severe.

Since the recovery techniques are quite different in each case it is most important that we attempt to speak and react from **"common ground"**.

IXAT

As we add more helicopters to helicopter bases, more helicopters to fixed wing type bases and introduce bigger helicopters, so we have to evolve new methods of moving the brutes around the place to their optimum takeoff and landing positions, without getting in the way of other aircraft or creating local gales.

Of course what has happened is that taxiing has been invented in the same way that it was when fixed wing aircraft had to be got to and from the shed and runway under their own steam.

Now the name is the same but that's about all. Fixed g aircraft are designed to taxi and they have various means for moving along a taxiway at low power, with a measure of directional and braking control. Power and brakes which work independently at a wide range of speeds are part of the maker's package deal anyway, but such extras as steerable nose or tail wheels are there purely for taxiing.

Now the helicopter was invented to fly from where it's at and doesn't need a runway or other distant form of airwards assister. Just manhandle it out of the shed and it can spring into the air with little more demand than that it should be pointed into the wind.

The requirement for taxiing—in some manner akin to the fixed aircraft—is therefore an imposition on this elegant sky orientated screw. However since its downdraft could be embarrassing to its own kind or even fatal to its smaller brethren and since mankind demanded that it conform to a ground marked traffic route on the airfield, it learned how to use its talents to do this degrading trick.

If it applied some skywards power, but less than that required to lift off, then tipped its rotor disc towards its nose, it could drag its wheels along the ground, and if it varied its torque compensator it could turn as it went.

Since its CG is concentrated under its rotor and since its n wheels are not very far away from this position either, it ound that it had to taxi slowly or it could fall on to its nose when braking and in any case its brakes and wheels were not designed to work at high speed and could not be expected to slow a fast moving aircraft.

Now helicopter doctors know that these creatures, while capable of great feats of strength and speed and climb in forwards direction, are weak as kittens if they are asked to move sideways or backwards in the air. On the ground this weakness is mostly in the torque compensator (or tail rotor, if you are a windmill afficionado), and if there is a side wind with the chopper taxiing broadside on to it, then the whizzer is working overtime. The tail wheel is fully castoring and so offers little assistance, though there is spare power available from the main rotor. The loads in the tail rotor transmission and fuselage, can be much greater than for normal flying, and the vibration can lead to very high peak loads. As far as the aircraft is concerned, it's all fatiguing and fraught with danger.

If the helicopter air taxies, the situation still smacks of compromise, because, the limitation on sideways and backwards flight weren't written lightly. If the speeds are exceeded then there is a very real danger of losing air control and crashing.

This now means that if air taxiing is to be carried out in any but the lightest wind, irrespective of which direction the aircraft wishes to move relative to the ground, it must point substantially into the wind.

Now the title becomes clear, because there can be very sound requirements to taxi backwards.

One last factor with an air taxi at other than snail's pace, is that the ground relative speed is such that if the power should falter, for even a moment, the poor beast will drop on its feet and will roll straight over, i.e. more than at a walking pace over the ground sideways is dangerous.

The rules which should be followed then would be, when ground or air taxiing:

- Keep ground speed low at all times.
- Keep ground taxi distances to a minimum.
- Ensure the area is clear in the direction you are moving.
- Keep relative winds within the aircraft release by lifting off and continuing air taxi if necessary to track across wind.
- Keep relative winds on the nose for preference and air taxi backwards if movement downwind would otherwise exceed the backward flight limitations.

This isn't just fun, there is more taxiing going on these days and we've had an overtorqued Sea King in an out of wind limits, downwind taxi attempt.

The wear and tear on the airframe and transmission will be difficult to assess, but any infringement of airborne rules could be very obvious.

COCKPIT

Gen from Two-Ten

SEA KING, NORDO CONFUSION The aircraft launched at sea to conduct a series of stores transfers on three different ships and then return to home plate. Since an exercise was in progress, the crew had decided to conduct their mission NORDO. Arriving at the second of the three ships and finding the deck already occupied by a helicopter from another ship, they flew along side the ship raising and lowering the gear as a signal that they wished to land, then left the immediate area to await a clear deck.

