FLIGHT COMMENT

JANUARY • FEBRUARY • 1970

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Comments

There are apparently people still flying airplanes who feel that things like tarmac cockpit reviews are best done off the top of one's head. The checklist, when initially introduced, met universal detestation but today it's an accepted professional technique for building safety into every mission.

After the Last Chance Inspections story was completed (p. 14) we discovered that one of our Training Command bases had introduced a similar procedure for their T33s. Their "Last Chance Check" takes place after the energizer has been unplugged:

- tip tank pins removed
- check for hydraulic leaks
- upper and lower plenum panels secure
- pitot cover removed
- armament doors locked

A "Good Look" award has been proposed to go hand in hand with this check.

An incident occurred recently which although not indicative of a new trend serves as a timely reminder of the price we pay for inattention. *During pre-taxi checks the pilot gave the navigator clearance to lower the canopy, which he immediately did - right onto the pilot's ladder, still in place.* The cost? One complete canopy assembly.

A "FIRE HAZARD - NO STOWAGE" warning is being installed on a panel aft of the rear seat in the T33. This should eliminate the instances of stowed personal clothing being ignited by the focussing of the sun's rays through the canopy.

Major David H. Hook of the Canadian Armed Forces has become the first foreign pilot ever to be assigned to exchange duty with the Directorate of Aerospace Safety, Headquarters USAF, at Norton Air Force Base, California.

CANADIAN FORCES HEADQUARTERS — DIRECTORATE OF FLIGHT SAFETY

COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

MAJ J. G. JOY
Education and analysis

LCOL W. W. GARNER
Investigation and prevention

Editor — Capt P. J. Barrett
Art and Layout — CFHQ Graphic Arts

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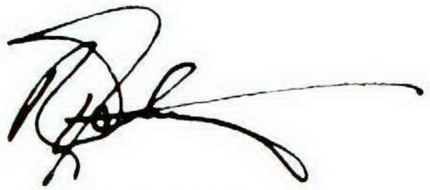
"GROUNDS" for concern

It is obvious that most of our flight safety effort is focused on the prevention of air accidents and incidents. This is understandable because these happenings are usually more spectacular and more often tragic than the so-called routine ground occurrence. At the risk of oversimplification this appears to be where we make a mistake in emphasis since the record clearly shows an urgent need to reduce the number of ground accidents and incidents.

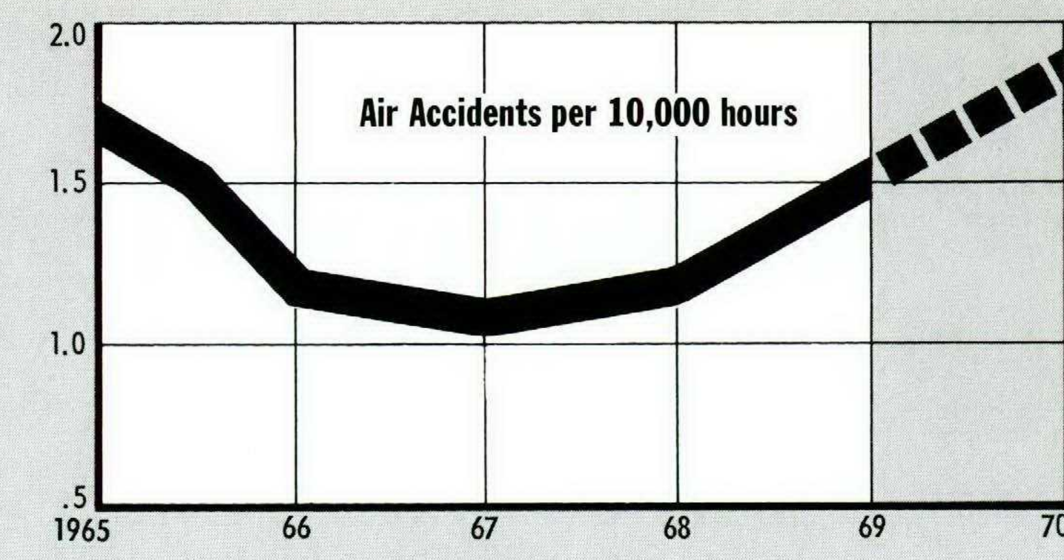
If you have taken exception to the word *routine* because you recognize the many hazards associated with the ground handling of aircraft then a good start has been made. Next, I think you will agree that everyone associated with the support side of the air operation should realize how easily an aircraft can be damaged and how expensive it is in time and money to repair. The question is, are we taking effective preventative action to eliminate those hazards most likely to cause future accidents? Based on facts presented elsewhere in this issue of Flight Comment the answer is an emphatic NO!

With hindsight we can see how most of these ground occurrences could have been prevented. In our opinion you are in an even better position to assess your own operation and associated hazards, and institute an effective prevention program tailored to your environment. This responsibility is yours. Waiting until an accident happens before instituting corrective measures is obviously the wrong approach - Act now.



COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

1969 ...that was some year!



FACT: 1969 saw 12 men killed in aircraft accidents.

FACT: 1969 saw 24 aircraft destroyed making it the worst year since 1965.

FACT: 1969 saw the re-emergence of several cause factors we had assumed were definitely on their way out. This indicates a disturbing trend towards a lack of vigilance in certain areas.

FACT: If the 1969 record continues, our flight safety situation will equal 1965 when 31 aircraft were destroyed.

The decade of the 70s for those of us in Canadian Forces aviation, was heralded in by the previous two years of mounting aircraft occurrences (see graph). To clarify the issues we sat three fictitious gentlemen by the table to discuss the problems...

Fesseau (a flight safety officer): Before we begin, gentlemen, let me make one thing clear. We in the flight safety business are primarily observers and advisors; we do not have the executive authority to accomplish the improvements so obviously necessary by the record stated above. Our function is to play the role of the "anxious assistant" in helping all of us to make the operation consume fewer resources...

Wheeler (a senior officer aviation manager): Okay, I appreciate your position in the scheme of things but my job's to get the work done - often under very challenging conditions. And these days you know what "challenging conditions" means.

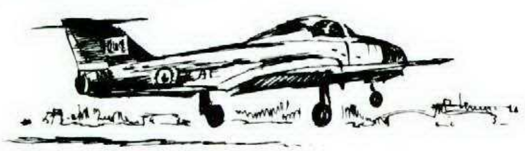
Werke (a technician): I've had a funny feeling for the last year or so that this situation might happen...

Wheeler: Well, we gave flight safety as much attention as we could afford, but the demands that were made on us by -

Fesseau: - may I suggest that flight safety isn't something one "affords"; it's got to be part of the way your organization works.

Wheeler: I'm as anxious as anyone to make my operation as safe as possible, but as an FSO you know that occasionally something that'll make the operation safer, is turned off. Frankly, I think you flight safety people could make more money if you started convincing the manager that safety stems largely - in my humble opinion - from decisions made miles away from the flying unit.

Werke: The men I know often feel that way - particularly when there's a hazard created by difficulty in getting equipment, for example.



Fesseau: Let's get off this "shortage" bit and see if there are some lessons to be learned from last year's experience. A glance over the statistics gives me the feeling that we're losing the ground we had gained years ago - particularly with those real clear-cut "avoidables" such as towing bashes.

Werke: Could it be that the flight safety program itself has fallen down in some way?

Fesseau: I hope that idea's not too widespread! Remember, the flight safety officer cannot initiate preventive measures. The *it's-up-to-flight-safety* attitude is prevalent but false. We're here to try to convince the technician and management that -

Wheeler: - I'm glad you made that point because I was just about to interrupt! My attitude towards safety comes from quite a few years' experience in military aviation. I say that accidents are merely external symptoms of a job done incorrectly. I know this is a simplification but it's a good rule of thumb, I've found. Consequently I [illegible]e difficulty in relating safety to my operation as "[illegible]fety".

Fesseau: I think the cause factor definition in CFP 135 under "Management" best indicates its function:

> Management: any function relating to the formulation of plans, the apportionment of resources, the creation and writing of orders and instructions, is management.

You're quite right when you say that safety is inherent in the operation. Mind you, not everyone feels that way!

Werke: From last year's record it seems that there's a general falling off on everyone's part. Is this management's fault?

Wheeler: Well, if everyone's involved then the problem seems to be one of simultaneous involvement; by that [illegible]n, do the statistics point to a more basic underlying [illegible]e? Let's face it, we're in a period of transition...

Fesseau: Maybe - but if you extend that logic we have to accept change as hazard-producing. I remember when a new aircraft was introduced we were more or less psychologically prepared to accept high losses, as if this were the natural course of events.

Werke: Yes, but when you're unfamiliar with the aircraft and its operation, isn't this to be expected?

Wheeler: That's a challenge that hasn't been as aggressively pursued as I'd like to see it. It's somewhat akin to pressing on to hilly terrain in reduced vis! What is needed is a little foresight -

Fesseau: - and that's where flight safety planning can really pay off.

Werke: I can give you an example of that - at least, in the negative sense. We had a senior NCO who was faulted for "lack of supervision" when he actually had three hangars to supervise! He just happened to be absent when a goof was made and he carried the can. Now, I call that a lack of planning.

Fesseau: There are numerous examples of that. Sometimes, those accident cause factors seem to stand out painfully obvious in hindsight!

Werke: You know, it's ironic that all this is taking place when the reporting and anlysis of aircraft accidents and incidents has never been better. Trouble is, we're not employing the wisdom gained by our previous mistakes - and that's for sure.

Wheeler: I agree. Frankly, as managers we're inclined to spend too much time on the day-to-day details and trivia and not enough on analysing the whole operation. If we could only convince people that safety is simply recognizing the facts of life about airplanes - that is, a moment's inattention or indifference can sometimes make the fatal difference. If a pilot drives an aircraft into the side of a hill in low visibility he's acting much in the same manner as the chap who tows an aircraft out of the hangar and doesn't bother to check the clearance. Both these individuals are momentarily indifferent to the possibility of an accident occurring. Where it really gets dangerous is if this indifference insidiously extends into a full time attitude to one's work.

Fesseau: I think you hit the nail on the head, here. It seems to me it's about the only way to explain the fact that our setbacks have occurred across the board. Whatever the reason - and for every person there's probably a reason - the consequences showed up in the statistics of the last couple of years. Flight safety, for its part, will be making increasing efforts to provide everyone - from top management to operator - with the information so vital to flight safety planning. This year will see the introduction of the computer into flight safety's recording and analysis. We're hopeful that greater insight into problem areas will be gained from the substantially closer scrutiny the electronic brain can bring to bear. 1970 will be the decade of the "preventive measure". This little fellow will emerge, I have no doubt, as the decade's most effective flight safety management tool. If I may explain this for a moment; I think it's worth the time. Traditionally, the case has been "closed" when the cause factors were established and published. Of course, hopefully the system would respond by applying preventive measures to specific cause factors. But in all fairness, the lack of response was a result of a rather tenuous association of cause factor and preventive measures. Further, there was no effective method of follow-up which resulted in a proposed preventive measure disappearing quickly from sight. I'm not saying this happened in all cases, but it did happen...

Wheeler: Something like keeping the pressure on, eh?

Fesseau: If you want to put it that way - yes. It's bou to create a little abrasion, but if the eradicatio needless resource loss is the aim, the consequen are more effective monitoring and management. And with that we can close the discussion on an optimistic note. Not that the new regime is going to please everyone, but from the experience in 1969 we must accept the consequences of seeing the 1970s as the decade of more effective flight safety management.

Dirty end of the shift

Studies in factories using multiple shifts show that frequent changes in working hour assignments are hard on people. The more frequent the change the worse the strain. And what frequency of change were they examining? Monthly or even less often. Changes which were any more frequent were regarded as marginal personnel practice at best. But shift work is something we can't escape. And - perhaps you'll find this surprising - many shift workers won't let their supervisors make any changes from this traditional inefficient arrangement.

