FLIGHT COMMENT

JANUARY • FEBRUARY
1971

How often? — page 2

Comments

The new CFP 164 (Air Traffic Control Orders) contains a number of significant changes in ATC regulations. These changes, along with the gradual implementation of GPH 209 (Manual of Criteria for Instrument Approach Procedures) have had a marked effect on how ATC provides its service to pilots. They also direct attention to the close co-ordination that prevails between pilots and Air Traffic Control, and to the important role of the BATCO, through base ICPs, in keeping pilots up to date on Air Traffic regulations. In addition, pilots should get hold of a copy of CFP 164 and browse through it - it contains a lot of gen which should give them a better understanding of just what to expect from Air Traffic Control.

For pilots of greater than average stature, this gem relating to rudder pedal adjustment:

> A T33 student (of greater than average stature) ended up in the boondocks after a formation trip recently because of his habit of flying with the rudders adjusted to the full aft position. When he shoved-on rudder in applying crosswind landing technique, he inadvertently also shoved-on the brake on the rudder pedal which came back. The brake action at high speed caused the tire to blow.

The Gen from 210 item, Buffalo, Brake Fire, in the Nov/Dec issue, states that a UCR submitted in Feb 69 for providing dry chemical fire extinguishers on board, was *still* being processed. In fact the UCR had been completed 4 Dec 69 approving installation. A modification for fleet fitment was issued with a target of 15 Mar 70 for completion. On the date of the accident (8 Jun 70) the modifications kits were being held by the Unit section responsible for carrying out modifications.

Interceptor magazine tells of a recent incident where a pilot ran into trouble shortly after takeoff. When he attempted to declare an emergency he found that he also had radio failure. He then flew a NORDO pattern, received a green light and landed. After clearing the runway he discovered smoke emitting from his aircraft just behind the cockpit. *However, no fire truck was nearby,* so he taxied to the line and shut down. Interceptor goes on to suggest that it might be a good idea to send out the fire trucks every time a NORDO aircraft is in the pattern. Just because the pilot can't tell what is wrong doesn't mean there is nothing wrong - right?

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

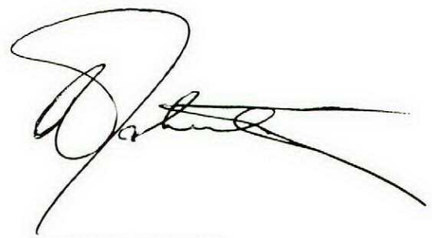
Flight Comment is produced by the CFHQ Directorate of Flight Safety. The contents do not necessarily reflect official policy and unless otherwise stated should not be construed as regulations, orders or directives. Contributions, comments and criticisms are welcome; the promotion of flight safety is best served by disseminating ideas and on-the-job experience. Send submissions to: Editor, Flight Comment, CFHQ/DFS, Ottawa 4, Ontario. Subscription orders should be directed to the Department of Supply and Services, Publications Distribution Division, Blvd. Sacré Coeur, Hull, P.Q. Annual subscription rate is $1.50 for Canada and the USA.

Brakes & Breaks

Very often we become so concerned with the big picture that we overlook or downgrade the so-called routine occurrences such as landing short, raising the landing gear too soon, misuse of brakes, and so on. In some instances those involved consider these occurrences acceptable - this is what prompted me to devote an editorial to at least one aspect that has bothered me for many years.

Space permits me to discuss only one type of repetitive occurrence so I have chosen the issue of misuse of brakes. Of the more than 70 cases where brake problems resulted in some degree of damage to the aircraft, 32 had misuse or abuse assigned as a cause factor. The accidents and incidents involved 14 different types, from the Chipmunk to the Argus, so don't think for one moment that brake problems are limited to high performance aircraft. It should also be sobering to realize that the cost of repairs in at least two instances exceeded $50,000.

There are many explanations as to why the trouble developed in the first place but seldom, if ever, are these accepted when the whole story is known. The reasons include - lack of knowledge of the limitations of a particular system, ill-conceived taxi tests, turning off at the first convenient intersection and inadequate maintenance. There are others, but similarly, few of them can stand up to the question, "Was this occurrence avoidable?". This issue of Flight Comment includes an article on misuse and abuse of aircraft braking systems which I suggest that you read carefully. Some thought on this matter could save you embarrassment and, possibly, much more.



COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

HOT WHEELS

Maj W. R. Barnes DFS

In recent months the incidence of hot brakes, blown tires and seized wheels has increased at an alarming rate. Significantly all types of aircraft and operational environments have been involved. Not only is the dollar cost high but, more important, because resources are limited, the "time out of service" cost is becoming increasingly apparent to senior management at unit, command and CFHQ levels.

In the majority of cases prolonged or high speed taxiing or excessive application of brakes has been the cause - but pilots are not the only people responsible. In one case an axle wheel nut had been overtorqued and, sure enough, the wheel bearing eventually seized. Even our good friends, the air traffic controllers, have become involved. Consider this example: A new squadron pilot completing a cross-country mission is landing at a civilian airport. Let's tune in on tower frequency.

"Canforce 2805, check you on tower frequency - expedite clear of live runway."

Our "newie", believing that someone was about to climb his (air) frame, immediately put his size tens to work and turned off at the first intersection. Five minutes later, approaching the ramp, "newie" feels his aircraft slow down. Naturally, because he has no appreciation of what is happening yet, he applies power. Still his bird drags its feet - more power. Suddenly - the light shines brightly all around. But it is too late. The muffled explosion of the tire as he shuts down on the taxiway only serves to increase the tempo of his evacuation procedure. A short time later, having retreated a considerable distance from his disabled bird "newie" sees over his shoulder the first signs of a promising fire. Fortunately the tower controller was himself expeditious in alerting the fire fighters and a write-off was averted; the landing gear however was reduced to a smoking mass of molten metal.

Rather than go into a long analysis let's just say this: unless your aircraft is in jeopardy, considerations such as "I can save time and fuel", or "I must get that aircraft clear of the live runway immediately - there's a 707 on final", are just not in the best interests of flight safety. There is no substitute for common sense and sound judgement, whether in the cockpit, on the hangar floor, or in the tower.

Here's another hot one!

A CF104 pilot aborting a takeoff, decided that he could stop without deploying the dragchute. He probably reasoned, "there's 7000 feet of dry runway ahead of me and the AOIs indicate that I can stop in half the distance. Why bother with the dragchute and put the groundcrew to all the extra work of picking it up, repacking it and installing another in the aircraft?"

The pilot had no difficulty stopping or for that matter, starting back to the ramp, but obviously there is more to braking than this pilot knew at the time. The result was a wing badly "dinged" when the tire blew.

At this point you may be inclined to say, "So, these people goofed - it won't happen to me". But let's have a look at another incident.

A CF101 pilot was giving taxi demonstrations for an Armed Forces' Day crowd. Each demonstration required him to line-up at the end of the 10,000-foot runway, cut in the afterburners and immediately abort. He used the brakes only on the first run and then very sparingly. The aircraft rolled the full length of the runway, then retu to the starting point. As the bird cleared the runway aft the second run, the brakes seized - the wheels had been welded to the forks of the landing gear by the extreme heat!

Sure enough, the AOIs place a restriction on how far the aircraft can be moved without allowing a cooling period because of insufficient dissipation of the heat created by disc brakes, rolling friction and tire flexing. Here's what the CF101 AOI says:

HOT BRAKES

"The CF101 wheel brakes and tires can become dangerously hot very easily with the resultant risk of tire explosion and/or buckling of the wheel assembly, and fire. Hot brakes can result from aborted takeoffs, landing emergencies, high-speed runs, a succession of low energy stops, or even prolonged taxiing. Never more than one high-speed taxi test or brake test should be conducted, as subsequent runs almost invariably end up in overheated brakes, tire failures, and tire explosions. The following shall be construed as hot brake conditions demanding remedi action:

a. any aborted takeoff where speed has reach a maximum of 80 kts;
b. any high speed taxi test. Runway braking action checks are prohibited in CF101 aircraft;
c. any abnormally heavy braking during the landing roll;
d. a succession of low energy stops;
e. prolonged taxiing in excess of 6 miles;
f. any conditions where wheel-brake binding is suspected".

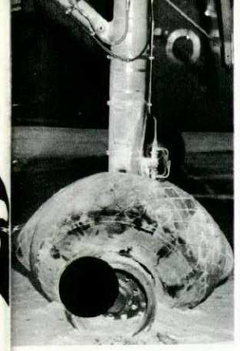
Do your AOIs cover the subject as completely? It is interesting to note that the CF101 AOIs are being rewritten to expand further on the subject.

I'd like to take you into "the books" for a few moments and discuss why "other" jockeys unknowingly got into trouble.

First let's agree that energy cannot be destroyed; it is merely converted to some other form. Thus, in stopping an aircraft the kinetic energy of aircraft motion plus the energy from the idle thrust of the engine, is converted to heat energy by the wheel brakes. Consider the CF104: To simplify calculations we will ignore th low aerodynamic drag of the CF104, the heat created rolling friction and tire flexing (which can be consid able), and the runway profile (in this case, practically level). So much for the theory; now the facts:

CF104	- 170 kts
Aircraft weight	- 21000 pounds
Runway remaining	- 9000 feet
Engine thrust (idle)	- 400 pounds

Using the formulae: $KE = \frac{1}{2}MV^2$ and $TE = FxD$ to find the aircraft's energy and the energy of the engine's idle



thrust, we compute the total kinetic energy converted to heat energy by the brakes as 30,500,000 foot pounds. Dividing this figure by 778 converts the foot pounds into heat energy units - British Thermal Units - or 39,200 BTUs.