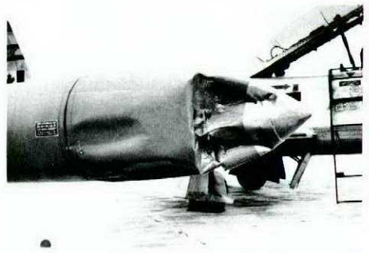
On their return to the ship the crew of the Sea King received marshalling signals which brought them into a five- to ten-foot hover over the flight deck – which was still partially obstructed by the other helicopter. The pilot in control interpreted a further signal as a landing signal (although the director did not intend it as such) and touched down on the flight deck, far enough back it turned out, that the tail wheel dropped off the edge and the underside of the fuselage struck the deck.

The marshaller and flyco immediately signalled a wave-off and the helicopter returned to a hover from which the crew then decided to transfer the goods by hoist, however no one broke radio silence and no one informed the crew that the wheel had dropped off the edge, possibly resulting in damage. So the helicopter completed the transfer and flew off to the next ship and landed for the stores delivery. Before takeoff, while the aircraft was "trapped" on the deck, the crewman made a quick external inspection and found nothing amiss. However a subsequent inspection at home plate uncovered substantial damage – to the extent that the aircraft was unflyable.

The investigation was critical of the decision, given the relatively routine nature of the task, to operate under stringent communications restrictions to the point of actually conducting a NORDO free-deck landing (listed as an emergency procedure in CFP 282) on an obstructed deck. Neither the crew of the helicopter nor the flight director on the ship knew the intentions of the other – and no one broke radio silence to ask. Going by past experience, the outcome of such a communications mix-up is usually predictable.

T33, TIP TANK-TENDER TANGLE Aside from different names and a different place, there is little new in this mishap–another in a long series of towing bashes.

A three-man crew was towing a T33 to the ramp from a hangar, along a route which passed between three parked aircraft and a fuel truck engaged in refuelling a group of starting units. The mule driver misjudged, and when collision became apparent to the man in the cockpit and the supervisor (riding on the towing vehicle) they simultaneously shouted "brakes", but too late to prevent one of the T33's tip tanks from becoming actively involved in the braking action.



Adherence to base policy governing towing operations would have precluded this mishap. It specifies a minimum of a three-man towing crew with the condition that the man in charge of the operation does not ride on the tow vehicle if the aircraft is being towed within 50 feet of any obstacle. In spite of all reasonable precautions, it is evident that established towing techniques continue to be violated by some.

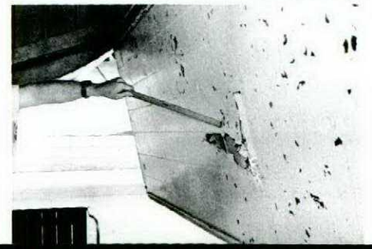
ARGUS, PANIER TRAY DROP The aircraft was participating in a night exercise with a standards officer on board. The crew were attempting to upgrade their qualifications. Twice in the course of the mission the bomb bay doors were opened during simulated attacks on submarine contacts. Unknown to the crew however, a cargo panier had been installed in the forward bomb bay compartment and on one of the attacks one of the trays dropped out causing extensive damage to the underside of the aircraft.

Installation of the panier had been listed in the CF335 (L-14) but somehow no one on the crew had noted the entry. And since as much realism as possible was being injected into the exercise it didn't occur to them not to operate the bomb bay doors. The pilot in command had encountered a frustrating experience prior to the flight which distracted him so that he neglected to peruse the 335 thoroughly. The reason for his concern was that his crew had flown the previous mission in the aircraft that he had just been assigned and had encountered nothing but trouble with the RADAR and MAD equipment. He was understandably annoyed at having been assigned the same aircraft for an upgrading flight.

Thus, what developed had all the earmarks of an interrupted procedures situation in that it led to the omission of a key item which the captain would normally have checked.

One of the questions raised in light of the mishap was just who beside the captain is responsible for reading the CF335. The answer of course is that it depends on the type of aircraft, the mission, the number of crew and so on. Several guidelines were subsequently issued by MARCOM specifying CF335 checking responsibility:

- For pilot training a minimum of the aircraft captain and one other pilot, and in the case of the Argus, the lead flight engineer as well. This ensures that there is at least one person in the cockpit who has full knowledge of all CF335 entries.
- For patrols and crew training a minimum of the aircraft captain and first officer and all leads, i.e. lead flight engineer, lead observer, lead navigator.
- Remaining crew members must be briefed (by those responsible for checking the CF335) on all entries which might effect flight safety or the aircraft's operational capability.