Flying is an around-the-clock operation, one which demands many folks work at night. If this night work involves regular shift changes - and we'd be joshing you to intimate it doesn't - then the impact is pretty obvious. The point the specialists make is that regularly changing schedules mean continued sub-par performance. Three years of this will grind the average head down to a

numbnoggin nubbin. And continually breaking the metabolic cycles so drastically can lead to neurotic disturbances. Isn't it remarkable that we are able to conduct our part of international defence at such fractional efficiency?

- adapted from Airscoop

What did he say?

Official correspondence may have some deceptively-phrased passages that could confuse the uninitiated. For the wary, here's a translation of a few common-place confusers:

Concur
"I'd rather not say anything; it might be controversial"

Still under investigation
"We haven't had a look at the thing yet".

Active consideration
"The idea died when Capt Smedley was transferred".

We're working on it
"Two more years and they'll phase out those aircraft, anyway".

Some progress has been made
"We just found the missing file".

The idea has merit
"No!"

Agenda item
"We'll talk it to death".

Attacks on Aircraft

In the discussion that followed it was concluded that fuel leaks from air transportable vehicles, attacks on aircraft by ground handling vehicles and personnel-induced incidents in general, are all indicators of a lack of professionalism...

- Flight Safety Committee

Yes-

It's reportable!

or any occurrence

having accident potential.

Good Show


Cpl E.W. Savoy


Cpl R.E. Lundquist

CPL R.E. LUNDQUIST

As a student undergoing equipment familiarization in an Argus, Cpl Lundquist was carrying out an independent external inspection. Drawn to the starboard side by an unusual noise he discovered flames spreading up a grounding wire to No 4 engine. He immediately sounded the alarm, then grabbed a fire extinguisher from the aircraft and smothered the fire.

Through his alert reaction Cpl Lundquist probably prevented the loss of a hangar and a valuable aircraft.

CPL E.W. SAVOY

While carrying out a daily inspection on an H21 helicopter, Cpl Savoy discovered a crack on the top side of the crankshaft front housing. The area is very difficult to inspect; numerous panels must be removed and the check completed with a flashlight.

Through his professional approach to a routine inspection, Cpl Savoy eliminated a possible engine failure which, on the planned low-level search and rescue mission might have been disastrous.

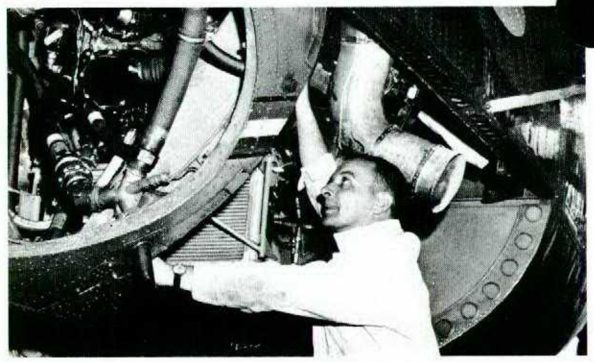

Cpl A.W. Hynes


Cpl T.P.W. Wallace

CPL T.P.W. WALLACE

During an "A" Check on a transient T33, Cpl Wallace discovered damaged electrical wires in the port wheel well. Further investigation revealed that a cotter pin on the eye end of the main undercarriage actuator had passed over these wires when the undercarriage was cycled, causing chafing of the wiring insulation.

Cpl Wallace's thoroughness prevented further damage and the possibility of an in-flight unserviceability.


Cpl R. Noble

CPL A.W. HYNES

Cpl Hynes was performing a dye penetrant inspection of engine mounts in a Hercules when he detected a crack so small that it could barely be seen by fellow technicians, even when it was pointed out to them. The crack had progressed deep into an engine mount which carried half of the weight and pull of one engine. Had this stress point failed the engine could have been lost.

Through this display of special interest and keen observation in a routine NDT inspection, which had repeatedly revealed no cracks, Cpl Hynes probably prevented a very serious in-flight emergency.

CPL R. NOBLE

During a PI on an H21 helicopter, Cpl Noble found a small oil leak near the front oil sump. He wiped the area clear, and after completing the inspection returned to find a further accumulation of oil. Dye penetrant tests revealed a crack three inches in length around a bolt holding the crankcase front section. The engine was removed as a result.

Employing a thorough inspection technique Cpl Noble eliminated a potentially serious malfunction of the H21 engine.

CPL L.A.J. BOURQUE

While servicing the oxygen system of a transient T33, Cpl Bourque heard a faint hissing sound coming from the intake area. Unable to find the source, Cpl Bourque reported the situation to his supervisor who assigned additional technicians to the job. Air pressure was found to be leaking from the hydraulic accumulator.

By his attention and conscientious follow-up action Cpl Bourque prevented what could have been a serious in-flight emergency.


Cp[illegible] J. Bourque


Cpl R.A. Arnold

CPL R.A. ARNOLD

While performing a daily inspection on a Tutor, Cpl Arnold discovered a barely visible crack in the main wheel assembly - an item outside his basic trade area. This discovery led to corrective action being taken on all Tutor aircraft.

Through his thorough inspection Cpl Arnold uncovered a metal fatigue problem which might otherwise have remained undetected until it caused an accident.


Capt M.S. Vacirca
AC 4(T) OTU

Capt G. VanBoeschoten
AC/UT 436 Sqn

Capt J.C. Brace
1 OFF 436 Sqn

Capt A.A. Pulfer
RO 436 Sqn

Capt R.T. Brown
NAV ATCHQ

WO A.G. Wood
FE 436 Sqn

WO J.H. Arsenault
FE 436 Sqn

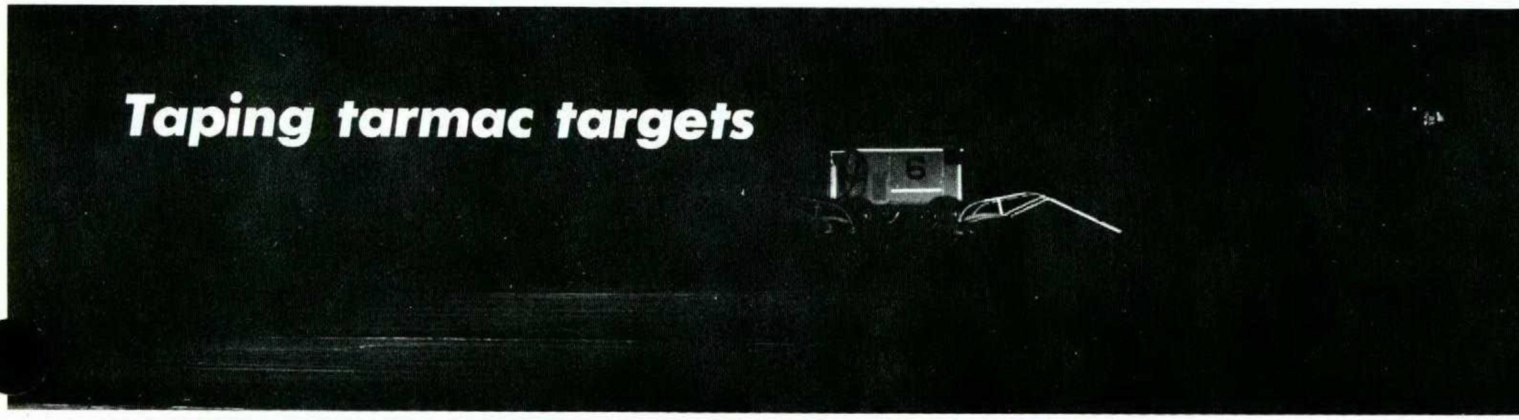
Cpl J.G. Langlois
TT 436 Sqn

CAPT M.S. VACIRCA AND CREW

Five hundred miles east of Goose Bay enroute from the UK the Hercules crew picked up a distress call; the solo civilian pilot reported malfunctioning trims and venting fuel. In addition he had sustained frost bitten feet due to the failure of his heating system.

Capt Vacirca diverted to offer assistance, eventually sighting the aircraft some three hundred miles east of Goose Bay. During this time his crewmembers computed fuel, heading and distances, and were able to assure the pilot that he had sufficient fuel to reach Goose Bay. An emergency was declared and during escort to base at a lower (and warmer) altitude, the crew continued to assist and encourage the extremely agitated pilot; they provided terrain clearances, approach procedures and various checks enabling the aircraft to land safely two hours after the original intercept.

Through their professional approach to this emergency situation Capt Vacirca and his crew prevented the loss of this civilian aircraft.



Taping tarmac targets

One solution to the problem of illuminating ground equipment at night is now in use at CFB Gimli. Inexpensive reflecting tape lights up their fleet of "tarmac targets" - and at bargain prices too!

(Note untaped ladder at left)

something new....

ribbon chutes

Reports indicate the chutes are effective and are not susceptable to as much damage as standard chutes. There have been no failures in the last 120 deployments...

- Flight Safety Committee

A variable porosity drag chute has proved highly successful in trial deployments on the CF5 and CF104. As a result, the chute has been selected for both types of aircraft.

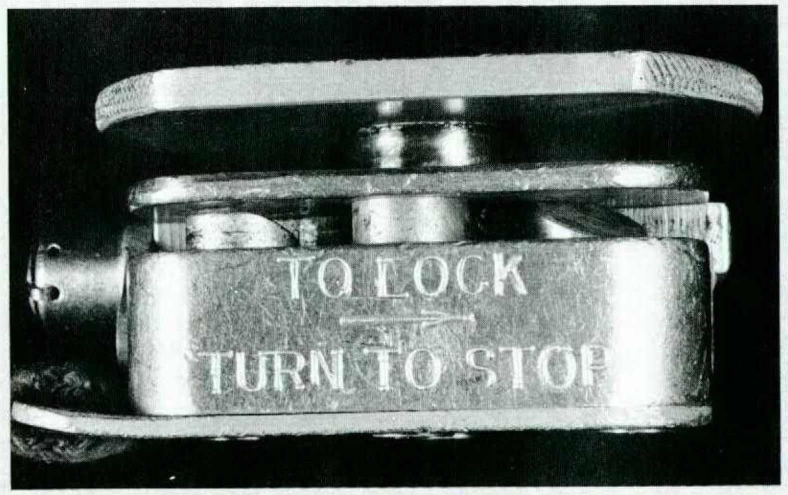
The "ribbon chute" is superior in many ways to the ring slot chute previously in general use. Because of its rapid opening it has a longer drag period, and is less prone to damage caused by the chute and deployment bag striking the runway. Pilots now have a maximum deployment speed of 200K in the CF104 and 190K in the CF5.

Maintenance on the "ribbon chute" is much simpler and is required less frequently. Catastrophic failures which frequently plague the ring slot chute once a tear has started, no longer occur.

A 100% resource saving is expected on the CF5; the present 25 deployments per chute will be doubled, while the CF104 deployment life has been increased 50 per cent at a cost increase of only ten per cent.

Drag chutes have been a particular problem in the past for the Canadian Forces. Let's hope this new chute has the problem licked.

Murphy again...



An aircrew member recently had his parachute harness checked on a routine inspection and since the parachute harness was adjusted for proper size when it was initially issued, there was no requirement to try on the harness following the inspection. Later, while donning the harness he found that the left shoulder strap would not hold.

The pin for the left shoulder strap in the release box had been installed backwards on the "routine inspection" and had gone unnoticed by the safety systems technician and by the aircrew member.

How is your harness? Do you check everything on your parachute?

beware the Red Herring!

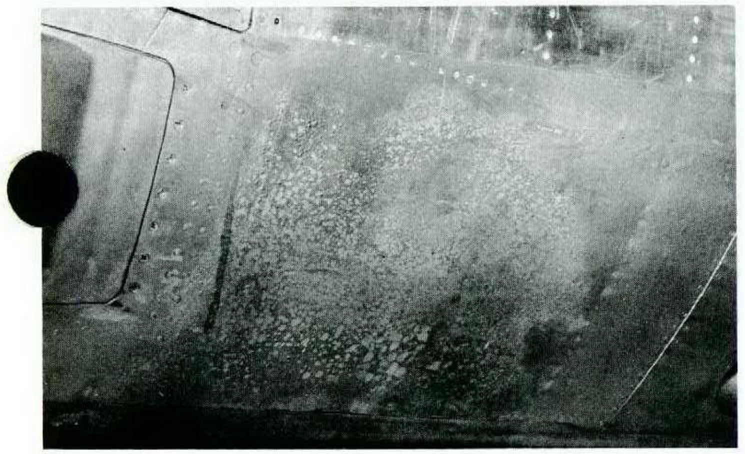
Capt. R. J. Kelly
DFS

A Red Herring turned up recently giving a Voodoo crew some anxious moments. After returning from a mission the aircraft had been put u/s for a faulty attitude indicator; the pilot reported a smell of burning wire and a very hot instrument panel. The technicians located and repaired a broken wire in the attitude indicator but found no indication of heat, smoke or fire in the area. The aircraft was released for a test flight.