What does this mean to the pilot who doesn't carry a slide rule as a status symbol?

Well, to equate these images with something more practical, let's compare it to the BTU limitations of the brakes. Brake designers' biggest headache is the effect of heat on components; the components weaken with heat - something is going to give if things get too hot. The CF104's Bendix brake is capable of 50 stops at 7700 BTU and has an emergency one-stop capability of 12,800 BTU. During the CF104 stop just described, the brakes generated more than three times the heat they are built to withstand during an emergency stop. It is important to realize also that the heat generated by brakes is dissipated largely by air flowing past the wheels, brakes, tires while the aircraft is moving.

For those who think that the problem of heat in wheels only applies to high-performance aircraft, here is an even more startling case that concerns a slower but equally important tactical support aircraft:

The day and the conditions were ideal for a taxi test - winds light and variable, runway bare and dry and in good repair. Starting at the north end of the runway, the pilot increased the power to about 75 to 80 per cent and allowed the airspeed to increase to about 30 knots. He then reduced power and let the aircraft coast. It slowed down with little or no brake action required. Taxiing to the south end of the runway required just a little more than idle power. On the second run, with full power this time, he allowed the airspeed to increase to about 35 knots before closing the throttles. The aircraft decelerated nicely and braking was not required to slow to a reasonable taxi speed. The pilot then taxied the remainder of the distance to the north end of the runway and lined up for the last run. After several minutes of checking instruments and preparing for the final run, he advanced the throttles smoothly to full power and when the airspeed reached 38 knots pulled them back to idle. s time the aircraft did not appear to be decelerating preciably in response to light pumping of the brakes. When firmer pressure was ineffective the pilot applied full steady brake pressure and finally with the aircraft still not decelerating he selected reverse pitch. When the aircraft came to a halt the port brake was on fire and flames were being sucked up into the nacelle of the engine by the prop. The pilot immediately returned to forward pitch to blow the flames back and control them as much as possible with prop wash. By this time two or three airmen were in position with fire bottles spraying powder on the burning brake. When they appeared to have the fire under control the engines were shut down.

We don't expect pilots to work out snap calculations of KE and BTUs every time they apply the brakes, but to avoid the stench of molten metal, smouldering rubber, and the slow burn of the supervisor, you should consider, at all times, such decelerating devices as the dragchute, aerodynamic braking and reversible thrust. But remember - these devices are more effective above than below 80 knots. When you do resort to wheel braking, don't assume that because you had no trouble stopping, you've got it made - maximum heat in the wheels is not reached until 25 or 30 minutes after the stop.

It might be worth rehashing some of the "Do" and "Don't" techniques of braking:

Don't:

- taxi or fly an aircraft which you suspect has a dragging brake
- ride the brakes
- taxi fast - this requires more than normal use of brakes
- pump the brakes - use steady increasing pressure for as long as needed then get off them
- lock the wheels - not all aircraft have anti-skid devices

Do:

- use nosewheel steering if provided
- slow down before entering a turn
- make turns as wide as practicable
- taxi slowly, particularly when the aircraft has a high gross weight
- fly the ideal final approach and touchdown speeds for your aircraft's weight
- know what to do if hot brakes and wheels are suspected.

May I recommend that you devote a few minutes to reviewing the Aerodynamics Manual of Training, (CFP169(1)) Articles 2313 to 2317 and EO 15-45-2A, Use of Landing Wheel Brakes (required reading for pilots, students, and maintenance personnel). EO 00-80-4/32, Aircraft Wheel and Brake Fires, is also good reading particularly for technical personnel.

Maj Barnes joined the RCAF as a pilot in his home town of London Ontario. After completing basic flying training he was transferred to 441(F) Sqn at Marville, France. On his return to Canada in 1959 he became a T33 instructor at Portage la Prairie. In 1963 he returned to Europe on CF104s with 444 St/A Sqn at 4 Wing. He returned to Portage in 1967, was promoted to his present rank and assumed command of FIS T33 Flight. He was transferred to DFS in late 1968 to become the CF104 accident investigator.

SOUND ATTENUATION

Capt A. Cooper DFS

I can't hear you, I have a banana in my ear. It's an old joke but perhaps he has the banana in his ear to cut out unnecessary sound (like you telling him he has a banana in his ear). Unnecessary sound, whether it be a rattle in your ear or the scream of a jet is one thing only - NOISE.

That beautiful instrument we call the ear is great for hanging ear-rings and sunglasses on, in addition to hearing. Unfortunately, being a typical mechanism, it is subject to damage through abuse or by exceeding its design limits. While an aircraft instrument can readily be replaced, we are stuck with the same old ear, ear transplanting having not yet become a burgeoning field.

The sensation of sound is produced by compressional waves set up in the air by some vibrating body. These vary from a few to thousands of cycles per second.

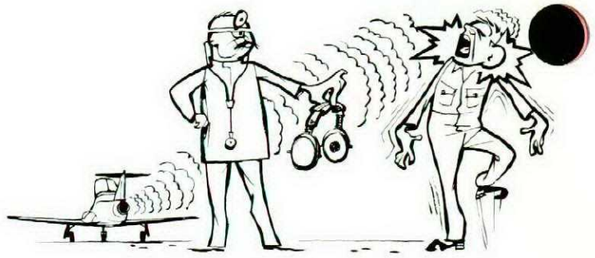
The ear is comprised of three main parts. The external ear is an inch-long cylindrical tube, with a thin airtight layer of skin called the eardrum stretched across its inner end. Sound vibrates the eardrum and the vibration is transmitted by tiny bones through the middle ear to the inner ear where the cochlea (a spiral sac of fluid) converts the vibration to nerve impulses which are transmitted to the brain by the auditory nerve.

Sound has two characteristics, frequency (pitch) and intensity (loudness). The frequency range of the human ear is normally 20 to 20,000 cycles per second (CPS); the human voice, when speaking, is between 300 and 3000 cps. Intensity of noise is measured in decibels (db) or steps of loudness. The ear can discriminate about 120 steps of loudness. Above 130-140 db an increase in loudness is not experienced as sound, rather it is felt and becomes painful. A faint whisper is 20 db, ordinary conversation 50 db and at a distance of 100 feet a small jet engine can produce 140 db.

The ear is subject to fatigue from over-use just as any other organ of the body. Hair cells in the cochlea can become fatigued; continued fatigue of sufficient duration, over a period of years can produce permanent damage. With severe impulse noise the eardrum may rupture and the ear bones (ossicles) may become dislocated. As with other organs the extent of damage varies with the intensity, duration and type of exposure to the irritant.

Quite severe loss in hearing can occur without danger of permanent hearing loss, provided sufficient time is allowed for recovery prior to the next exposure. Normally however, for people working in noisy occupations, there is insufficient time between exposures for recovery. The result is that they accumulate (usually undetected) the loss from day to day without becoming aware that anything is wrong until one day they discover they can no longer hear the little sounds of life. By then removal from the job or provision of adequate protection may be too late.

For some people the complaints are vague; they cannot put their finger on any one symptom - they just



don't like noise, it irritates them. For others, in addition to acute pain in the ears, there is a feeling of pressure or blast. Men who have sinus infection and toothaches suffer particularly from these pressure effects. It is often difficult to maintain mental concentration. In addition, instances of nausea, vomiting, weakness in the knees and visual disturbance may occur. Normally, the symptoms disappear with the reduction in noise.

There are two methods of reducing the hazard to personnel:

- reduce noise at its source
- wear protective equipment

The average person can do little about the source of noise, but must live with it; BFSOs and Base Flight Surgeons should inspect flight lines regularly for hazards and make recommendations as necessary; for example, to have runup areas located as far away from the hangar area as practicable. The lion's share of the responsibility for ear protection however falls on the individual - helmets, ear defenders and earplugs are provided to protect YOUR ears, but many individuals think themselves too tough to wear earplugs or defenders.

It is commonly and mistakenly assumed by many that an ear defender or earplug which cuts down noise will also hinder the hearing of speech. Everyone is aware of the fact that although he can see less clearly than normal when wearing sunglasses on a dark day you can see better with them when the sun is bright. The glasses cut out a greater proportion of the overall glare. Earplugs and defenders are the same for sound, they lower the intensity but improve perception. The speech frequency range is relatively limited so the earplugs reduce proportionately more of the noise than the speech, t result being you hear speech which stands out bet over the background noise. Of course the volume can be increased to permit better understanding. Extra caution must be exercised when wearing ear defenders to avoid the dangers of jet blast, jet intakes, propellers and so on.

There is a factor however which precludes the use of earplugs in aircraft - pressure change with height. Ascending is no great problem; the earplugs would probably pop out as pressure decreases. However, if they are reinserted prior to descent the earplug will tend to go in deeper, possibly causing great discomfort or even ruptured eardrums. If you feel that you require earplugs, consult your Base Flight Surgeon; under no circumstances wear earplugs under close fitting helmets.

In summary:

- for protection from noise and its effects aircrew should wear a well-fitted flying helmet and keep radio volume as low as possible;
- earplugs should not be worn while airborne;
- groundcrew get best noise protection from properly fitted ear defenders and earplugs;
- don't try to be tough - protect your ears from loud noise and retain your hearing acuity;
- personnel employed in noise hazard environments should be given audiograms every six months;
- CFAO 34-22 contains more information on hearing conservation.