Capt F.K. Lawlor

Capt C.A. Lagroix

Capt Armstrong and Capt Cooper

Capt E.J. Jackson

DFS Staff Changes

CAPT E.J. JACKSON

Captain Jackson joined the RCAF in 1963 and attended Royal Roads and Royal Military College at Kingston. Following wings graduation at Moose Jaw in 1968 he served as a squadron pilot with VU33 Sqn at Patricia Bay, Victoria supporting the Pacific Fleet. In 1970 he was posted to 425 AW(F) Sqn at Bagotville via the 410 Sqn CF101 OTU. While serving with 425 Sqn he acted as UFSO and in April 1973 attended the USAF Flying Safety Officer's Course at the University of Southern California. At DFS Capt Jackson takes over as an investigator for the CF101 and CF100, replacing Maj R.J. Kelly who has been transferred to Staff College in Toronto.

CAPT C.A. LAGROIX

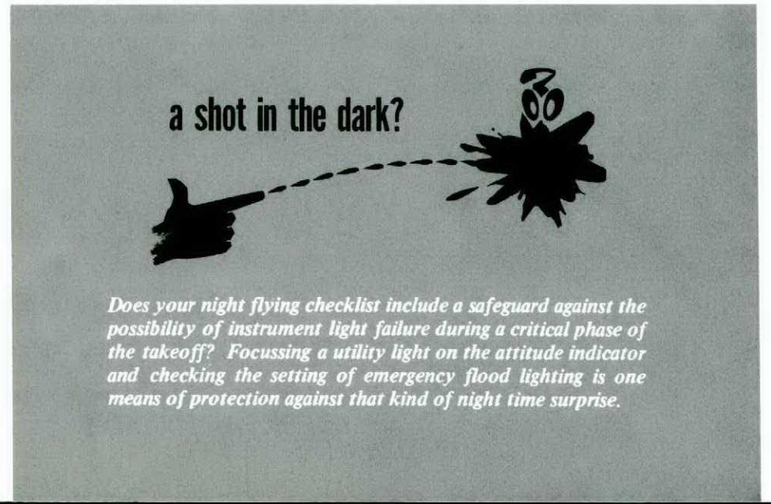
Captain LaGroix joined the RCAF in 1949 as an Airframe Technician. Following course completion he was transferred to 426 Squadron Lachine shortly before the Squadron was moved to McChord AFB Washington as part of the Korean Airlift. He graduated as a North Star Flight Engineer in 1954 and remained with 426 Sqn until 1958 when he was transferred to 1 OTU Trenton as an instructor. In 1961 he converted to Yukon aircraft and was transferred to 412 Squadron Uplands and in 1968 returned to 437 Squadron. Prior to commissioning in October 1969 he held the rank of Master Warrant Officer. Following Commissioning he was transferred to 426 Sqn as Chief Flight Engineer Instructor. At DFS he replaces Captain R.L. Chercoe on the educational and analysis staff. Captain Chercoe has been transferred to 435 Squadron at Namao.

CAPT P. ARMSTRONG

Captain Armstrong joined the RCAF in 1958 and following pilot training at Centralia, Penhold and Portage La Prairie, joined 444(F) Sqn at Baden-Soellingen flying Sabres. On return to Canada in 1963 he was employed as CE Admin Officer at Downsview. In 1964 he transferred to CA(R) and trained on helicopters at Rivers following which he was transferred to 450 Sqn (West Det) on Voyageurs. From 1968 until 1970 he was employed in Tactical Evaluation at HQ 10 TAG, St Hubert and from 1970 to 1973 was with 408 TAC Hel Sqn, Namao, on CH135 Twin Hueys. Captain Armstrong is a recent graduate of the U.S. Army Aviation Safety Officers Course and will replace Captain A. Cooper at DFS as investigator for the CUHIH, CUHIN and Kiowa. Captain Cooper has been transferred to 422 Sqn, Gagetown.

CAPT F.K. LAWLOR

Capt Lawlor is a graduate of Liverpool University and a former high school teacher who joined the RCAF in 1965. His first tour was at Moose Jaw as a T33 instructor, following which he was transferred to 450 Sqn on Vertols in 1969. Since 1971, he has been flying Hueys with 450 Sqn's VIP Flight at Uplands. Capt Lawlor comes to DFS as editor of Flight Comment, replacing Capt P.J. Barrett who leaves for Baden-Soellingen via the CF104 OTU at Cold Lake.



Comments to the editor

Fur Trimmed Parka Hazard?