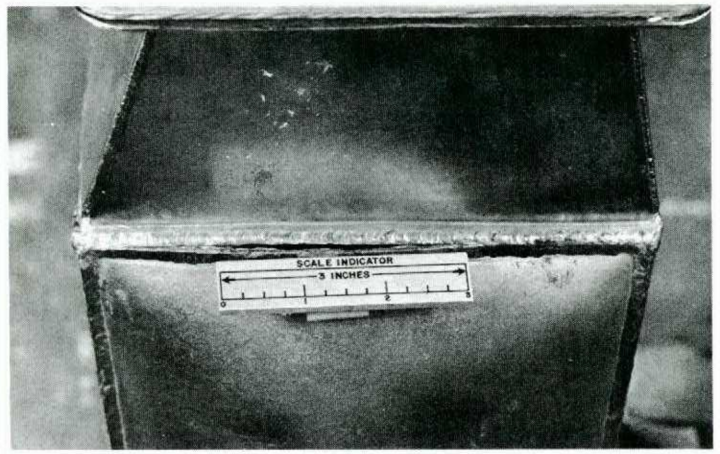
The test flight ended with an emergency recovery at base because of smoke in the cockpit. This time blistered paint led the technicians into the Heat and Vent System where a three-inch crack in the primary heat exchanger was found. This had permitted extremely hot air to blow on components under the cockpit, causing seizure of a defroster valve and damage to several hoses. The smell of burning wire was in fact, the smell of overheated duct hose.

The technicians were foiled in the first place by the pilot's report of the burning wire smell, then, finding the broken electrical wire, they assumed that the problem had been solved. This Red Herring obscured the trail leading to a malfunction, thereby setting the scene for a serious in-flight emergency.

Blistered paint on Voodoo fuselage



Cracked primary heat exchanger



5 years prop-death free

a non-accident report!

Injury and death continue to occur as a result of propeller accidents. Close to fifty incidents were reported in US Civil Aviation during 1967-68, of these, six were fatalities. A particular threat is posed by the turbo props:

- *they windmill for a longer period after engine shutdown*
- *the flat pitch angle of the blades during shutdown creates little warning sound.*

The last death in the Canadian Forces from a prop occurred in January 1965. Let's keep alert to this hazard and keep the record clean!

Why we're going for the QRB

Capt. B. R. Arnott DFS

"That bloody QRB
if they hadn't stopped the boat
and jumped in after me
I would've swallowed most of the Med!"

This sort of comment from a half-drowned survivor of the Air Div Water Survival School is typical of recent criticism levelled at the Canadian Forces quick release box parachute fastener. During 1969 CFHQ received numerous recommendations to incorporate riser release fittings in jet aircrew parachute harnesses – based largely on the concern that downed aircrew, particularly if injured, could have extreme difficulty in opening the QRB if they were being dragged across the ground or through the water by the parachute.

A thorough study of the problem by CFHQ has uncovered the following points:

- The introductions of a riser release system would not necessarily overcome the problem.
- A number of new problems would be created by riser releases that would seriously compromise the entire life support package.

The chorus of criticism had some justification, but the suggested solutions were based on inadequate information; poor communication led to some erroneous conclusions in the field. All in all it was a very undesirable situation; to correct it, a letter of explanation has been sent to the user Commands. This article is intended to complement and illustrate that letter, and in helping to clear the air, restore confidence in our present equipment.

To begin, a decision taken in 1966 to upgrade the T33 ejection system by incorporating rocket seats has resulted in a requirement for installation of Ballistic Inertial Reels (BIRs). BIRs are also scheduled for use in the CF104 and the CF5. This equipment places the pilot's body in the correct position for ejection by hauling back the shoulder harness with a force of about 400 pounds, thus reducing the risk of injury during ejection. Investigation has shown that if a crewmember is wearing a riser release parachute harness (figure 1) the adjustment buckle on the shoulder harness can snag in the riser release buckle during the powered haul-back sequence (figure 2). This might cause seat-man entanglement and could in fact release the riser buckle (figure 3). A further possibility of seat-man entanglement exists during the seat-man separation phase of the ejection sequence.

This in itself would be a bad enough situation, but it has further ramifications. Because of the very real possibility of a riser buckle inadvertently releasing,

Figure 1

Figure 2

Figure 3

Figure 4

CFHQ parachute design authorities would insist on the installation of a cross-strap above the fittings (figure 4). The cross-strap would then ensure that the canopy stayed inflated if either riser release accidentally let go during the ejection or descent – but it would also inhibit the quick release feature of the system following landing. That is, with the cross-strap in place it would be necessary to release both buckles – rather than just one – to spill the canopy. A man being dragged through the water would almost certainly run into more problems undoing two riser releases, than he would opening a QRB.

For the cynics, the idea of a cross-strap is not something dreamed up by the guy who sells QRBs. Since their introduction, riser release systems have undergone numerous major modifications; one of the latest, because of the possibility of an inadvertent release, has been the introduction of a cross-strap by one major user. These and other problems with riser releases have caused several other air forces to review their overall life support package; one has already decided to discard the riser release system and reintroduce the QRB.

Other problems arise from the shape and position of the releases once they have been opened (figure 5). Unless they are closed before entering the life raft the protruding parts could puncture it (figure 6). In fact, this has actually happened several times. At best they make entry into the raft more difficult. Of course, as mentioned, these problems can be overcome by closing the releases prior to entering the dinghy. However, fastening two rather complex spring-loaded catches, with cold, wet fingers, while bobbing in the water would be a real trick, and would certainly require the use of both hands.

"Okay" you say – "But if the QRB is all that great, why do our pararescue people, who know as much about parachutes as anyone, use a riser release system?" Simple. With a reserve chute and all kinds of related gear strapped to his chest, a pararescue jumper cannot get at a QRB to release it. The shoulder-mounted riser release, on the other hand, is accessible to him. He also isn't worried about seat-man entanglement.

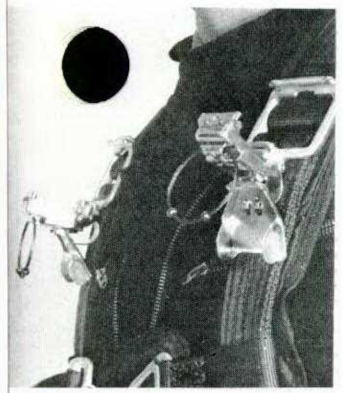


Figure 5

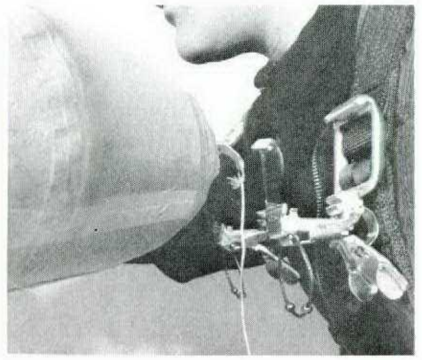


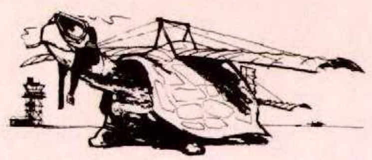
Figure 6

Canadian Forces life support equipment is designed to be as effective as possible, yet simple to operate. The success of this policy seems to be borne out by the fact that, as far as we know, our ejection survival rate is unsurpassed. However, this does not mean that we are resting on our laurels, or that complaints about the present system are being ignored. The present QRB can be very stiff to operate and therefore difficult to "squeeze off" after a water landing; it can fill with dirt and become impossible to "squeeze off" if a man is being dragged face down over the ground. Both these problems will be overcome with a new QRB (figure 7) expected to be distributed in the near future. The new box operates much the same as the old one, but release pressures are reduced, and a flange around the pressure plate will keep dirt and foreign matter from jamming it. It should be a substantial improvement.

Figure 7

No matter how effective the equipment, it will not perform to its full potential unless it is supplemented with continuous training. It would be nice to have an escape package that guaranteed aircrews 100% success, even if every person who used it were unconscious from the moment he pulled the handle, but such a system is still a designer's dream. Until it is a reality, training programs in the operation of survival equipment must be carried out to ensure complete aircrew familiarity with the proper procedures. That, added to simple, effective equipment that is as automatic as the "state of the art" allows, will provide the best insurance available.

That rock's a turtle!



We came across this anecdote which seems worth repeating.

Private aircraft: *"Kansas City tower, you might inform the TWA aircraft about to take off from the north end that the object near my position that looks like rock is really a turtle on the runway."*

TWA 707: *"Tower, we heard that transmission. Understand one turtle crossing the runway."*

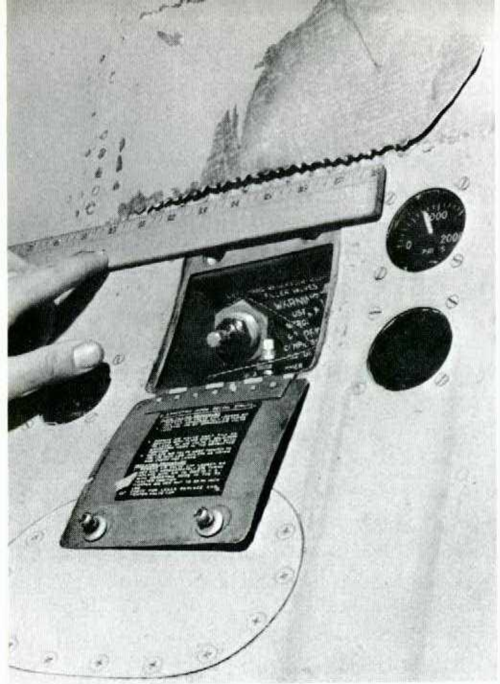
Tower: *"Based on available pilot reports, turtle's course is oriented southeast, heading toward gate five."*

TWA 707: *"Tower, can you give us info on turtle's speed and estimated time of runway clearance."*

Tower: *"Computer calculations indicate turtle's speed around 200 feet an hour - may be less in this quartering headwind. If present course and speed are maintained runway should be clear in eight minutes."*

TWA 707: *"Unable to wait due to fuel depletion. Will employ evasive action on takeoff roll."*

Tower: *"Roger, TWA cleared for takeoff. Be on alert for wake turbulence behind departing turtle."*



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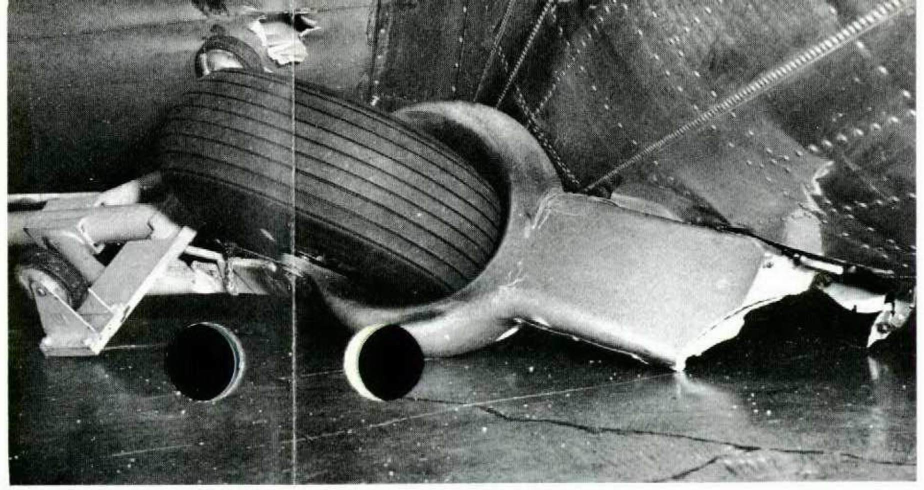