Capt Cooper joined the Canadian Army in 1959. He was commissioned in the Royal Canadian Armoured Corps the following year and posted to the Fort Gary Horse. In 1962 he was selected for pilot training with the US Army and graduated at Fort Rucker, Alabama in 1963 as a helicopter pilot. After graduation he attended a tactical helicopter course at Rivers before returning to regimental duties with the Fort Gary Horse in Europe. In 1964 he was selected as an exchange pilot with the British Army Air Corps, flying Skeeters and Bell 47s. On his return to Canada in 1967 Capt Cooper was transferred to Petawawa as an instructor on 403 Sqn. At Petawawa he also held the position of Unit and Base Flight Safety Officer. He attended the US Army Flight Safety Officer Course at University of Southern California in 1968 before becoming a DFS investigator in 1969.

I've got it

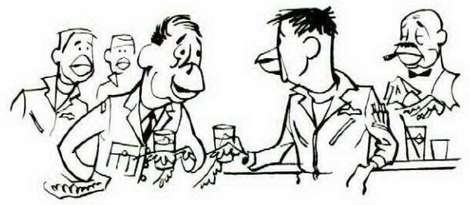
Definitions:
When I say, "I have it," I have it.
When I say, "You got it," we have it.
When I say, "I've had it," I've had it!
Case in Point - Helicopter Incident.

A student pilot was attempting a normal approach to touchdown. During the approach, the instructor observed the ground speed to be slightly fast. In order to graphically demonstrate an incorrect approach, the instructor allowed the student to continue. (Good, trial and error method of instruction.) After touchdown, aircraft continued forward and rolled off of the landing pad (no sweat for helicopters). After leaving the pad, the instructor noticed (good) a depression in the ground ahead (bad). Instructor told student, "I have it," (good call, refer to the above definitions) and pulled in collective (magic handle in helicopters for up-down, now!). BUT, did not put his hand on the cyclic (similar to pitch and bank maker in real airplane). The student, upon hearing the instructor's, "I have it," let him. As the collective took effect, the nose pitched up causing the other end to contact (hit) the ground. Instructor then took it (all) and landed without further damage.

Primary Cause: Supervisory Factor in that the instructor did not physically assume control after orally saying so.

Moral for instructors: If you say you are, you might as well, otherwise nobody will.

The MAC Flyer



OVERHEARD AT THE BAR

"...and they insisted I justify procurement of a new crash ambulance for my hospital on the basis of the mileage on the old one..."

Good Show

SGT D.C. BEYERLE CPL G. ROWE

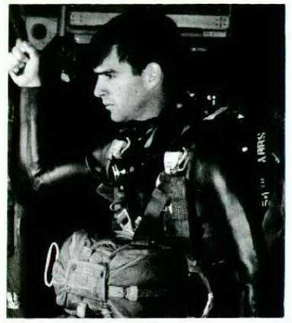
The Sea King was returning to Shearwater after participating with another helicopter in a sea rescue of four survivors from a sunken trawler. On board, in addition to the crew, was Sgt D.C. Beyerle, a USAF pararescue crewman who had been in the water with the trawler survivors.

At 300 ft and 125K, a loud bang startled the crew and the aircraft immediately yawed to port with air rushing through the interior. The forward personnel door had opened and a crewman had fallen out; fortunately he was thrust against the port stub wing and sponson and managed to hold on with the aid of the slipstream.

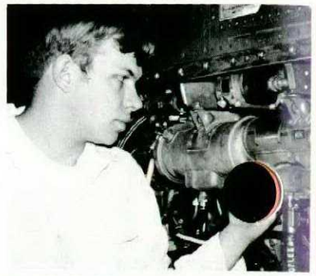
With complete disregard for his own safety, Cpl Rowe lunged for the open door and by leaning out managed to grasp the man's flying suit. At the same time, Sgt Beyerle grabbed Cpl Rowe so that he would not be pulled out. Together they pulled the crewman back in. During the remainder of the trip Sgt Beyerle administered first aid while Cpl Rowe held the badly damaged door in place.

By their quick reaction and courage in the face of grave personal danger, Cpl Rowe and Sgt Beyerle undoubtedly averted a fatality.

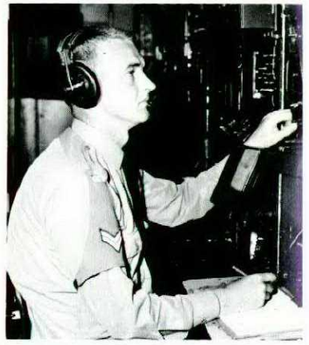
Cpl G. Rowe



Sgt D.C. Beyerle



Pte F.E. Shippee



Cpl K. Cotter

PTE F.E. SHIPPEE

During a supplementary check on a Hercules engine, Pte Shippee detected chafing between the sensing element of the fire detector wire and an improperly positioned oil line assembly leading to the oil pressure transmitter. Alerted to the possibility of this situation occurring, technicians subsequently found the same condition on another engine; the result was a Special Inspection on the entire Hercules fleet.

Pte Shippee's extra effort and alertness in discovering this potentially dangerous situation on components which were not required on this check, probably prevented an in-flight false fire warning and subsequent emergency engine shut-down.

CPL K. COTTER

During a VFR flight from Montreal to Toronto, a civilian pilot radioed for assistance when he became lost in fog. Cpl Cotter, the duty radar controller at Trenton, responded to the emergency call, quickly located the distressed pilot and gave him vectors to the nearest Trenton runway where he landed safely with his fuel supply almost exhausted.

This was the second occasion in three days that Cpl Cotter demonstrated his calm response under the stress of a low-fuel emergency to guide a lost civilian pilot to a safe landing. Cpl Cotter's competence exemplifies professional radar controlling at its best.

CPL G.R. SCORY

As a T33 was about to start, a snag developed which required the attention of an IE Tech. While he waited with his starting unit for the repairs to be completed, Cpl Scory carried out a visual inspection of the aircraft. Examining the main landing gear he discovered a hairline crack in a shock strut which subsequently was found to have already progressed halfway around the strut.

With his attention to detail Cpl Scory showed a professional approach to his work. Had the metal breakdown gone undetected, a landing gear failure would probably have been the eventual result.

LT K.R. KEEVILL CAPT R.M. HELLBERG

During takeoff on a night scramble out of Val d'Or, Lt Keevill and Capt Hellberg experienced a loud explosion and a flash of light immediately followed by a forward compartment firewarning light on one engine. Although certain that they had a fire, the crew elected to delay jettisoning their external fuel tanks (which the checklist clearly called for) because their takeoff was directly towards the town. Instead Lt Keevill shut do the affected engine as the checklist directed, dropp the tanks in the designated area and made a safe single-engine landing.

The immediate response to this critical emergency by Lt Keevill and Capt Hellberg demonstrated outstanding skill and crew coordination. Their acceptance of grave personal risk to avoid endangering the town of Val d'Or and to save a valuable aircraft, well merits a Good Show.

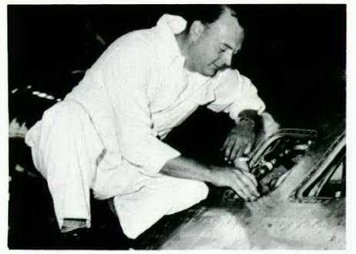
Cpl G.R. Scory

Lt K.R. Keevill
Capt R.M. Hellberg

Cpl A. Westergaard

Cpl W.A. Edgar

Pte D.E. Killens



Cpl N.A. Shepherd

Cpl T.J. Condon

PTE D.E. KILLENS

During an inspection on a CH113 engine, Pte Killens found a small piece of metal (3/8" long by .032" thick) in front of the accessory gearbox magnetic plug. This discovery led to dismantling of the engine and the metal subsequently being traced to a bearing that was breaking down in the starter drive gears.

In spite of limited experience and no formal training on the CH113, Pte Killens proved himself an effective technician by his thoroughness and attention to detail. His efforts prevented further damage to the engine which could have resulted in an in-flight engine failure.

CPL A. WESTERGAARD

After marshalling a T33 into the line, Cpl Westergaard observed smoke coming from the tailpipe and intakes just after the engine was shut down. He immediately checked the cockpit and closed the high pressure cock which had been left partially open, then he opened the plenum chamber panel to verify that no fire existed. Next ground cranked the engine while the fire fighters, o had been called to the scene, applied dry chemical to the front screen area. The smoke ceased after the ground cranking.

This was a potentially hazardous situation requiring immediate corrective action to avert a fire and the possible loss of an aircraft. Cpl Westergaard remained cool under stress and displayed a high degree of job knowledge in correctly diagnosing the cause and taking the proper action to prevent engine or airframe damage.

CPL W.A. EDGAR

Just after takeoff on a passenger flight, Capt Edgar discovered that the right main gear of the Caribou had not retracted. A visual check by the crew revealed that the locking pin was jammed, preventing either retraction or extension.

For approximately two hours the crew attempted all the recommended procedures, but to no avail. Capt Edgar then attempted to jar the pin in place by running the main gear on the runway while maintaining flying speed. Again, no success. Next he tried touching down with crab applied – this time the faulty gear locked down and an uneventful landing was made on the next approach.

Capt Edgar managed this emergency situation in a cool and efficient manner. His professional flying technique overcame a serious malfunction and prevented damage to his aircraft.

CPL N.A. SHEPHERD

During a Periodic Inspection on a CF104, Cpl Shepherd noticed a small crack in a panel located in an almost inaccessible area behind various control rods and fuel lines. On examining it closer, it appeared to him that the panel was slightly out of line. His report resulted in one of the saddle tanks being removed revealing extensive damage in the saddle-tank cavity as well as severe wear and abrasion to the tank itself. Had this condition gone undetected the tank would eventually have ruptured probably creating an in-flight fire as the fuel leaked into the intake duct.