On Page 14 of the May-Jun '73 issue of *Flight Comment*, two men are shown wearing fur-trimmed parkas.

On exercise New Viking (Churchill), the staff totally rejected fur-trimmed parkas, claiming that there was a high possibility of sustaining eye damage from frozen fur spikes when turning the head.

I'm not sure of the legality of fur-trimmed parkas, or even whether there are any documented cases of eye damage. However, the potential for an accident would seem to be there and your attention may be warranted.

Col P. Charlton
TCHQ

To our knowledge this problem has not been encountered by aircraft technicians, possibly because their exposure tends to be of relatively short duration (aircraft starts, towing, and so on) compared to that faced by land personnel.

Nonetheless, we appreciate the information and DFS will approach the appropriate NDHQ agencies to establish whether or not they are aware of problems brought on by this phenomenon. Additionally, we would like to hear from any aircraft technicians who may have encountered it.

What, No Flight Surgeon?

I am disturbed and disappointed that such an august and informed journal such as Flight Comment should not see fit to include a Flight Surgeon in "just the right mix of people" or in "a specific specialist if appropriate" in the composition of a Flight Safety Survey Team. It has been the custom to do so in this command for some time.

This omission is especially glaring in an issue (May–Jun '73) which contains two complete articles illustrating the importance of aeromedical input to flight safety.

LCol C.A. Burden
Deputy Command Surgeon
TCHQ

A valid observation, however there are two points which should be clarified. First, in so far as responsibility for conducting FS Surveys is concerned, DFS involvement (As FSO to the Associate ADM Materiel) lies primarily with surveys at civilian contractors where the presence of a flight surgeon is not always required. A related factor is the availability of people with expertise. Secondly, FS Surveys on bases and ships are the responsibility of the appropriate command, consequently the command decides on the composition. Thus, from time to time, as with the recent surveys aboard HMCS Margaree and HMCS Protecteur, DFS personnel are invited to participate.

Nevertheless, DFS encourages commands to include a flight surgeon on surveys of flying establishments. It is welcome news that Training Command is able to employ a flight surgeon for this purpose.

Peters' Pains

Re: "Oh, My Aching Back" (Flight Comment, May-Jun '73). Now I know why I have been plagued with back problems these many years. And at the same time I note that you have managed to place the onus squarely upon myself by eliminating the possibility that they were occasioned by service or service-sanctioned causes.

My first attack seemed to stem from participation in service sponsored recreational activities (I have been known to 'chuck' ball occasionally) as did a few subsequent attacks. But my most recent advice from an orthopedic surgeon was to avoid 'contact' sports and he defined 'contact' to exclude everything except golf, bowling and curling. Since I have followed this advice and still feel the odd twinge there must be another cause.

My most serious attack, which resulted in a spinal operation, occurred after I had completed a tour with 414 Squadron (EWU) where the average sortie length was 2.2 hours and the maximum sortie could be as long as 4.2 hours. This culminated 1500 hours of fitting a 6'3" frame into the vast expanses of the CF100 rear seat and quite freely manipulating the switches and viewing the dials so conveniently placed there. No, it was not this factor – my real troubles started six months too late.

Nor does my problem seem to stem from violations of the sitting, standing, lifting or exercising advice contained in the article. But sleeping –AHA– there's the rub. Go ahead, try sleeping with a pillow under your knees. You'll get some sleep OK; after three or four nights of chasing the pillow around under the covers you'll be so dead tired that you'll go to sleep standing up (with one foot up a step). That is if the good wife doesn't ridicule you out of the house with remarks to the effect that even a beginner in the profession knows where the pillow goes. So I sleep flat out on either my abdomen or back, just as the orthos, the neuros, the nurses and the orderlies insisted and recommended.

But never on my side.

So thanks for the information, it's nice to know that it's a personal pillow placement problem which produces Peters' pains.

Capt D. A. Peters
DMAS/NDHQ

SASI Seminar

The newly formed Canadian chapter of the Society of Air Safety Investigators (SASI) will host "The Annual Seminar of SASI", to be held in Toronto 29-31 of August, 1973. The theme of this year's seminar will be "Training".

For further information write to Canadian Chapter SASI, 301 Warren Road, Toronto, Canada, M5P 2M7.