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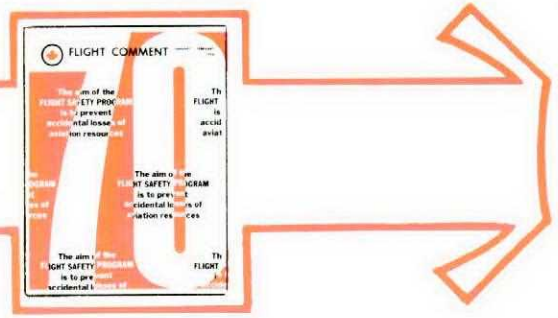


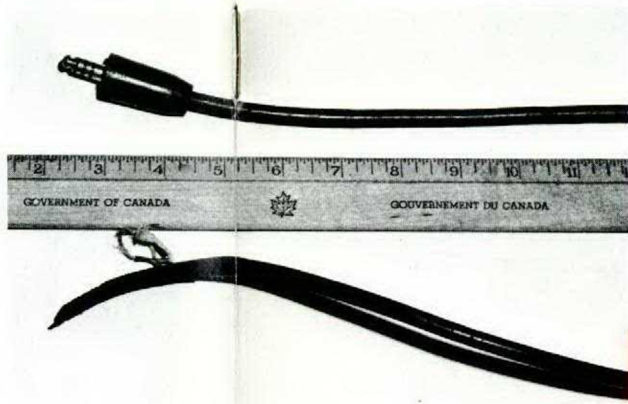
GROUND ACCIDENTS

Statistics show a dismal and striking upsurge in ground accidents during 1969. For the third year in a row these occurrences reversed the trend of the previous eight years, moreover the reversal accelerated during 1969.

These statistics, of avoidable damage caused to aircraft, reveal several startling figures:

- In one command the supervision/management factor increased 300%
- Maintenance cause factors increased in all but one command; an increase of 400% in one and 300% in another.

In fairness it must be explained that a portion of the increase was due to an improved reporting system. We are confident that this new system will enable the Canadian Forces to sleuth out the difficulties and establish a downward trend.



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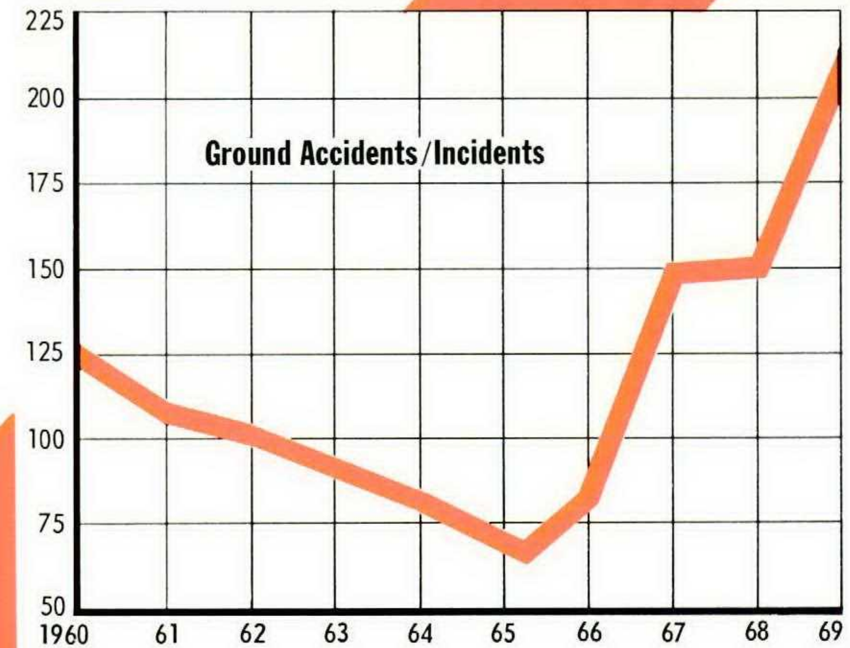

	CF TOTAL 1968*	1969*	% UP
PILOT FACTOR	3	5	67%
MAINTENANCE	40	70	75%
MAINTENANCE (CIVILIAN)	4	8	100%
SUPERVISION AND MANAGEMENT	29	36	41%
MATERIEL	25	60	140%

* 1 Jan to 30 Sep

1. Over pressure resulted in a burst reservoir
2. CF104 H-link failure caused by metal fatigue
3. Dakota lost tail wheel when main wheels were stopped by lip at hangar door.
4. Typical of many occurrences: In this case an intercom cord was injested by a J85, necessating an expensive repair.
5. Combination lock found under hydraulic pump handle in Tutor cockpit.
6. Typical of 20 aircraft damaged by vehicles and maintenance stands.
7. Representative of 23 towing accidents, this Argus wingtip was damaged because the understaffed towing crew, having previously moved an aircraft through the opening, apparently assumed that the doors hadn't been moved in the meantime.

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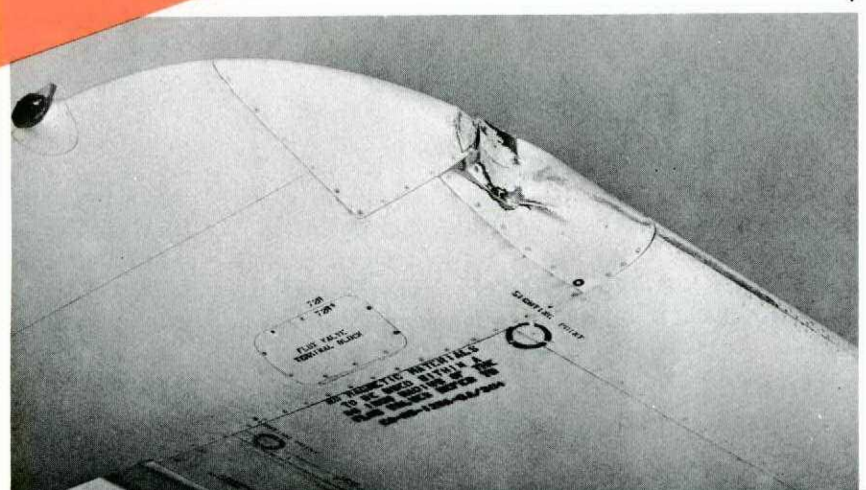

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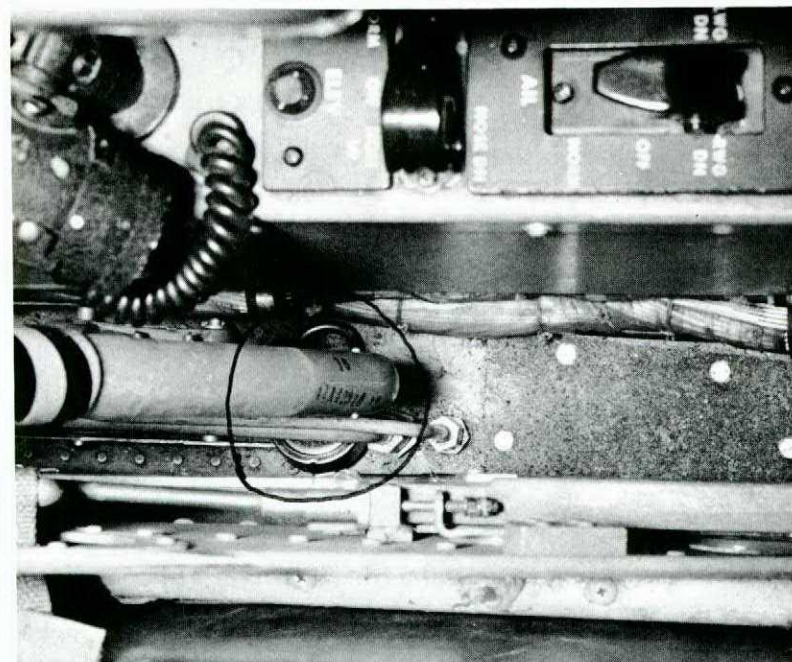
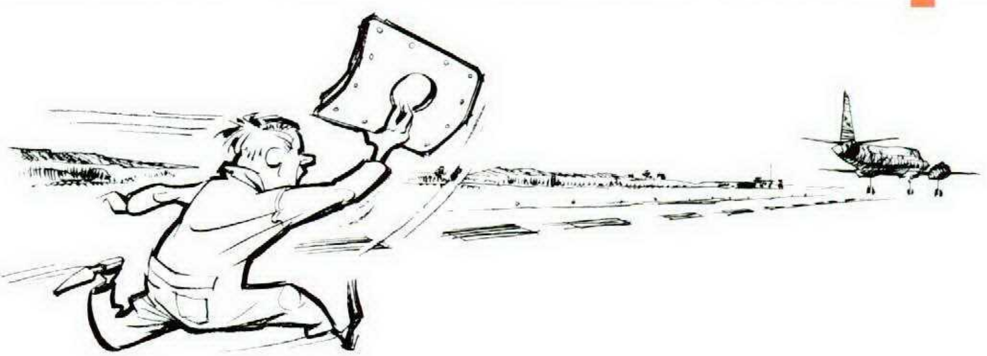


last chance inspections



On these pages we throw out for public debate the pros and cons... What do you think?

Where do you stand on last chance?

Some of you have heard about the Last Chance Inspection and wondered what it really is. If one were to say it's another redundant inspection, there would be plenty of controversy and emotion generated. Some would argue that any additional inspection would degrade the integrity of previous checks because tradesmen would adopt a "the-next-inspection will-catch-it" attitude. Also, there's the question of the extra manpower required. So, maybe it would be better to start off by describing what it isn't.

It's not a redundant inspection! It's not a supervisory check of the pilot's pre-flight which in turn is not a check to find fault with the groundcrew. Confusing? Yes, if you think solely in terms of an inspection of an inspection, and so on.

The last chance inspection is an extension of the start-up visual and the functional checks. Some items are impossible to see when the aircraft is sitting on the tarmac. Remember those tires that blew because the bald spot was missed? The bald spot (so the story goes) was on that part of the tire touching the ground and therefore couldn't be seen. Does anyone recall aircraft that have started dripping fluid after taxiing from the tarmac? And remember those hatches and doors that came off in flight? The explanation for these occurrences? The groundcrews and the pilots goofed. But did they?

We feel reasonably sure that in many cases interrupted procedures and transient staff overloads had a big input into these occurrences. There have been several occasions when an eagle-eyed technician spotted a loose or open door or panel as the aircraft taxied by - and received a well deserved Good Show award for his contribution to flight safety.

Certainly, those deficiencies not apparent until the aircraft moves from the parked position means that the last chance inspection is actually an extension of what in this context might be considered an "incomplete" inspection.

The last chance inspection can require more manpower; a few bases assign two men for the job. However, some units use the pin pullers to do the last chance inspection portion of the pre-flight. Others use the start crew who completely check the aircraft after it has moved a few feet to rotate the tires. No matter how it is done, the writer thinks it's a good idea. It has prevented incidents and possibly some accidents. Initially, the ground abort rate may increase; however, that ground abort is preferable to a more serious occurrence.

Where do you stand on last chance inspections?

Maj K. S. Wong - DFS

Luxury or life insurance?

Maj J. R. Chisholm

In November, 1968, 416 AW Squadron at CFB Chatham initiated a system of last chance inspections on their CF101s. The purpose of this inspection was to allow qualified groundcrew technicians to carry out a visual inspection on each aircraft just before it entered the active runway for takeoff. These groundcrew were line servicing personnel who drove to the inspection area just before each departing section arrived. A rotation system was arranged so that in effect line crews were double checking the work of another starting crew. In addition any visible defects which occurred after the aircraft left the tarmac should have been detected. The Squadron began this system as part of their flight safety program. What has prompted this article is the fact that there are many opponents to this latest innovation who believe that last chance inspections are both redundant and unnecessary.