Cpl Shepherd's thorough inspection resulted in a timely discovery which prevented the development of a potentially dangerous situation.

CPL T.J. CONDON

While carrying out a Primary Inspection on a H34, Cpl Condon detected a crack in the helicopter's main transmission housing that was barely visible to the naked eye. A dye check revealed a four-inch crack.

By diligently performing a routine job, Cpl Condon uncovered a dangerous condition which could have caused an in-flight transmission failure.

Margin For Safety

AVM W.H. Stratton
Chief of Air Staff
RNZAF

"In our operational roles we have always accepted the need to fly close to the limits of both aircraft and crew, for to do otherwise would impose restrictions on our operational effectiveness. Hence, in peacetime training, our strike aircraft fly attack profiles at high speeds and at low levels; our helicopters use restricted landing zones in meeting Army * tactical needs; our transport aircraft operate from undeveloped airfields and fly supply missions over difficult terrain; our maritime force patrol at long range and employ exacting low level attack patterns. In war, our operations are different only to the degree of enemy reaction encountered.

"True Service flying is, therefore, somewhat analogous to 'cycling near the edge of a rugged cliff top, while tasked to observe the beach below'. The distance one selects from the cliff edge is a compromise between safety and effectiveness: to be far from the edge is to be very safe, but as the beach cannot be seen the task is not completed; pressing too near the edge is foolhardy and unnecessary risks are incurred, for neither is there sufficient room for error, nor is there an adequate margin to cope with an emergency, and concentration on the cliff edge to ensure safety will be at the expense of the task.

"Irrespective then of the operational necessity, a carefully judged 'Margin for Safety' must always be retained. Doctrines and techniques are formulated, to permit reasonable freedom to exercise individual skill and judgement in achieving our operational tasks within an acceptable margin for safety. Minor deficiencies in skill and judgement will occur, technical failures, incidents and situations will arise, but most of these factors are anticipated in training and can be handled without a critical reduction in Safety.

"However, few major aircraft accidents are caused by a single factor or event. Most accidents are the result of a sequence of compounding events. So then, we must seek to arrest this sequence before an accident occurs. It is in the individual levels of skill and efficiency of our flying and ground support personnel where this can best be done.

"The aircrew member who flies knowing his pre-flight preparation is sketchy, knowing his drills and emergency procedures are sloppy, or who simply allows his level of concentration to decline, inevitably reduces the margin for safety within which he can detect, assess, react to and overcome an emergency. Likewise, the airman who services an aircraft or handles its equipments with a casual familiarity of long practice or is distracted by thoughts of the 'girl-friend' or the coming weekend, may overlook some quite minor action or miss some defect which might become the catalyst for events leading to an accident.

"Assuming the highest standards of personnel training, sound flying and technical doctrines and procedures, then the major individual contribution to the elimination of *avoidable* accidents is to be found in our standards day-to-day work.

"I ask you all to examine your personal standards of skill and competence. If you leave *anything to chance* then you may contribute directly, or indirectly, to an avoidable accident. Whether you work in a firehall, a control tower, an operations room, a technical or supply area, a cockpit or as an aircraft crew member, the need is much the same: a conscientious and disciplined approach to the job in hand will ensure that the risks are minimized and the margin for safety is preserved.

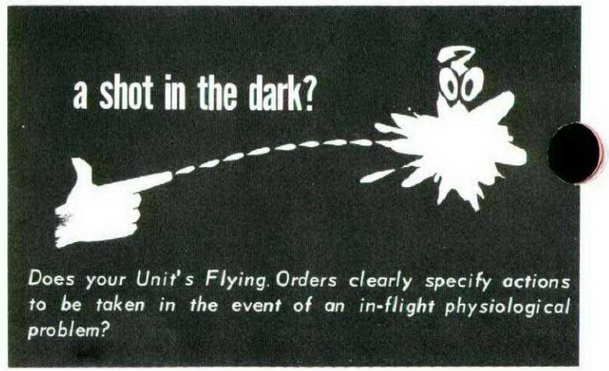
"This, for us individually, is Flight Safety".

* Land Element - Ed

Strong greasy-kid stuff

A new flight safety hazard was encountered recently by a Phantom pilot. Shortly after takeoff he was blinded by a stinging in his eyes. This was later found to have been caused by a combination of perspiration and a popular hair grooming compound.

Interceptor



CLOSE CALL · OPERATIONAL HAZARD · SAFETY SUGGESTION

"The trip was uneventful, but half way through..."

Early one June morning, a T33 three-plane formation briefed for a routine training mission. I was Captain of one of two dual aircraft – a student was flying the third aircraft solo. Start and takeoff were normal and we climbed VFR into the Gimli MFA for a workout. The weather as forecast, was well above VFR limits.

The trip was uneventful, but halfway through I noticed that extensive low cloud had formed over Lake Winnipeg, about 2 miles from base. Approximately 45 minutes after takeoff, the solo student was given the lead for a practice letdown and overshoot followed by a VFR traffic pattern and circuit for a full-stop landing. After the change of lead, we turned towards base. A fuel check indicated that each aircraft was down to 230 gallons.

Lead called Terminal, requesting an ADF letdown from 12000 feet; the controller responded with a series of UHF/DF vectors for traffic separation which delayed our arrival overhead by about eight minutes. Receiving clearance for an approach, we flew an overhead procedure and turned outbound; by now we were each down to about 180 gallons. The latest weather from Terminal gave no cause for alarm, and we could still see the aerodrome through a thin layer of low cloud.

The descent was uneventful, however after level-off the R/T became extremely cluttered by military and civilian aircraft refiling flight plans because of deteriorating weather. The student completed the pre-landing check for the formation, but was then unable to get us to tower frequency until three miles and at minimum altitude. At this point we were in a scattered to broken cloud layer based at 500 feet AGL, topped at 900 feet. Since there had not been time to discuss a landing sequence the lead gave us the signal to overshoot and we climbed straight ahead to on-top and requested a radar-square.

After establishing our assigned altitude the lead held a high power setting which resulted in the airspeed building to 270 Kts and our pattern being about 5NM too wide. We took vectors for the square pattern and on downwind lead decided to use speed brakes to slow down to the ideal 195 knots. This provided momentary excitement as the student in the number 2 aircraft reacted to speed brake call by lowering his landing gear – 50 knots above the maximum speed. I then slid over for a visual check of his gear – no apparent damage.

The radar controller meanwhile turned us on final for a QUAD-PAR with limits of 400 feet and 1 mile. Cloud had continued to form and there was now a complete undercast. The lead flew an excellent radar final and levelled off, still in cloud. At minimums he announced that he was overshooting, but number 2 quickly told him to punch down with him, because he had picked up the runway momentarily. Both disappeared immediately and completed a very steep approach and formation landing.

Meanwhile we were still in cloud! I took control from the student and overshot. With fuel down to 45 gallons, I used only 90% power and turned immediately 90° to runway heading for a low-fuel radar. The controller gave me an excellent tight pattern while I held a low power setting to conserve fuel and delayed the gear and flaps until we intercepted the glide-path. At minimums, we were still in solid cloud, so I decided to ease it down till I saw the ground. We broke out at 300 feet with ½ mile visibility and landed safely. The first two birds shutdown with about forty gallons – we had ten.

We're grateful to this pilot for taking time to pass along the account of his experience. The phenomenon of small things snowballing to box pilots in is well known. First-hand reminders of just how easily this can occur serve as preventive measures by inducing other pilots to ponder how they would handle a similar situation. How far, for example, do you let a student go before you take charge to prevent a situation from getting completely out of hand?

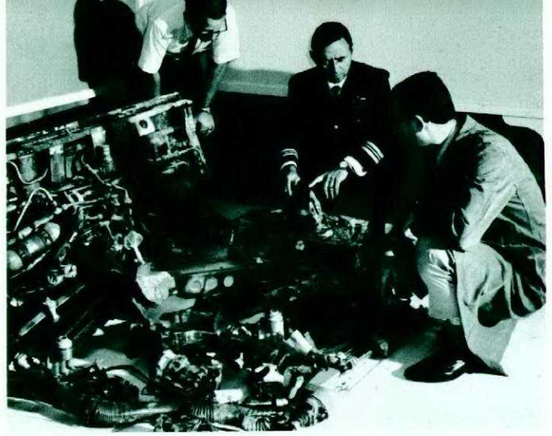
The hazards of descending below limits are obvious. In this case, familiarity with home base plus the fact that normal precision limits for the runway were 200' and ½ mile, made the risk acceptable to the pilot and gave him his "out".

The sudden weather deterioration was apparently a local phenomenon and very difficult to anticipate. Low stratus ceilings are an extremely rare occurrence during the summer. As a result of this incident, double coverage by meteorologists during the busy morning hours has been introduced at Gimli, thereby enabling one forecaster to be free from the regular rush of early morning met queries and personal briefings. Use of this system permits one Met man to concentrate on the resolution of any meteorological problems which may arise.

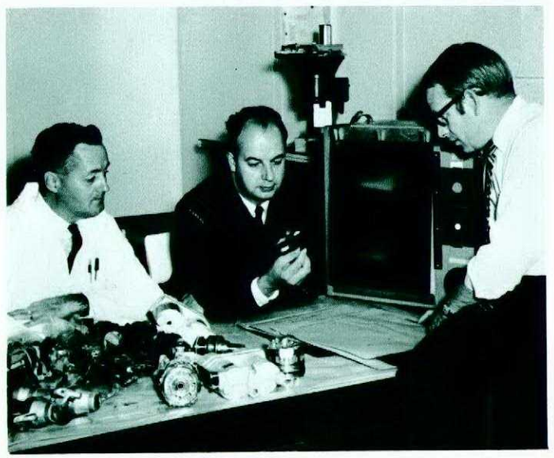
"Your engine's on fire!"