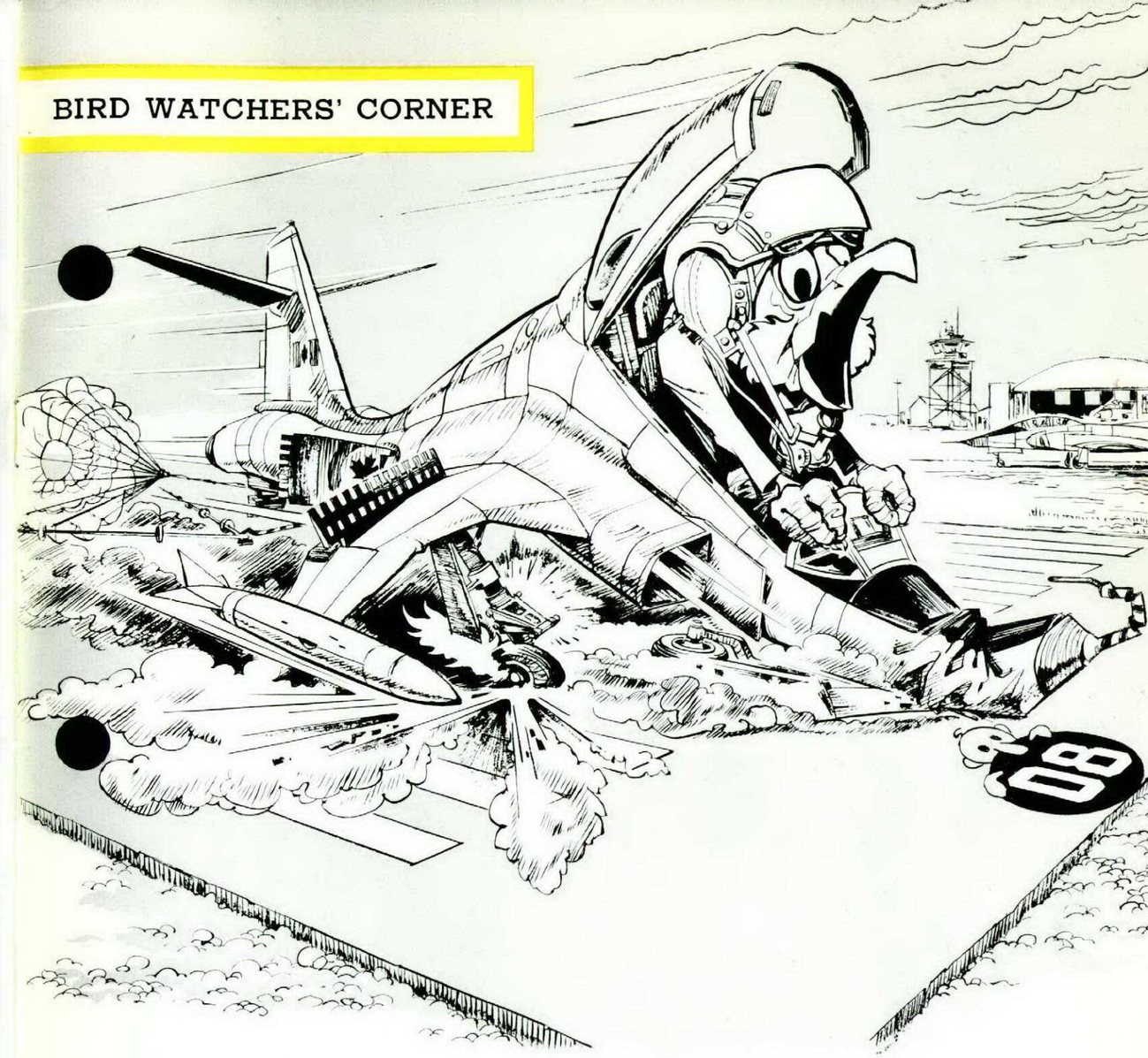
H. Reid Glenn
Secretary, Canadian Chapter

Now Let's Hear from the Herc

It was noted that this was the sixth meeting that a Hercules has done a runup.