There is nothing unique about last chance inspections. They have been carried out in various forms by both the USAF and the RAF for many years. In fact, the March, 1969, issue of USAF "Aerospace Safety" contains an item supporting last chance safety checks. USAF Aerospace Defence Command have recently initiated a system of last chance inspections throughout the Command. This might not be too significant if one assumed that the standard of line servicing in other organizations is inferior to that of the Canadian Forces and therefore extra safeguards are necessary. One might also point out that most transport types of aircraft, both civilian and military, maintain a high standard of safety despite the fact that they don't undergo last chance inspections.

"The purpose of last chance inspections is to detect any aircraft malfunctions or discrepancies which may have gone unobserved prior to taxiing or which may have developed during taxiing." This definition was borrowed intact from the USAF ADC magazine "Interceptor" and clearly states the case of the protagonists who support the introduction of this inspection system. Last chance inspections should have many advantages:

- disclose defects that would otherwise remain undetected
- reduce the airborne accident/incident rate
- lower the returning unserviceable rate
- raise the work standards of line servicing

Opponents of the system do not dispute the purpose of last chance inspections. They contend that although there have been a significant increase in the maintenance abort rate, there has been no corresponding decrease either in air incidents or the returning aircraft unserviceable rate. There are other disadvantages:

- it means an extra workload for both men and vehicles
- there is no guarantee that the inspections would be more thorough than post start inspections
- it may lead to complacency on the part of those responsible for other preflight checks

A study of the statistics available for the first four months of operation of the system at CFB Chatham is very enlightening. During the four months twenty-three aircraft were turned back at the last chance inspection point and four were passed after deficiencies were corrected. The malfunctions found may be categorized as follows:

Malfunctions which could have been detected prior to last chance	Malfunctions which were unlikely to have been detected prior to last chance	Malfunctions which could not have been detected prior to last chance
1 - tank pins left in 1 - undercarriage locks in 1 - loose antenna 2 - panels partly undone	13 - hydraulic leaks 7 - fuel leaks 1 - oil leak	1 - badly cut tire (bolt found on taxiway)

Also, the aircraft returning unserviceable rate did not decrease for the period and the air incident rate was equal to or greater than that for the same period in the previous five years.

In studying the conduct of this program of last chance inspections by 416 Squadron several factors emerged:

- the cost was negligible
- although some lack of line servicing discipline was evident, it probably existed before last chance inspections
- last chance, if properly applied, could improve the standards of support functions such as FOD control, airfield inspections and post start inspections
- as in any accident prevention program, positive results are difficult to measure

The last chance inspection is not a panacea to prevent aircraft accidents and incidents. It may encourage laxity on the part of certain servicing people who have little self discipline or pride in their work. The results which 416 Squadron have reported reinforce the fact that humans are fallible and that no safety program will ensure zero defect performance. Skeptics who adopt the

cont'd on page 21

NIGHT DITCHING

The ordeal began with a collision on the flight deck during a 'bolter'. Damage sustained by the wing and aileron caused a serious restriction in lateral control; the Tracker could not be held on the glide path during a series of approaches that followed. Now, under maximum stress, with fuel running low (alternates had been out of range from the start) the pilot was faced with a night ditching.

"...Opening all overhead hatches and locking our harness, the ditching preparations were complete. I began the descent from 500 feet, slowly reducing my airspeed and rate of descent. I did not want to reach a low airspeed too soon as we had trouble earlier keeping the wings level. The entire approach was completed on instruments; there was no visible horizon. At 200 feet ASL, the airspeed was approximately 100 knots with a rate of descent of 200 feet per minute. To keep the wings level, the co-pilot maintained full left aileron while I handled the elevator and held the wings level with rudder. Final power adjustments were made and the throttles not touched during the remainder of the approach. The main instruments used were the VSI, radar altimeter and compass.

Approaching the surface of the water the airspeed was back to 90 - 95 knots with a very small rate of descent. As we descended below 20 feet I saw the water glinting, then some part of the aircraft struck the water - probably the tail hook. It seemed like forever; then the aircraft hit with a terrifying sound and everything went black. There seemed to be one long deceleration, although other crewmembers recall more than one. When the aircraft stopped the water level was about halfway up the windscreen, but little or no water had come in through the overhead hatches. As far as we could tell the aircraft did not break up at all.

When I attempted to move my legs I found that something *(possibly a nav bag)* had come forward and jammed between my leg and the centre console. By this time the co-pilot was half way out of his hatch. I released my harness and had to slide into the side bubble window to free my leg, then I scrambled through the overhead hatch where I found the two crewmen on the aircraft and the co-pilot in the water near the starboard engine. When I asked whether anyone had released the main life raft I was told "negative", so I reached back into the cockpit and pulled the release handle, simultaneously sending the crewmen back to the hatch in the event the emergency release did not work. When the men reached the liferaft compartment it was partially open and raft inflation had started. The three of us pulled the raft away from the hatch and cleared the HF antennae just as the co-pilot yelled from the starboard side to clear away from the aircraft as it was sinking. One man jumped in on the port side; the other crewman and myself went to starboard, and with the co-pilot got into the raft. Because of the darkness we were unable to see the other crewman until he turned on his strobe light, although he was less than 10 yards away.

Once settled in the raft, we checked for injuries; barring a few scratches everyone was okay. None of the crew took their seatpacks out with them as it is squadron procedure not to connect the seatpack to your mae west in case the pack gets caught up. We noticed that a smoke float was burning not too far away. Two smoke floats were carried on this trip but the starboard one was knocked off on the flight deck. We felt extremely lucky that no fuel or oil had ignited.

The "plane guard" hailed us almost immediately and the destroyer was close enough that we could shout back and forth to the crew. A boat from the destroyer picked us up shortly and took us alongside, from which position we had to use a scramble net to get on board. This net - difficult to climb under normal conditions - was a hairy experience for us at this time.

I am convinced that the ditching drills carried out at the squadron enabled us to abandon the aircraft so quickly."

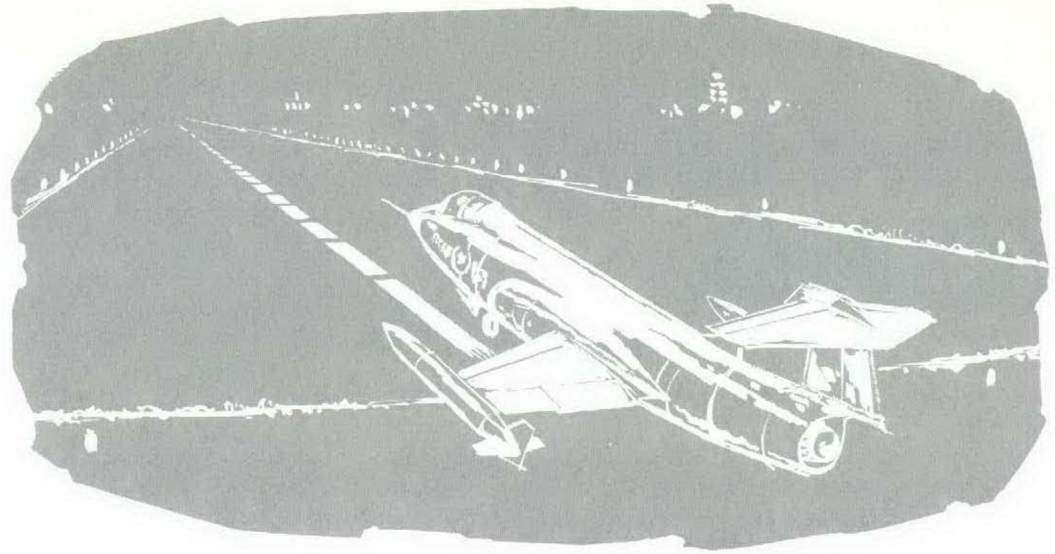
Readers will be grateful to this pilot for the report of his experience. In the light of reports such as this, pilots and their crews can critically search out and correct flaws in their own procedures.

Snow clearing...

The CO —— Sqn stated that several pilots had fallen while running to aircraft over snow-covered paths. He asked that in future snow be removed from these paths...

- Flight Safety Committee

Mission with a porpoise...



An F104 pilot in another service wrote an account of a night flight - or should it be "fright"? We present this much-reduced account because it carries a lesson in airmanship. Would you have handled this problem differently?

I was scheduled for a night low-level navigation trip... start-up and taxi were normal and all ground checks performed normally... on takeoff when I raised the undercarriage I immediately felt an over-controlling pitch motion... something was overriding my control pressures and my correcting actions were always a bit late... the autopilot was definitely off.

I turned out of traffic and when the aircraft was stabilized at 1500 ft AGL, I put the APC switch ON and engaged the autopilot. Before I could make any other movement the aircraft started a severe porpoising motion from +2.5G to −1G...

...I had to decide whether to stay in the local area of the airfield and burn up my heavy fuel load or to go on with the navigation and use up the fuel that way. The weather seemed good... the aircraft with the autopilot off was feeling comfortable... since I felt I would interfere with other aircraft by staying under radar cover from the local GCA I decided I may as well fly my planned navigation trip...

The slight porpoising kept on... I entered cloud and about 35 minutes later I broke out again... during this cloud flying I gradually got vertigo from the continuous movement of the aircraft and the lack of any visual reference outside. I had to concentrate and force myself to believe my basic instruments... At one point I even thought I was going to be airsick...

The sight of visual reference points made it again more comfortable. By now I was back near home base... I entered the landing pattern with about 2800 lbs of fuel... I asked the tower for assistance to remedy my problem... no corrective action was forthcoming...

I was still quite heavy on fuel and wanted to be able to make a last moment go-around in case something went wrong on the flare... I decided I was going to make a takeoff flap approach... The initial part of the GCA was quite normal but when I slowed down to final approach speed after lowering the landing gear, I had the impression that the porpoising motion was aggravated by the lower speed. I started my glidepath... with the instability of the aircraft I was getting kind of nervous... At about 200 feet I decided to go around...

At this point I had about 2000 lbs of fuel left... this time, I was going to make a land-flaps approach hoping that this would make the aircraft more stable... The porpoising motion was such that I was not at all sure to be able to make a normal landing because of the timing between the porpoising and my correcting action... I suddenly had the impression that I would have to go around since the nose came up too high but the nose came down and the aircraft settled down on the runway...

Part of the movement of the aircraft attitude was beyond my control; from this standpoint I think it was a real hazardous maneuver...

Yes, indeed!

Respect - not neglect

The BFSO stated that a number of observations have been made recently about the apparent neglect by individuals of their personal safety equipment. He stated that included in these observations were improper parachute adjustment, poor Mae West pre-flight inspections, and pate suspension cord entanglement.

- Flight Safety Committee

Stay with the regs...

The pilot of an F101 encountered difficulty in starting the number two engine. Maintenance personnel decided to start the number one engine, remove the starter from that engine, and mount it on the number two engine for starting. While attempting this Mickey Mouse procedure, raw fuel sprayed on the hot starter, resulting in second degree burns to the personnel involved...

- USAF/ADC Interceptor

. . . a refresher

IN-FLIGHT ICING

N. T. Taylor
B Met O, CFB Winnipeg

Improvements in aircraft design and inflight procedures have combined over the years to reduce the problems that weather once caused aviation. In spite of this, pilots have accidents either as a direct result of weather or where weather is a contributing cause. A problem in flight that in itself is not serious, can become so if other problems arise. It is very typical of weather that it can be the last of a series of difficulties that, in effect, boxes in a pilot so that no way of escape is left open and an accident becomes inevitable.

Aircraft icing is one of the more important weather factors that by itself can normally be managed, but in combination with other difficulties may end in disaster. Like so much of meteorology, icing is not a simple subject. Accordingly, judgement is required for the correct solution to a particular icing situation. This article is intended to provide background information on the basis of which sound decisions may be made.

Ice forms on an aircraft for a rather simple reason - water freezes there. The more water that freezes, the worse the icing. The water originates as cloud droplets with a diameter of a few ten thousandths of a centimeter, or as drizzle with a diameter of a few hundredths of a centimeter, or as rain with a diameter of a few tenths of a centimeter.