When the new board displaying marshalling signals was shown the UFSO stated that the least known, yet one of the most vital signals was "Your engine is on fire."

- Flight Safety Committee



Wreckage from a CF104 accident in which flight control malfunctions were suspected. QETE investigators, R. Clark and R. Solman examine the Main Attitude Indicator with Maj. W.A. Speck of DFS. In recent years much emphasis has been placed on CF104 flight control problems, particularly on hydraulic servos. During this period QETE examined many of the servos and their components to gain knowledge about their general condition and the kinds and causes of existing defects in order to recommend changes in overhaul procedures. During the servo program QETE has been directly involved in modification proposals, qualification test requirements, servo test rig design and development and a hydraulic system flush program, all requiring continuous liaison with the Directorate of Aerospace Maintenance and the contractors involved.



After assigning the chemistry lab the task of analysing fuel, engine oil and hydraulic fluid from a CF5 accident site, the special projects lab undertook to examine all the hydraulic components and instruments. A broken splitball arm on one of the hydraulic servos of the rudder was passed to the metallurgy lab for fracture analysis; the analysis uncovered a hazardous condition in the CF5 flight control servos. This information was passed to DFS where corrective action was initiated. DFS investigator, Capt R.J. Kelly, examines the broken splitball and x-rays with MWO A.E. Graves (left) and Special Projects Co-ordinator, R. Clark.

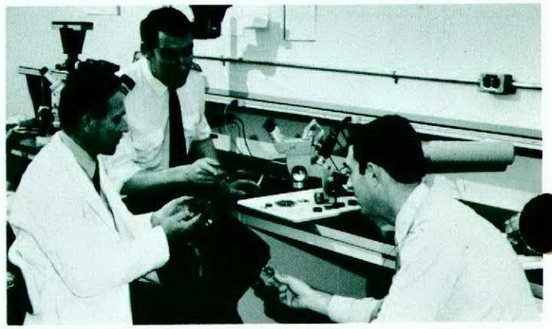
the behind-the-scenes investigators . . .

QETE

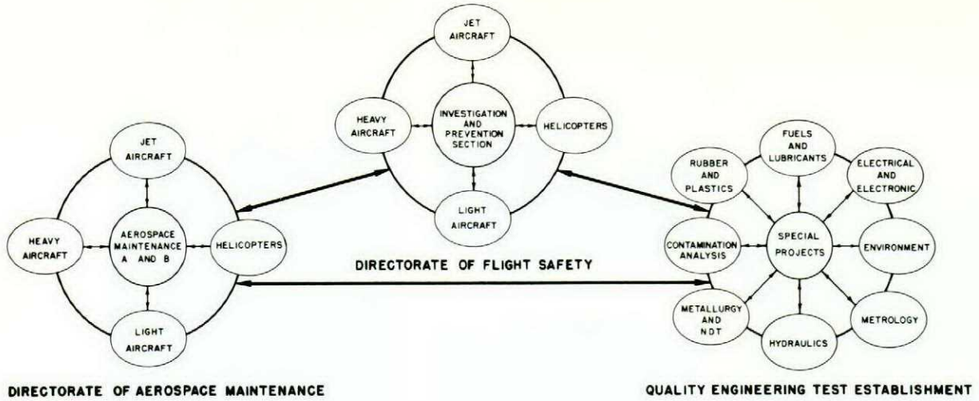
Special Projects Lab

This is the second in a series of articles outlining contributions to flight safety resulting from the behind-the-scenes work in accident investigation carried out by the Quality Engineering Test Establishment.

For the Directorates of Flight Safety (DFS) and Aerospace Maintenance (DAM), and the Quality Engineering Test Establishment (QETE), Flight Safety is a common interest. To this end their cooperative efforts provide a maximum information exchange among the three agencies as well as among the various labs within QETE. It is the means whereby hazardous situations can be uncovered and their causes determined and rectified.



QETE investigators WO C.M. Kanciruk (left) and R. Solman together with DFS investigator (T33, Tutor), Maj S.O. Fritsch, examine the cabin cooling turbine from a Tutor to determine the failure sequence.

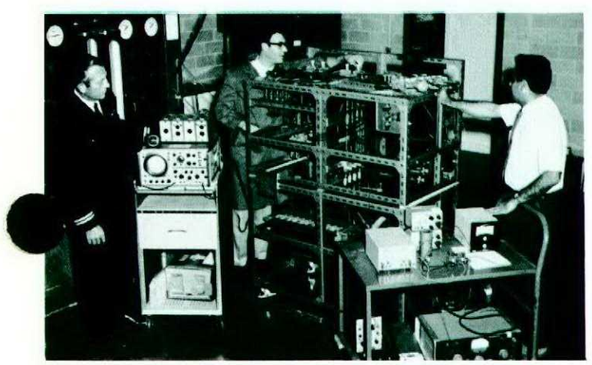


QETE's role in this effort is to assist DFS and DAM.

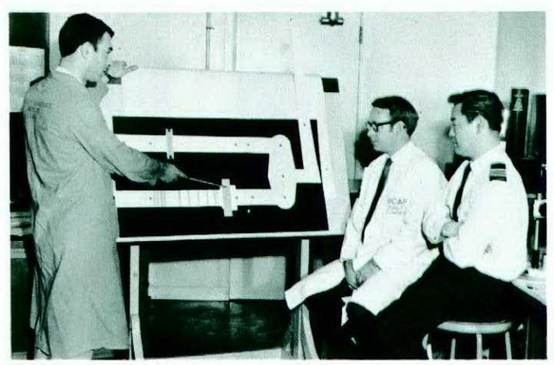
When DFS asks for assistance from QETE, all technical requirements are channelled through QETE's Special Projects and Investigations Lab. Here the problem or aspects of it can be assigned to one of the labs within QETE or the facilities of other agencies such as National Research Council, Department of Energy, Mines and Resources, Ministry of Transport, universities, manufacturers or overhaul facilities.

The problems presented by the DFS investigator range from determining the cause of a particular component failure to searching through several hundred pounds of aircraft wreckage for clues of unusual characteristics which may have some bearing on an accident. All CF aircraft are involved.

Some investigations clearly fall within a single technical discipline; many on the other hand, require inputs from a variety of specialists. In addition, problems often extend through many phases. Beginning with the search for a cause, a contributing factor or a potentially hazardous situation, there are frequently numerous phases of investigation before reaching the stage where QETE has a direct input assisting DAM with corrective action. In the end the investigation may result in qualification testing of modified components, fluid sampling programs or the development of maintenance inspection techniques.



Servo test rig in design and development stage - Capt L. Lichtenwald of the Directorate of Aerospace Maintenance, R. Solman and WO J.L. Menard.

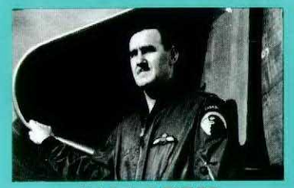


The problem and what to do about it. R. Solman, R. Clark and DFS investigator, Maj K.S. Wong, discuss the CF104 flight control servo.

MAJ H.B. LARSEN
SOFS ADC

CAPT R.J. MURRELL
Chatham

MAJ R.S. POTTER
Cold Lake



MAJ A. LEITER
Comox

MAJ J.R. FARNHAM
North Bay

CAPT A.J. BARDEN
Bagotville

MAJ L.W. REID
SOFS ATC

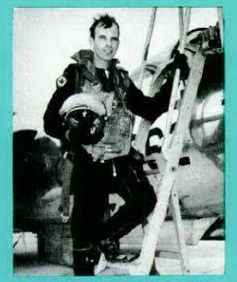
MAJ W.J. HUTCHINSON
Edmonton

MAJ T. FLETCHER
Trenton

MAJ R.W. BEATON
Uplands

CAPT K.M. KENNEDY
Toronto

MAJ G.R. KENDRICK
SOFS CFE



CAPT R.R. SIMPSON
Baden-Soellingen

CAPT R.J. GOLDIE
Lahr

CAPT C.E. HANSEN
SOFS AETE

you can help them...

MAKE '71 A WINNER

MAJ D.J. PETERS
SOFS MOBCOM

CAPT J.E. GREIDANUS
Petawawa

CAPT G.F. GOWER
Gagetown

MAJ H.A. JOHANSEN
SOFS MARCOM

CAPT K.R. ALLEN
Greenwood

CAPT H.L. BANNISTER
Shearwater

CAPT J.L. ROY
Summerside

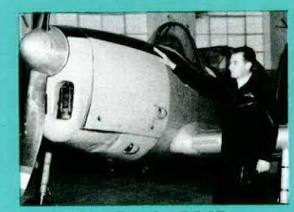
MAJ G.H. SHOREY
SOFS TC

CAPT D.W. REDFORD
Winnipeg

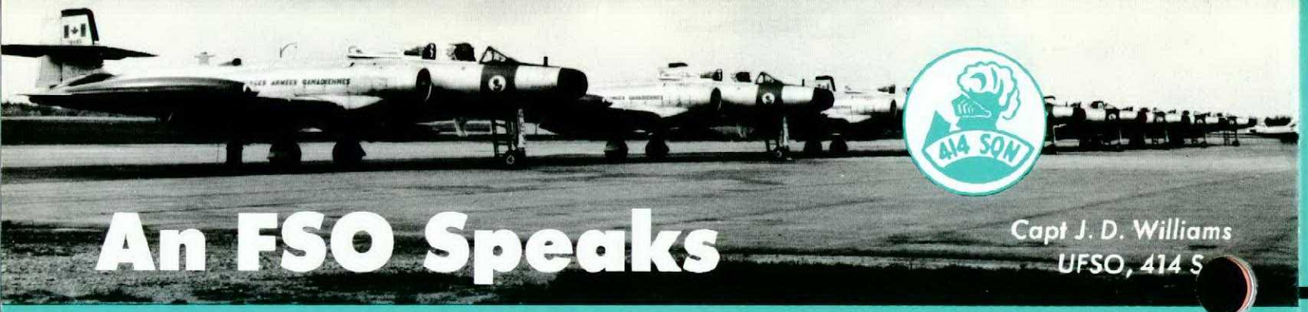
CAPT W.B. SIEGNER
Gimli

CAPT A. SUBA
Moose Jaw

MAJ T.E. SCANLON
Portage La Prairie



CAPT W.L. ROSE
Borden



An FSO Speaks

Capt J. D. Williams
UFSO, 414 S

"What does your squadron actually do?"
"We attack North America."