The Flight Safety Committee

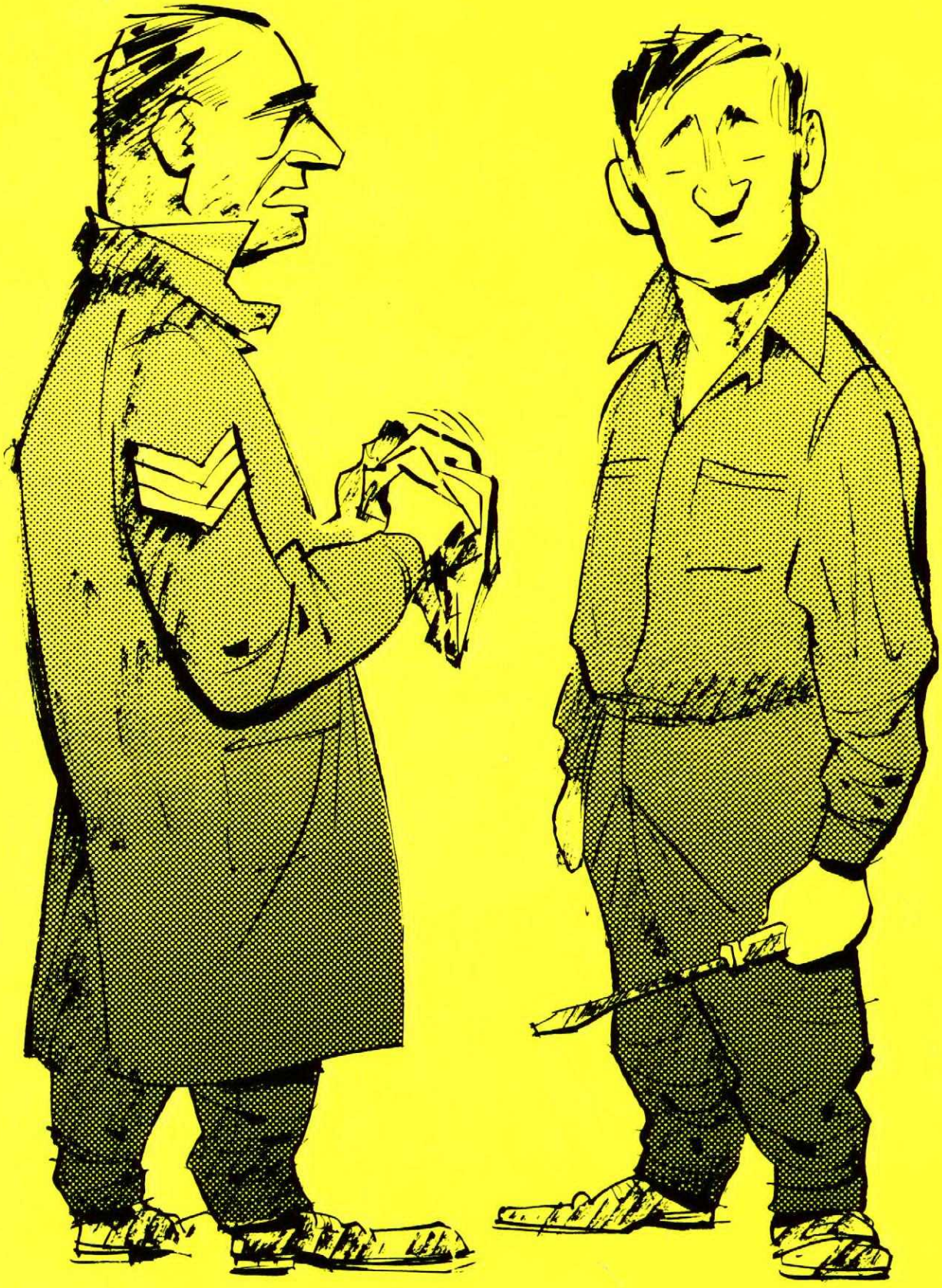
BIRD WATCHERS' CORNER



SCORCH-HEELED BRAKE-BRUISER

Screeching brakes, cycling anti-skid systems and burning rubber signal a Brake Bruiser in action, asserting that there are lots of ways to bend an aeroplane – not the least of which is an ill-conceived taxi test. And more often than not old Bruiser bears the brunt of abuse in the aftermath; being at the centre of the action, his involvement is clearly identifiable. Less so are others – at the supervisory and maintenance level where subsequent inquiry into the circumstances frequently uncovers a wide-reaching pattern of planning confusion. The painfully obvious factor emerging from most of the Bruiser's bashes is that some birdland units have no laid down policy on what constitutes a taxi test or even why it is done. A short cut in maintenance procedures is not an adequate excuse. Thus the Bruiser's lament, as he brings his latest wreckage to an abrasive stop:

THE-AIM-OF-THIS-GAME-IS-NOT-VERY-PLAIN



Don't be afraid to ask stupid questions; they're a helluva lot easier to explain than stupid mistakes!