The first complication to note is that although raindrops are thousands of times larger than cloud droplets, it does not necessarily follow that the actual volume of water in, say, a cubic foot of rain-filled air is greater than that in an equal volume of cloud. In very light rain, for example, there may be only a few rain drops in an air sample, whereas the number of droplets in the same volume of cloud may combine to make up a far greater amount of liquid water. In this situation, although it is unusual, icing in cloud may be greater than that in freezing rain. This 'Liquid Water Content' is the most important meteorological factor to be considered and more will be said about it later. There are factors regarding the aircraft itself, however, that are important and will now be discussed.

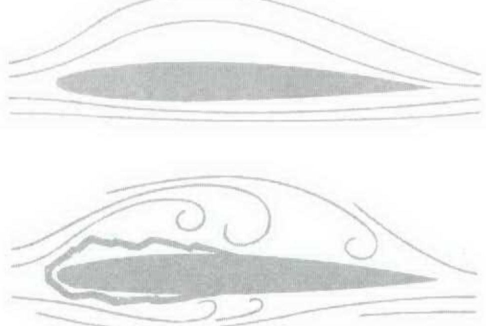
AERODYNAMIC FACTORS

Icing will not occur if the entire skin of the aircraft is above 0°C. It is well known that kinetic heating due to compression of the air and the friction of it against the aircraft increases the skin temperature. At high speeds in dry air this increase can easily be 30 or 40 degrees. What is not so well known, is that the increase in temperature is very much less if the aircraft is flying through a water droplet environment. Thus, it is not true that an aircraft whose skin temperature increase would be 15°C in dry air would be safe from icing in cloud or rain at say, -13°C. The main cause for this is the water on the skin of the aircraft evaporates, and since the skin is warmer than the surrounding air, the heat required for the evaporation is taken from the aircraft, tending to cool it. The amount of this cooling can be quite variable but it is such that little protection against icing should be anticipated at speeds less than 500 knots.

There is another very important aerodynamic factor. In an icing situation, as speed increases, the skin temperature rises until it reaches 0°C with the water droplets freezing as they hit the aircraft. With a further increase in speed, the kinetic heating, instead of increasing the skin temperature, is used up in converting ice to water. This means that for a further increase in air speed the skin temperature stays at 0°C until finally it starts climbing again. The air speed interval while the skin temperature stays at 0°C is in the order of hundreds of knots and icing can occur throughout all except the upper portions of this range.

Icing intensity is dependent upon the amount of water that wets the aircraft, that is, upon the number of droplets that actually hit it. As the air separates around an aircraft in flight some of the droplets are carried around with it and do not touch the air-frame. The amount that does strike the air-frame is dependent upon the liquid water content and the collection efficiency of the various parts of the aircraft. The collection efficiency is greatest for large droplets, very streamlined portions of the air-frame and high air-speed. This implies that the blunter parts of an aircraft may not give a proper indication of the icing that may be occurring on the more streamlined parts.

Aircraft engines can also change the temperature of the air environment around them. Of particular note here is the drop in temperature that occurs at a jet engine intake at large throttle settings and low air speeds. This could cause serious engine icing particularly during a run-up or take-off in fog when temperatures are around 0°C or a little warmer. Carburetor icing occurs for much the same reason on piston engines with fuel evaporation causing even further cooling. Up to 25°C of cooling can occur on some carburetors so that it is possible for icing to occur in clear air with temperatures well above freezing if the humidity is high.



Once formed, ice on an aircraft without anti-icing or de-icing equipment is difficult to remove. It has been computed that at 30,000 feet it would take five hours (flying at 500 knots) to sublimate (evaporate) ¼ of an inch of ice. It should be remembered that during the period that ice is on the aircraft it is operating inefficiently with higher than normal fuel consumption and stalling speed.

METEOROLOGICAL FACTORS

Icing is dependent upon the liquid water content of the air at below freezing temperatures, the principal meteorological factors being the air temperature, the initial water vapour content of the air prior to cloud formation, the rate of ascent of the air and the proportions of droplets that are liquid compared to those that have changed to ice.

On their own water droplets do not freeze at 0°C, but will do so if struck by an aircraft or if an ice crystal touches them; at around -10°C to -15°C they start freezing spontaneously but liquid water predominates over crystals to around -18°C. By -40°C the number of water droplets is negligible. Large droplets freeze first, with rain freezing at around -10°C to -15°C and the very smallest droplets freezing at the colder temperatures.

The warmer the temperature the greater the liquid water content possible. If cloud top temperatures are below -15°C, ice crystals will form and as they fall into the warmer cloud below will cause the water droplets to change to ice. This can have a chain reaction effect. In one case that was studied, the liquid water content was measured to have decreased to one tenth of what it originally was in twenty minutes.

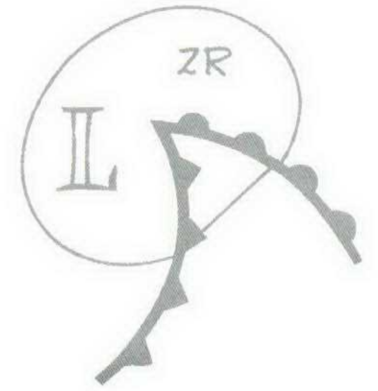
With respect to temperature then, unless other factors predominate, icing is usually not serious below -15°C unless instability is present. Between -25°C and -40°C it will normally be light except in cumulus cloud, or in stratocumulus that has formed over open water.

Open water, particularly if it is warm, is the major cause of the second factor governing the liquid water content, the initial water vapour content prior to cloud formation. The underlying earth's surface has a pronounced effect on the character of the low family of clouds. Where a suitable temperature regime prevails serious icing can occur in stratus, stratocumulus or cumulus clouds that have formed because of open lakes or oceans.

The third factor, the rate of ascent of the air can be related to the rate of water droplet formation. In a situation where the air is rising rapidly, the formation of new water droplets can exceed ice crystal formation even at temperatures below -15°C. A high rate of ascent also tends to produce large droplets resulting in a high collection efficiency on the aircraft. The rate of ascent is large in deepening low pressure areas, active frontal systems, unstable air, flow up mountains or hills and in mountain waves.

The height the air has ascended is the fourth factor and it determines the amount of water vapour that condenses. This results in the maximum icing occurring somewhere near the cloud tops. However, if the cloud top temperatures are colder than around -18°C ice crystals will predominate and the maximum icing will be at a lower level. This factor helps to determine the vertical extent of icing layers which in stratoform cloud is frequently of the order of 6000 feet and in cumuloform cloud, around 9000 feet.

Freezing rain can create the worst icing hazard. It occurs in a weather system sufficiently developed to produce precipitation from middle cloud that falls as snow through an above freezing layer aloft. The snow then melts and becomes rain. If there is now a layer of cold air with below freezing temperatures lying beneath, the rain will fall into it, acquire a below 0°C temperature itself but remain liquid unless struck by an aircraft or other object. This situation develops most commonly in



the North East quadrant of a frontal depression, where warmer air with a high freezing level is overrunning colder air.

Due to the sparsity of upper-air temperature observations and the fact that both the freezing level and frontal surfaces are moving and undulating, it is difficult to delineate the freezing areas or the above freezing layer precisely. It is hazardous therefore in such cases to attempt to fly in the above freezing layer. By flying above the freezing level of the overrunning warm air you are assured that you will not encounter freezing rain.

The freezing rain can fall into air cold enough to spontaneously freeze it and form ice pellets. These will ping against an aircraft just like very small hail. If the aircraft is headed towards the warm front, this implies that there is freezing rain ahead of the aircraft and at its level.

Freezing drizzle forms in a more simple manner. Water droplet clouds can form at below freezing temperatures. If the air is stable there will be very little updraft in the cloud and the larger cloud droplets will start floating down. This is drizzle and as long as temperatures are below 0°C it will freeze when struck by an aircraft. It falls in significant amounts only from stratus cloud with bases typically 3-6 hundred feet above ground and seldom more than three thousand feet thick. It very frequently forms just under an inversion so that at times the temperature just before entering cloud on a descent may be misleading and lead one to think that there will be no icing in the cloud.

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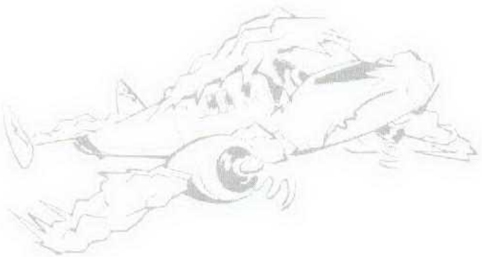
TYPES AND INTENSITY OF ICE

Icing conditions are sometimes such that as the little super-cooled water droplets hit the aircraft they freeze instantly. At other times they freeze more slowly and tend to mix and flow back over the airfoil. The first instance results in rime ice, and would occur if the aircraft skin was very cold and the droplets very small. The second instance results in clear ice and would occur with a skin temperature just below or at 0°C with larger droplets. Frequently both forms of ice will form at the same time. Clear ice is glossy, translucent, difficult to remove and tends to deform the airfoil more than rime. Rime looks more like crusted snow and is more easily removed.



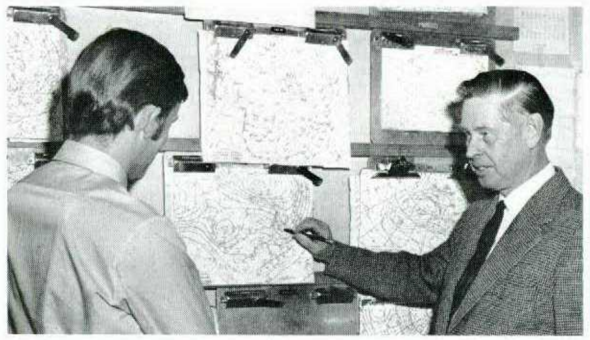
Icing is described as light, moderate or heavy, with the effect on the aircraft depending also on whether it is rime or clear. Light rime would not constitute a hazard, although for prolonged flight, de-icing might occasionally be used. Light clear would noticeably affect the performance and might create a hazard in prolonged flight. Mechanical de-icers might, or might not remove it.

Moderate rime would require frequent or continuous use of de-icers and would be a serious threat to an aircraft without de-icing, but not to one with de-icing. Moderate clear would seriously decrease the performance of an aircraft and would constitute a hazard in prolonged flight unless thermal anti-icing was available.

Heavy rime would require continuous use of de-icers. Flight would not be possible without the removal or prevention of heavy rime. Heavy clear constitutes an immediate hazard to all types of aircraft.

Since there is no satisfactory instrument installed on most aircraft to indicate the rate of ice accretion the above terms must be interpreted qualitatively. It is up to the pilot to know the actual effect of the different intensities on his own aircraft.

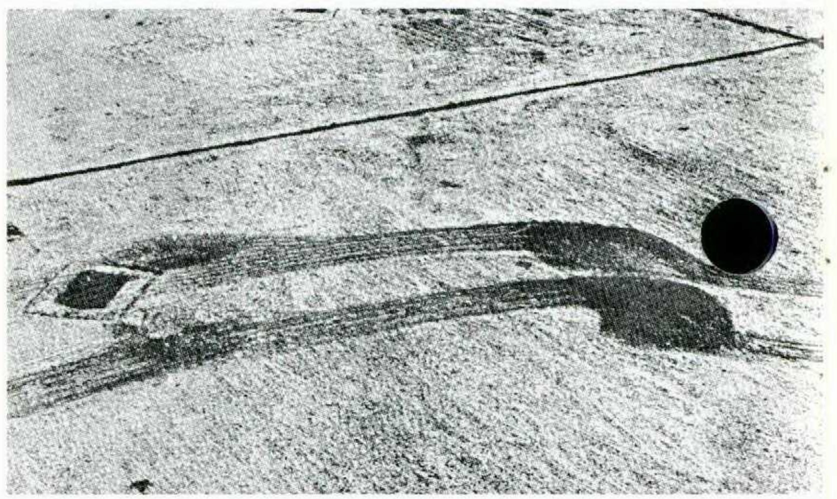
One final type of ice will be mentioned - hoar frost. This forms as water vapour sublimates on the upward facing portions of an aircraft left out in the open, due to radiational cooling of the aircraft surfaces. This will occur on clear calm nights when the air is quite moist. Temperatures must be below 0°C, but the nearer the temperature is to freezing the more water vapour there is for sublimation. Frost creates a very rough surface over the lift portions of an airfoil, creating turbulence in the airstream which may be sufficient to keep it in a stalled condition. This has prevented an aircraft with even a light wing loading such as a Dakota, from getting airborne.