That's how the deep serious explaining usually begins for members of 414 Squadron, Canada's "Friendly Enemy", and such conversations have taken place as far north as Inuvik, as far south as Key West, as far west as Comox, and as far east as Argentia.

We in 414 take a lot of pride in being a part of something special. We are, for instance, the only real "Squadron" left that is a self contained operation. We have our own aircraft, our own groundcrew, our own antique aircraft collection, our own highly individualized operating problems - and we're proud of them.

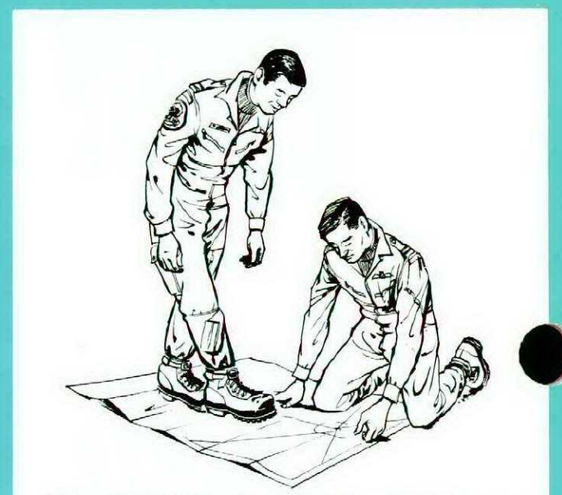
We do a high percentage of our flying in the United States where we find facilities and co-operation magnificent. There are some funny moments though. You've probably never seen true wonderment on someone's face until, for instance, you've pulled up on the ramp at Wright Patterson Field and heard the fuelling crew muttering about the modification job those crazy Canadians have done on the F100.

It's also kinda fun to "Put On" our Yankee friends with the old "One Mukluk, Two Mukluks, Three Mukluks at one and a half Mukluks per hour that'll be about two hours" trick.

Of course it isn't all fun and games. Sometimes we have to deploy to Bermuda for a few days, or San Francisco, or Las Vegas. Why, a lot of people just wouldn't believe the troubles we've had - with crews being subjected to salt water immersion near hot, sandy beaches; or forced to attend meetings in smoke filled rooms where one-armed bandits and spinning tables disturb the mind's tranquility.

In all honesty though I must admit that we have occasionally been known to visit other less scenic areas. Goose Bay in February, for instance, is not always known as one of the world's jet set watering points, but frequently its flightline will echo to the whine of twenty Orendas (which nowadays are found almost exclusively in matching pairs on the wings of Avro's Clunk). If that doesn't make the point, then try Orlando in July - the world's "it's not the heat it's the humidity" Capital was not in the minds of the inventors of the CF100's air conditioning system. They were thinking in terms of sub-arctic intercepts, not sub-tropical taxiing comfort.

Now the point of this whole thing is to tie 414's operation in with the question of flight safety. Therein lies the rub. It can safely be said that if there's anyone



"One Mukluk, Two Mukluks, Three Mukluks. At one and a half Muckluks per hour, that'll be about two hours."

in North America who hasn't at least once seen a contrail made by us - he probably just hasn't been looking. It can accurately be said that at nine out of every ten bases we land there is no one but the aircraft crew itself who has ever been within touching range of a CF100.

What does this mean? Well, it means that postflight inspections, fuelling, oxygen re-supply, preflight inspection and starting must be carried out by the aircrew. This means that the aircrew must possess a solid working knowledge of the applicable engineering orders as well as the ability to operate the appropriate ground support equipment.

It means that in the event of a major U/S occurri anywhere else but in Ottawa, squadron groundcrew mu be prepared to evaluate the situation by telephone, prepare the necessary equipment for shipment, ship it, and fly to the Base to carry out the repairs. These men have been known to arrive at an American Base in the evening, carry out an engine change and ground run-up and have the aircraft ready for airtest by noon of the next day. That kind of support really impresses the onlookers, and gives the Canadian Air Force a sharp image.

Capt Williams is a former army officer who joined the RCAF in 1966 following postgraduate studies at the University of Western Ontario. He is currently employed as Squadron Flight Safety Officer and Chief Test Pilot at 414 Squadron.

Because our operation is so widespread, squadron aircrew are of necessity required to do a lot of decision making on their own and exercise a lot of self discipline. Young pilots arriving on the squadron are immediately impressed with the fact that there will be no nursemaiding. Decisions regarding weather limits, alternates and routing are left to the pilot and navigator team - and the decisions made affect the outcome of exercises which have been planned months in advance and which may involve up to a hundred or more aircraft.

Poor weather and unfamiliar airfields are regular hazards and because of this a high standard of proficiency in IFR flying must be maintained. There probably aren't too many units who can boast of having worked out of more than the 103 airfields which we have visited within the last two years. Obviously in such an operation we are well aware of the value of careful flight planning and frequent reference to NOTAMS.

What do we do? We "attack" North America. We jam the radars, evade the fighters, cover the countryside with a thin layer of aluminum foil, and keep the citizenry awake at night. Our arrival in any area means that local fighter crews or missile controllers or area commanders are in for a little practice. To keep us out of the hair of the airlines and other innocent bystanders we do a good percentage of our work after sundown - "Black Knight Squadron" is not a misnomer - nor is it as some might suggest, a spelling mistake.

414 Squadron has established an enviable reputation in the field of electronics warfare specifically and air defence generally for setting for itself a high standard and consistently living up to it. Flying an aircraft that is as old as some of the pilots themselves, under conditions which, though often pleasant, are just as often less than ideal from an operational standpoint, inevitably presents problems. We feel that through professionalism and safety consciousness we have overcome these problems and thus have virtually always been able to meet our commitments. Hopefully we shall continue to do so.

"It works!"

A red-faced Otter pilot recently reported that he had just shot his own aircraft. It seems that while he was attempting to clear his 9mm before turning it back in, he inadvertently verified its well-known lethal power. As the message stated: "HE PULLED THE ACTION BACK TO CHECK THE CHAMBER VISUALLY AND THEN LET IT SLIDE FORWARD THEREBY LOADING THE WEAPON. THE TRIGGER WAS PULLED TO UNCOCK THE PISTOL AND THE ENSUING ROUND WENT THROUGH THE FLOORBOARDS, FRAYED A RUDDER CABLE, PENETRATED THE AUGMENTOR CONES, AND FINALLY EMERGED THROUGH THE BOTTOM SKIN OF THE AIRCRAFT."

Supervisors' Quiz

Test yourself on the following statement:

You get on the elevator and there are five people on it; it stops at the next floor where four people get out and two get on; it goes up one more floor where three people get on and no one gets off, but at the following floor two get off, and at the next floor two get on and three get off.

How many times did the elevator stop?

We have misled you, haven't we? Why didn't we tell you what you were supposed to remember? Well, we had a reason.

Many a new man on the job has had the same trick played on him. When he comes to the new job, he gets a handful of papers and a rule book. He is expected to stay strictly in line just on the assumption that he has read the 1,001 rules and knows how they apply to his job. But how is he to know what he is supposed to remember?

Written guides are fine, but instruct the man and show him how safety is part of his job. After you have demonstrated the work, have him explain it to you and then have him do it, if he has explained it correctly.

He can soak up the facts quickly when you can show him why they make sense.

- USN "Safety Review" -

CLOSE CALL | OPERATIONAL HAZARD | SAFETY SUGGESTION

A notable IFR formation takeoff

A new squadron pilot taxied out for his first marginal-weather takeoff as leader; his chase pilot was number two. This mission was to be one of his last before becoming combat ready. Because of the weather (300' ceiling, 1.3 n.m. visibility) the chase pilot would have to stay in close formation until they were on top and therefore be unable to closely monitor the climb profile.