Mr Norm Taylor was an RCAF bomber pilot in World War II. Attached to the RAF, he saw active duty in the Middle East and India, after which he completed a tour with Coastal Command. At the war's end he was a Canso instructor at Pat Bay, B.C.

Mr Taylor began as a forecaster at Greenwood in 1950, then served in the RCAF as a Met Officer in Air Div and completed this tour as Senior Met Officer, 3 Wing, Zweibrucken. He was Senior Met Officer at Rivers until 1966 when he moved to CFB Winnipeg to instruct at the navigation school. Since 1967 he has been Base Meteorological Officer at CFB Winnipeg.

UNFAIR WEAR AND TEAR



Take a look at the illustration. The black marks you see were made by an aircraft being moved by a tractor in such a manner that the rear wheels of the bogie were "screwed" into the concrete before skidding sideways and the turn continuing.

The heat generated by the "screwing" action melted the rubber of the tire at its contact area and left a molten rubber trail over approximately 39 feet of turn.

Before an aircraft is moved it is imperative to know and understand the limitations applicable to the type of aircraft, and to ensure these limitations are observed.

On the Dials

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

Flight Planned Airspeed

The pilot of a CF single-engine turbojet flight plans a proposed TAS of 300 knots. He then actually flies at 350.

At the time of writing, pilots in Canada can get away with this. Maybe a Centre Controller gets a bit choked up, but the pilot stands very little chance of being violated. However, we suspect that tolerance limits for the filed TAS may be legislated into Canadian regulations.

Internationally, legislation already exists. For example, when working under an ICAO Flight Plan the following rule applies to TAS variation:

- if the average true airspeed at cruising level between reporting points varies or is expected to vary by plus or minus 5% of the true airspeed from that given in the flight plan, the appropriate air traffic services unit shall be so informed.

When operating within American airspace, the pilot is obliged to advise ATC when changing TAS by more than 10 knots from the flight planned value.

While this may sound like a tempest in a teapot, remember that IFR separation applies to three directions: horizontal, lateral and longitudinal. And one of the longitudinal criteria is the cruising airspeed.

May we suggest that pilots should:

- be accurate when filing a proposed TAS; and
- advise ATC if unable to comply with the filed value.

Vortac Approach Procedures

We have received several queries relating to the performance of a published VOR procedure by a TACAN only aircraft when the aid is a VORTAC (collocated ground equipment).

The argument generally given is that TACAN provides continuous DME, and is maintained within closer tolerances (± 3/4° as opposed to ± 2½° for VOR).

Despite TACAN's supposed compatibility for such an approach, we must class it as a "No-No" for the following legal reasons:

- The approach has probably not been flight checked for TACAN.
- An ATC clearance authorizes an aircraft to proceed under specified conditions. And in the case of an instrument approach, one of the conditions is that the aircraft be equipped with the appropriate guidance system.

The same rules must be applied to any published VOR procedure within the United States, for an additional reason. An American VORTAC site may have the VOR and TACAN components located as much as 2000 feet apart.

Conversely, where the procedure may be flown using either aid in the USA, it will be called a VORTAC, and identified as follows:

- VORTAC RWY 21 (Amarillo Air Terminal, Texas)
- VORTAC RWY 32R (Laredo AFB, Texas)
- VORTAC RWY 17 (Yuma MCAS, Arizona).

cont'd from page 15

attitude that last chance inspections are justifiable only to the extent that defects are disclosed that would otherwise remain undetected are indeed purists. One fact cannot be denied. Carelessness and improper ground handling procedures have, in the past, caused airborne accidents and incidents. Additional positive safeguards which can be instituted within our available resources will reduce the hazard potential and will ultimately improve quality control. Last chance inspections will have become completely redundant when the inspectors are unable to turn back aircraft which are obviously unsafe for flight. In fact, when that day comes, we will probably be able to disband the Flight Safety organization as well.

Maj Chisholm was until recently SOFS for Air Defence Command. He is now attending Canadian Forces Staff College.

Winter reminder

The WMetO stated that November to March is a bad weather period and weather offices would appreciate pilot reports.

- Flight Safety Committee

Police liaison

The BFSO stated that the recent visit of 17 policemen from the Base flying area, was deemed very successful. The object of the visit was to familiarize police officers of personnel rescue from downed aircraft and to inform them of what actions are to be taken at the scene of an aircraft accident.

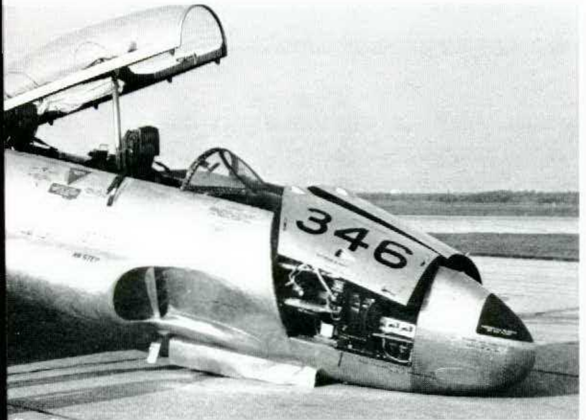
- Flight Safety Committee

Gen from Two-Ten

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

T33, CANOPY JETTISONED During taxi out for takeoff, the passenger jettisoned the canopy when he grabbed the ejection seat handle for a hand-hold. The captain shutdown the aircraft, told the passenger to insert the seatpins and cautioned him to touch nothing else.

The passenger had flown in the T33 before and had been briefed by SE techs on strap-in and emergency procedures. Because of this, the pilot saw no reason for a personal briefing or even to supervise the strap-in. The captain assumed the man was familiar with the jettison system. But CFP 100, art 351, says otherwise...



T33, PASSENGER RAISES GEAR While the pilot was taxiing to the ramp after landing, the passenger in the rear seat unintentionally raised the landing gear selector when he reached for the auto-chute disconnect.

A switch on the left main gear, designed to prevent an "up" selection while on the ground, failed to function because the oleo was extended beyond the 7½-inch limit of the switch. This hazard will shortly be eliminated by the installation of a duplicate switch on the right oleo enabling any uneven oleo extension to be compensated for.

This occurrence, like the jettisoned canopy, is symptomatic of a lack of appreciation among T33 pilots of the need to thoroughly brief all passengers not T33 qualified. A message has been sent to all commands reminding pilots of their responsibility to supervise the strap-in and unstrapping of passengers.

T33, CONTROLS JAMMED After an enroute descent during a "round robin" training mission, the student levelled off at 1300 feet AGL. At this point he sensed a restriction in control column movement; his instructor took control, but despite maximum physical effort was unable to stop a gradual descent. With the T33 rapidly bunting over the instructor and student ejected safely.

In the wreckage investigators found that the top of the student's clipboard had fallen off and jammed behind his control column.

Immediate action was taken to warn all pilots of this hazard and an interim modification issued to prevent the separation of clipboard components. Meanwhile studies are under way to determine further modification or a complete design change.

CF101, FATAL MID-AIR Following an air display the four-plane section was reforming from loose line astern into a box formation. Number two was in position and number three just sliding in when their crews saw number four slide forward under the lead Voodoo and synchronize speed just slightly ahead of him. With the danger of a collision obvious a warning was shouted by the pilot of number three as both he and number two broke away, but it was too late; number four had pulled up and collided with his leader.

In the collision the other crews saw a wing of number four aircraft break upwards and over the lead, striking in the vicinity of the canopy. Both navigators were killed; neither had made any attempt to eject. The pilots managed to eject safely, the lead with extreme difficulty because his left arm had been sucked through the broken canopy and immobilized.

The pilot of number four stated later that as he moved forward under the lead, "I lost sight of him, but I just held it steady because I knew I was going to come right back into position again".

The rules and procedures have been written - what's needed is compliance. One of the basic rules of formation was broken; disaster was the result.

ROTOR BLADES STRIKE TREE The helicopter was flying support operations during construction of a survival training site; the landing area had not yet been fully cleared. Making an approach into the area with a heavy load of freight the main rotor blades struck a tree damaging the blade tips.

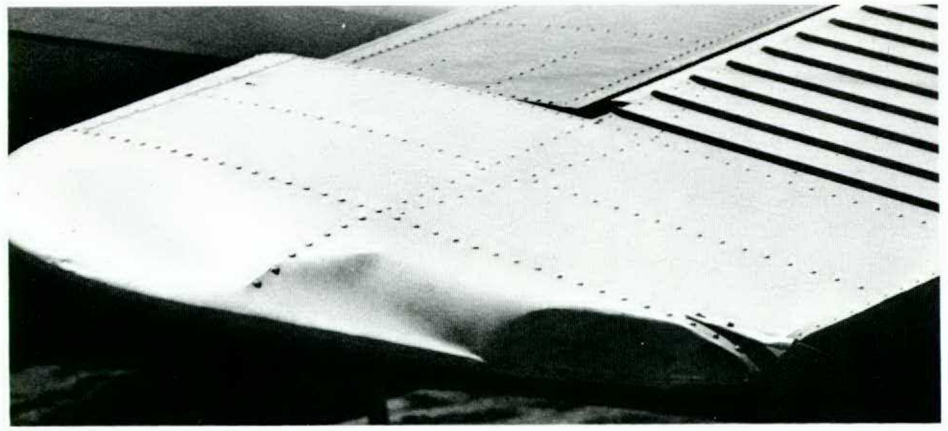
In an apparent rush to complete this project the helicopter and its crew were exposed to the danger of manoeuvring in a confined area *at a time when clearing work was in progress to provide an adequate landing area.*

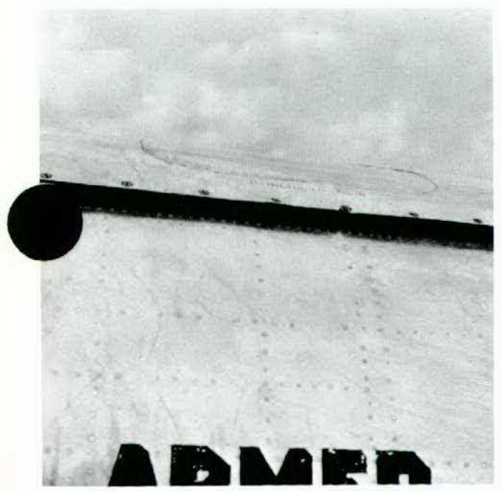
CUH-1H, UNAUTHORIZED LOW FLYING While paralleling a railroad on a ferry flight the pilot flew into a wire that crossed the tracks. After landing and examining the aircraft he elected to fly back to base - *despite damage to various components, including a 3-inch gash in the right synchronized elevator.*

A requirement to fly a helicopter from one base to another clearly gives a pilot no justification for operational low flying. Ignoring unit flying orders and CFP 100 is gambling with disaster.

OTTER, MID-AIR During formation practice the wingman's right wing struck the lead's elevator. The pilot flying the wing position had not been given a formation checkout as required by Command flying orders; in addition, contrary to Command instructions, formation SOPs were not available in the squadron.

Formation reference points are *now* being established to ensure adequate separation and positioning, and squadron formation SOPs will be issued.





T33, PLENUM PANEL OPENED Shortly after takeoff the pilot heard a loud bang accompanied by the telltale vibration of something hanging. A visual inspection by another aircraft determined that an upper plenum door was standing vertical. The pilot returned to base after burning off excess fuel and made a successful straight-in landing.

Only one of 23 "air-loc" fasteners had been locked prior to flight and it ripped loose soon after takeoff. A technician doing a fluid check on the aircraft prior to flight had been interrupted to refuel another aircraft; that job complete, he forgot the remaining fasteners and signed off the check. The fasteners (with very worn paint lines) were subsequently missed by the pilot on his pre-flight.

This occurrence, one of many in recent months, illustrates the hazards to which pilots and expensive aircraft are subjected as a result of interrupted procedures and incomplete pre-flight external checks.

Comments to the editor

A recent "On the Dials" article in Flight Comment has raised some questions regarding PAR limits at DOT units.

In the last paragraph of the article entitled DOT Precision Radar, the statement is made that "Pilots operating with DOT PAR must, therefore, remember that they still have about 100 feet to descend when the controller calls them thru minima". This statement may not always be correct and could lead to a hazardous operation. As the article explains, DOT generally publish PAR limits in Canada Air Pilot as 300 and 1, whereas GPH 205, in some cases, shows military limits for similar DOT bases as 200 and ½. DOT controllers are required to inform the aircraft that he is "passing precision limits" when the aircraft passes through the controller's operational limits. Exactly what is meant by "controller's operational limits" is not known and action has been taken to clarify this with DOT.

Until it is known at what altitude DOT controllers are calling limits, pilots should exercise caution and should not automatically descend a further 100 feet following the controller's "passing precision limits" call. The aircraft altimeter is still the main reference in determining the aircraft's altitude relative to the published approach minimum.

PAR and ASR limits, as published in GPH 205, have been checked to ensure that the required obstacle clearance criteria are met. Insofar as known obstructions are concerned, pilots are assured of adequate protection down to the limits as published in GPH 205.

LCOL W.M. French
CFHQ

While reading the Sep/Oct Flight Comment, I noticed in Cpl McPherson's table of cause-and-effect relationship for T33 aircraft that "failure to drain the cockpit water drains" resulted in "frozen or stiff controls during flight".

The solution to this problem was put forth some time ago in a USAF publication which is distributed to the Canadian Forces. The solution applied equally to all aircraft requiring water removal from a pressurized area; it practically eliminated human error and was an inexpensive installation.

The solution to the problem? It was reasoned that if a small hole was drilled in a plug and the plug installed in place of the water drain cock, water would not accumulate. If it did, it would be discharged when the cockpit was pressurized. The continuous venting through the small hole would have no effect on cockpit pressurization and water could still escape from a partially blocked hole.

So there it was, a simple, inexpensive, automatic device, almost foolproof, which practically eliminated human error. And we passed by. I wonder why.

What I would like to suggest is this: When solutions to problems appear in magazines such as USAF Aerospace Maintenance, Flight Comment, etc, which have an applicability within the CF, some organization (logically DFS) should ensure that the technical side do something about them.

MWO T.H. Buchan
4 Wing

In the large volume of incident reports, accident files, and flight safety publications crossing their desks, a piece of pertinent information is now and again missed by our investigators; the one referred to by MWO Buchan is an example. We think his solution to the cockpit drain problem sounds like a great id[illegible] How about a reference so we can [illegible] everyone in on it?

Occurrence reporting

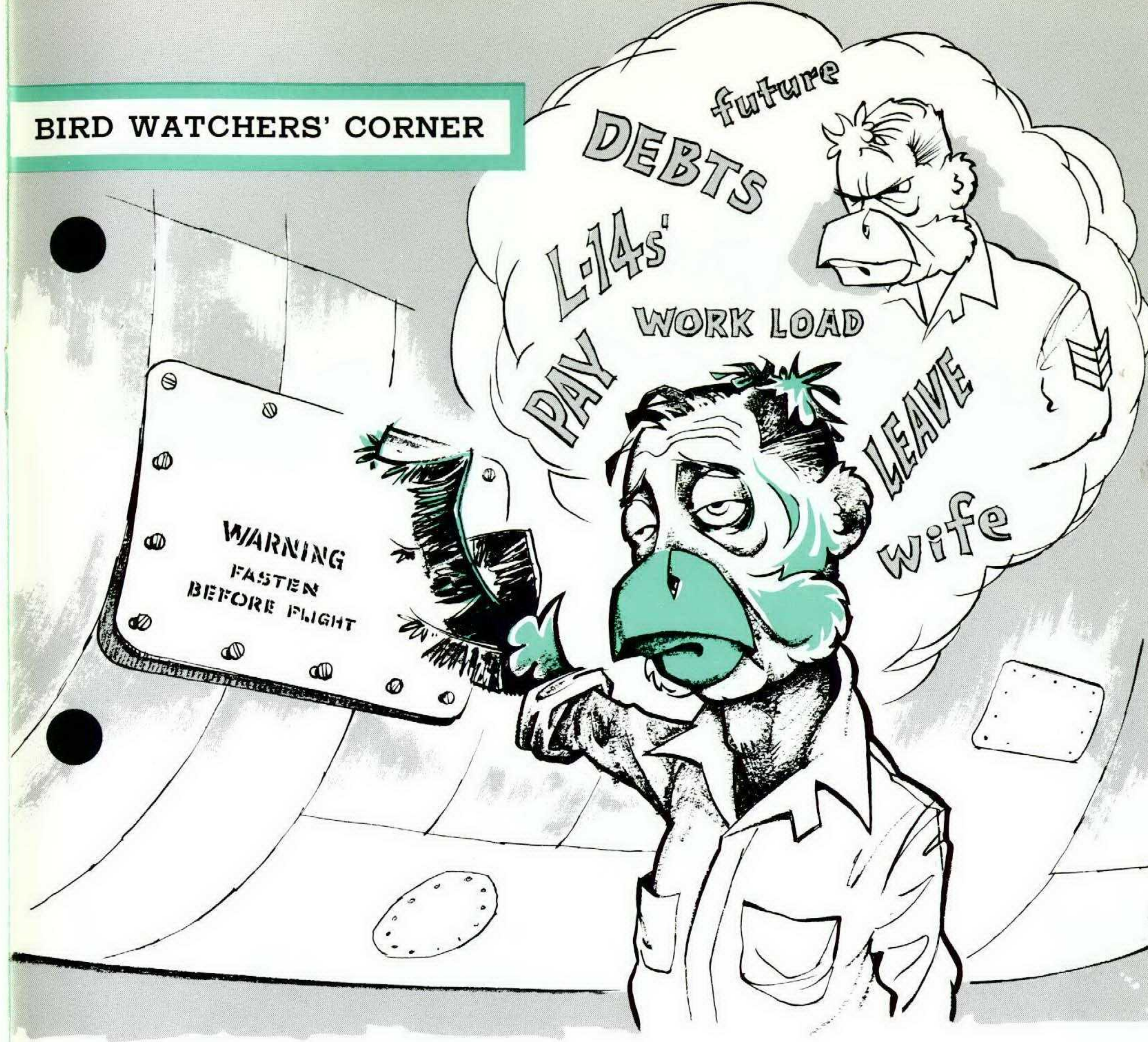
The BFSO reviewed the requirement to report all incidents whether damage was involved or not: "The primary reason for reporting incidents is to produce improvement and to eliminate the cause of potential accidents. Reports should not be used to pinpoint people for disciplinary action; such action will only lead to a covering up of incidents and the perpetuation of problems."

- Flight Safety Committee

Paperwork's important!

Recently an *unserviceable* Nene engine was shipped overseas. Beyond unit repair capability, it was shipped home again - an unnecessary expense because a logbook was not properly annotated. A similar situation was the arrival in Air Div of BAK 500 barrier - the wrong length; someone used an incorrect order number. False moves like these can get expensive.

BIRD WATCHERS' CORNER



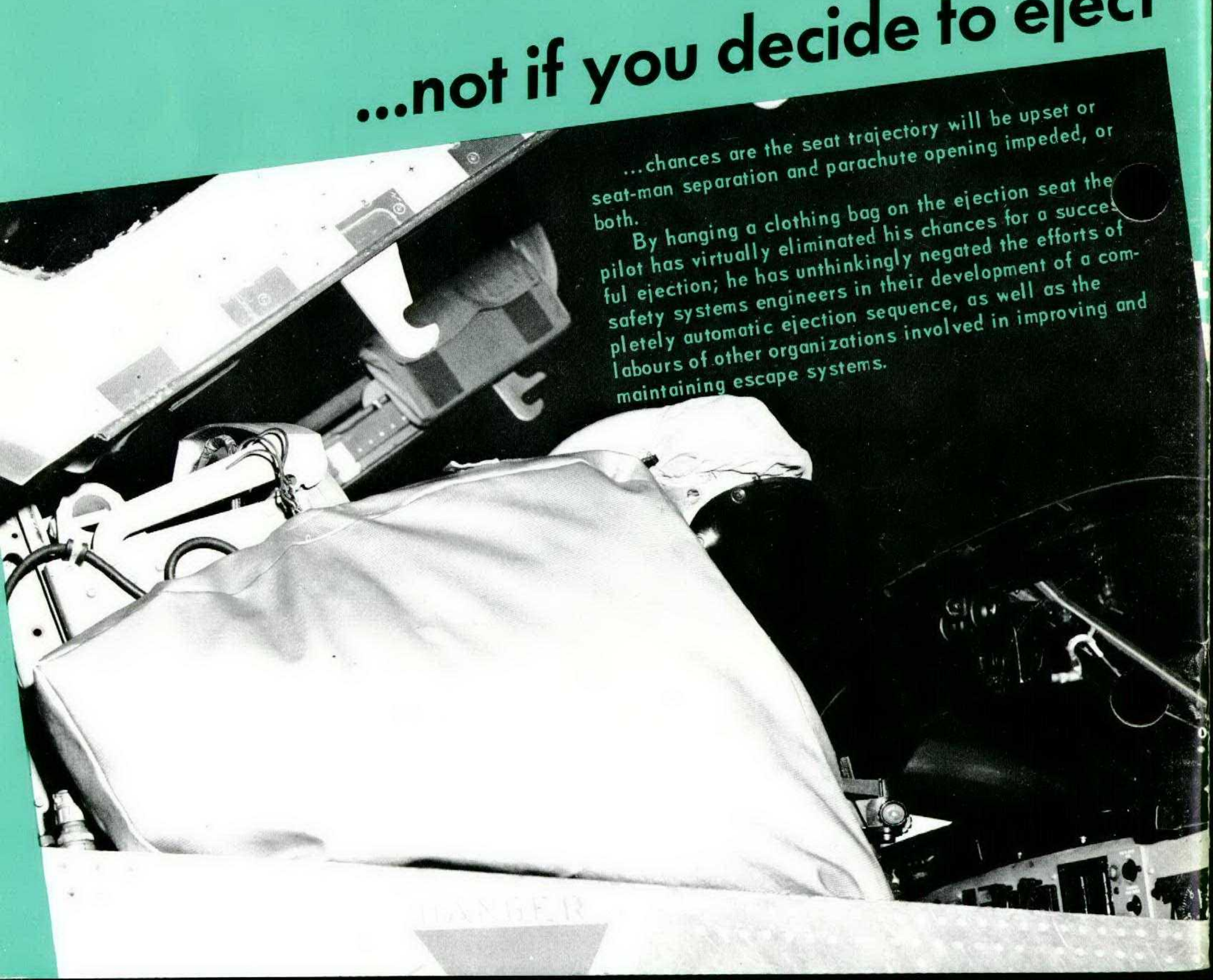
SOMNOLENT STROLLING STITCHEMUP

A close relative of the Far-away Fluster, this species contributes to countless cases of pieces parting from planes. When sent to scrutinize and secure, the Stitchemup perambulates past popped panels, loose lids and detached doors, oblivious to obvious obstacles to safe flight. Pondering personal problems, his preoccupation precipitates prangs. Thriving in an atmosphere created by overwork, long hours and many tasks, the Stitchemup can be identified by a vacuous vision or glazed gaze as he wanders around the flight line twittering a barely audible call:

BOOTSBOOTSBOOTSBOOTS - NOONECARESORGIVESTWOHOOTS

Going somewhere?

...not if you decide to eject



...chances are the seat trajectory will be upset or seat-man separation and parachute opening impeded, or both.

By hanging a clothing bag on the ejection seat the pilot has virtually eliminated his chances for a successful ejection; he has unthinkingly negated the efforts of safety systems engineers in their development of a completely automatic ejection sequence, as well as the labours of other organizations involved in improving and maintaining escape systems.