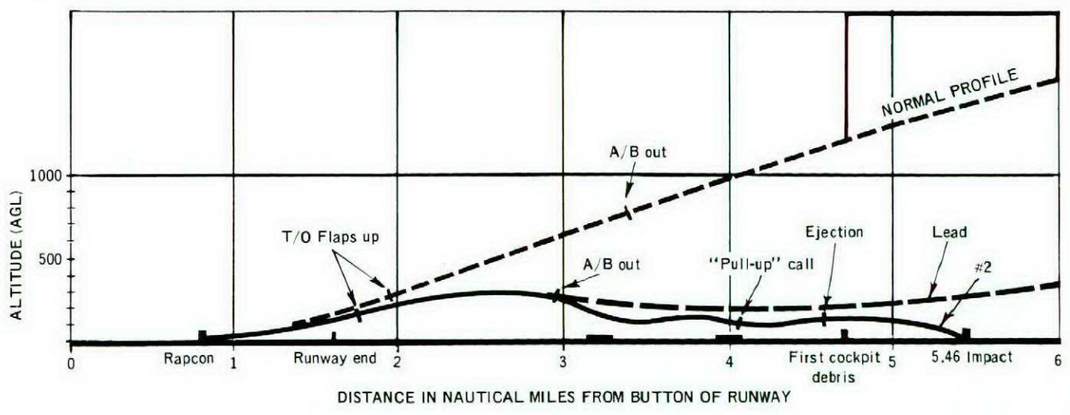
After the briefing there was a short weather delay before the day's flying program began (normal squadron limits are 400' and 1 mile) and another when number two was assigned a different aircraft - but so far, no sweat. The start was normal. Then some minor annoyances began to creep in; taxi instructions were unusual because of construction on the airfield; there was confusion in radio channels while taxiing; takeoff was delayed by an unscheduled IFR arrival. When finally ready, the lead forgot to give the "release brakes" signal, but number two, anticipating the takeoff roll, was only slightly out of position initially and soon got back in. Apparently the chain of minor problems was beginning to effect the leader's performance.

Shortly after lift-off the lead called "flaps up", at which time number two later stated, he felt an "uneasy mushing feeling" indicating to him that either the flaps had been raised prematurely, or that possibly the AB had been selected out early. Number two dropped back. Meanwhile, instead of following the established technique of making a definite transition to instruments, the lead, glancing in his mirror and seeing his wingman out of position, looked back over his shoulder to get a better view. At this point the two pilots were virtually formating on each other. With his attention thus diverted, the lead inadvertently descended dangerously close to the ground.

Then in a split second of realization the lead transmitted to number two to "pull up", a call his wingman understood as "get out". The warning coincided with the wingman's sensation of a forward force on the control column which, coupled with some degree of disorientation and a fear that collision with the ground was imminent, prompted him to eject at very low altitude. Approximately 75 seconds after his takeoff roll began the chase pilot was safely back on the ground. Meanwhile the leader, getting on the dials at last, established a climb and later landed safely after burning off fuel.

Corrective measures resulting from this accident included the following:

- A thorough review of the formation training program.
- A reassessment of the responsibilities of chase pilots.



Paper Size Important

A flight safety poster on the near miss in the control zone has been prepared, but is now being held up due to a shortage of paper sheets of the correct size.

- Flight Safety Committee

Transient Service Award

The Transient Service Recognition Program in operation in Training Command since 1 Jan 70, reached its first objective on 31 Jun 70, with the announcement of Commander's Commendation winners for high quality service to transient aircraft and personnel during the first six months of the year.

The program was initiated to evaluate the service being provided to transients and to recognize deserving operational support personnel. Transient aircrew report directly to the Staff Officer Flight Safety at TCHQ on forms having specific sections to check off and space for suggested improvements, exceptional individual performance and so on. In the first six months of 1970 over 1100 completed forms were returned.

In order that all Sections and Bases could participate, TCHQ decided that to be eligible for an award the Section or Base must have received a rating of outstanding or exceptional on a minimum of 90 percent of all reports received. While the other 10 percent could include substantiated constructive criticism, an operational hazard report automatically eliminates that Section from competition during the period. In this way the quality and quantity of service is gradually improved and transient crews receive increased operational support.

At many locations over the years the efficient and spirited manner of support personnel has been consistently outstanding, now aircrew have an opportunity to show their appreciation.

Propeller fatality

Recently a CF serviceman was killed by a propel- - the first such fatality in more than five years (see Flight Comment Jan/Feb 70). The man was struck when the engine of a light aircraft backfired as he pulled the propeller through by hand. Investigation showed that the man had little knowledge of aircraft operating procedures in general or of the task he was attempting.

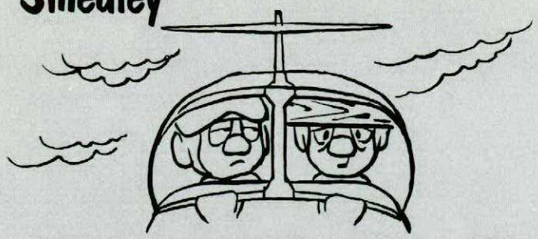
The following excerpts from CF EOs and MOT Air Regulations form the basis for prevention of such needless accidents:

- No attempt is to be made to start an aircraft engine by using any combination of mechanical means, hand cranking and hand rotating of a propeller. Otherwise there is a danger of damage to the engine and injury to the person rotating the propeller or operating the crank handle.
- On all occasions when starting up engines, an airman equipped with a fire extinguisher and trained in its use must be standing by each aircraft. It will be this airman's responsibility to ensure the propeller and the engine area of operation are clear of obstructions.
- The engine or engines of any aircraft shall not be started unless the pilot's seat is occupied by a person competent to control the aircraft or unless the aircraft is prevented from moving forward and the engines shall not be left running unless the pilot's seat is occupied by a person competent to control the aircraft.

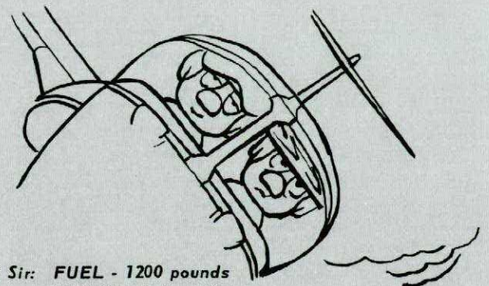
Additionally, remember the special threat posed by turbo-props:

- They windmill for longer periods after engine shutdown;
- The flat pitch angle of the blades during shutdown creates little warning sound.

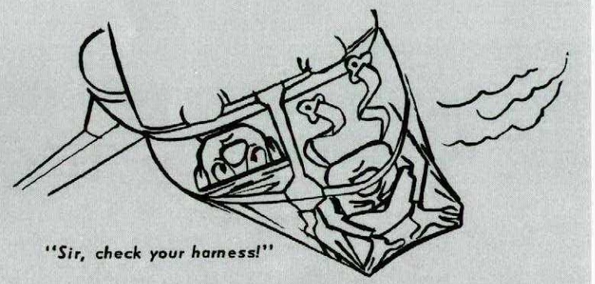
Smedley



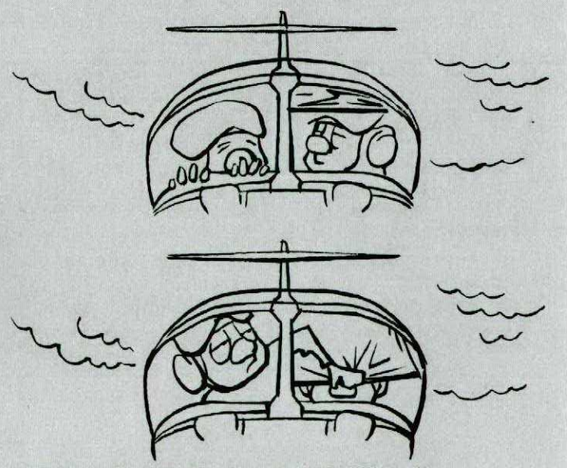
"OK Smedley come on out - that's enough instrument flying today - I'll just demonstrate some rolls on the way home..." "I have control - you can do the pre-aerobatic check Smed."



"OK Sir: FUEL - 1200 pounds
HYDRAULICS - OK
HARNESS - tight and locked..."



"Sir, check your harness!"



"Back to the dials Smedley... call RATCON..."

adapted from RAF Flight Safety Review

Ode to Groundcrew

Here's to the men with the greasy hands
Who fuel our planes when we come in and land,
Who fix the canopies, stop the leaks,
Change the tires, oil the squeaks,
Tend to the rigging to make them fly straight,
Wait by the planes when the pilots are late,
Who smooth the scratches, rivet the panels,
Check "Loud and clear" on the radio channels,
Who read all the write-ups and make the repairs,
Check lines and wires for chafing and tears,
Who pull the chocks and walk our wings,
And do a million and one little things,
That makes the airplanes safe to fly.
So here's a salute to the hard-working guy
From a group of fliers who too seldom ponder
The men who keep us in the wild blue yonder.

- Intercept

Don't talk, Communicate!

I know you believe you understand what you think I said, but I am not sure you realize that what you heard is not what I meant.

Are you talking when you should be communicating? It is distressing to observe how frequently the message which is received is not the message which was sent. This leads to confusion and loss of confidence. The supervisor asks, "Why didn't he follow instructions?" The workman asks, "Why didn't he say what he meant?"

adapted from USN "Safety Revie

Rodeo Time

The Line and Transient Servicing Section at CFB [illegible]lands has successfully completed its first "Tractor [illegible]ving Rodeo". The Rodeo was designed to test the [illegible]ews on their driving skills, knowledge of their vehicles, and adherence to safety precautions. The main purpose of the Rodeo was to stimulate job interest and to improve safe driving skills and habits, thereby developing a more efficient, accident-free organization. The course and tests were planned, set up and umpired by Lt Bruce Cossar and WO Bob Burford.

The Rodeo was divided into two parts: a written test covering local rules and regulations, safety precautions, and vehicle operation; a driving test which measured the drivers' skill, judgement, and reflexes.

The first test, using a D8 tractor, was designed to check drivers' ability to judge speed and stopping distances. They were required to maintain a certain speed through a designated course, then bring the vehicle to a smooth halt - with the front towing hook over a two-inch white line. Going beyond the line was assessed as a major fault - stopping short, a minor one.

Next to the D12 tractor. In the first of these tests, the driver had to manoeuvre his vehicle forward and backwards through a slalom course, being careful not to touch any of the markers or cross any of the foul lines. [illegible]e other test consisted of backing to a 707 tow bar, [illegible]oking up, driving forward so that the bar could be backed into a marked-off slot, and positioning the rear lugs of the tow bar directly over a two-inch grounding wire hole - all of this within a confined area.

The final two tests required skill in driving the D14 Tractor. In the first, the tractor was centered over a white line. The drivers' task was to turn the vehicle 180 degrees while remaining within a confined area, and reposition it back over the line. This whole manoeuvre had to be completed with no more than 4 gear changes. On the second test, a number of golf balls were placed on tees set in a curved path along the hangar floor. The drivers were required to follow this curved path and knock the golf balls off the tees with a 3-inch wide board that was suspended from the front towing hook.

The following scoring system was used: each man was given 100 points at the start of the Rodeo and could pick up as many as 15 additional points if his attire met VIP servicing dress standards. Penalty points were assessed for each error committed, such as touching any restraining barriers, crossing foul lines, hitting markers on the slalom course and so on. Further points were de[illegible]ted for such poor driving habits as omitting a walk-[illegible]und check, failing to put the transmission in neutral before starting, or improper use of parking brakes.

MCpl Bill McPherson accumulated the fewest penalty points, obtaining an overall score of 82. His prize - dinner for two at one of Ottawa's leading restaurants.

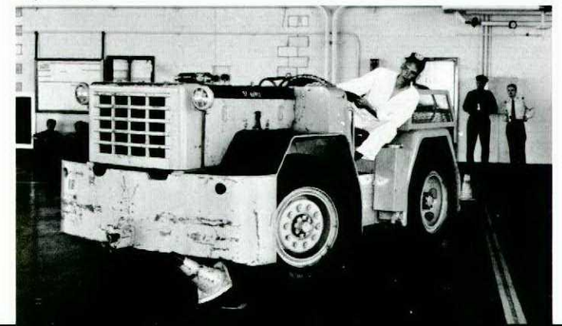
Plans are presently being considered to extend this program from an inter-crew to an inter-section competition.

Capt M.J. Connor (ASO) measures a well placed tow bar.

Cpl "Tiny" Ottenbreit skillfully manoeuvres his D12 through a tight turn.

The official umpires.

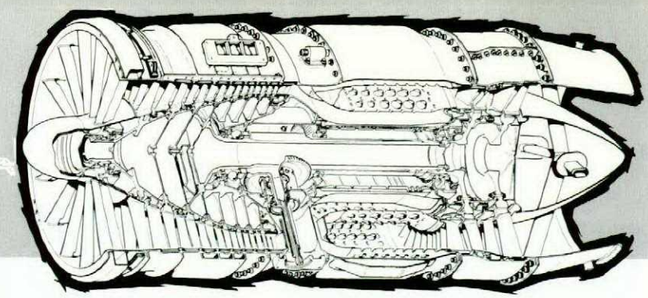
Oops! Cpl Tom Hullin finds his vehicle width more than expected.



2.2 FOD-damaged engines/1000 flying hours...

And on it goes

Maj K. S. Wong
DFS



Since the introduction of jet engines, there have been many published warnings of the hazards of foreign objects. The term for this hazard became Foreign Object Damage and it was soon shortened to the acronym FOD. Awareness of foreign objects and the damage they cause to jet engines has grown to the extent that the letters FOD are commonly used to mean *the foreign object* - any foreign object - not the damage. Therefore, to make sure everyone understands this article, FOD is defined as meaning any or all foreign objects, and the words Foreign Object Damage mean exactly that.

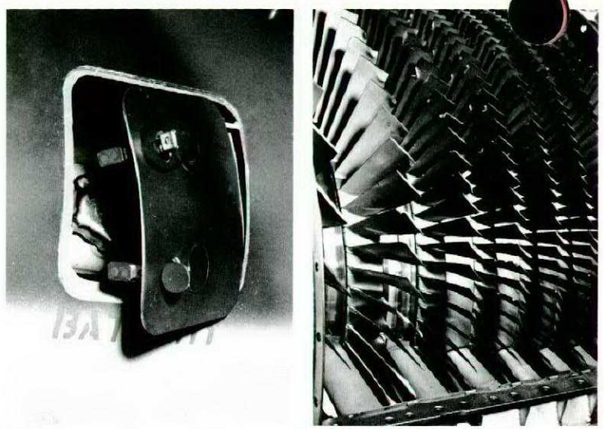
Everyone has seen at least some articles, posters and even special information leaflets dealing with Foreign Object Damage. The movie, "The Case of the Million Dollar Pliers", was circulated to all Bases. This excellent film is still available and should be shown not only to men in the aircraft trades, but also to anyone having access to the airpatch; CE, ME, Fire Fighters and Supply Techs would all benefit from this film. Unfortunately, in spite of the mountains of paper publicizing the hazard, engines are still being damaged.

Some jet engines are very robust and able to digest and eliminate small FOD. Others like the J79-OEL-7 in the CF104 and the CF5's J85 Can 15 cannot, and usually choke, regurgitate and belch out the FOD, sustaining various degrees of damage in the process. A study of the damage incurred by these two engines shows the good sense in being ever careful and practising FOD control at all levels.

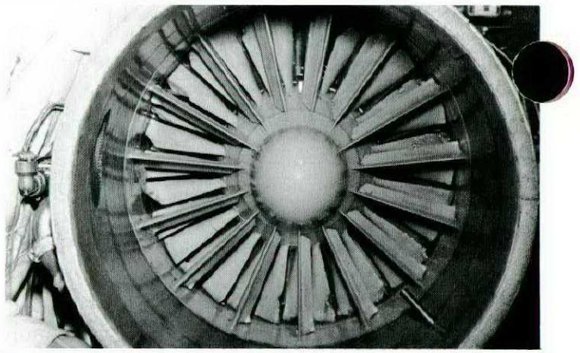
The J79-OEL-7 has had a poor history with FOD encounters. Sixteen CF104s have been destroyed as a result of FOD ingestion. The Foreign Object Damage in these write-offs has been caused by birds, screws and rags. Bird FOD is a well-known hazard and much time, money and effort have gone into studies aimed at providing pilots with information enabling them to fly where the birds aren't. Screws and rags are a problem that only the techs working on the aircraft can eliminate.

Statistics for one two-year period show that out of 251 engines returned to the contractor, 19.1% were returned because of Foreign Object Damage alone. An additional 42.6%, returned for other reasons, were found to have FOD damage as well, making a total of 61.7%. Unfortunately the FOD in most cases was unidentified, but in nine incidents it was determined to be screws, pins or rivets; in two cases the items were nuts or washers; one was tools; two were ear defenders and five were name plates, decals and miscellaneous components.

CF5 engines have suffered similarly during the short period they have been in service. Thirty-eight engines had been damaged by FOD up to May 70. The FOD has included locking wire, potting compound and



CF5 engine damaged by a push tab from the latch assembly on the battery access door.



Compressor damage caused by a nose gear pin and red flag which were snatched from a technician's hand by the tutor engine.

fasteners that have come off aircraft panels. The present rate is 2.2 damaged engines for every 1000 flying hours.

Repairing damaged J79s costs approximately half a million dollars per year. (Cost figures are not available for the J85 engines.) These costs do not include the engines, airframes and avionics written off in accidents. Also excluded are the CF manhours involved to get engine out of the aircraft and back to the contractor. T time expended by line servicing crews, tow crews, airframe and electrical techs to remove the aft section, and the time spent removing and canning the engine, must be added to the costs. After engine installation, independent inspections, runups and finally the test flight are more tasks that must be done - think about it.

And then there is the loss in operational capability. Aircraft serviceability suffers and so do maintenance

Pilot ejected safely when unidentified FOD disabled this CF104 at liftoff.

Unidentified FOD crippled this CF104 at 34,000 feet. A series of compressor stalls finally resulted in engine failure which forced the pilot to eject just short of an emergency landing field.

people and operators because shortages of aircraft usually result in a multitude of phone calls, paper work, and many angry words. Prevention measures are much simpler.

Everyone must be Foreign-Object-Damage conscious, not only the maintenance troops, but also the operators. Technicians can reduce Foreign Object Damage by:

- good housekeeping
- good maintenance practices
- eliminating carelessness
- working by a checklist

Operators can contribute to Foreign Object Damage prevention by positive actions such as:

- taxiing carefully so that jet blast doesn't kick up debris into other aircraft
- keeping personal equipment away from the intake ducts
- keeping safety pins and flags in the cockpit until the engine(s) has (have) been shut down

The savings earned by decreasing the costs of Foreign Object Damage may not give everyone a bonus in his pay cheque - and that would amount to a considerable bonus - but life would be much more pleasant if the workload caused by such damage was decreased and if a few ejections were prevented. It is easier to pick up debris like rivets, nuts and lockwire from a hangar floor or flightline than pick pieces of aircraft from a hole in the ground.

An acid mask?

Keep your flashlight in your helmet bag? A lot of aircrew do, but we know of at least one who doesn't – any more. After wearing his oxygen mask for awhile, this crewmember experienced severe discomfort from what was later diagnosed as minor acid burns on his right cheek. He found that acid from his flashlight batteries had leaked on the mask prior to the flight. (Big print on batteries: LEAKPROOF). Extra items in the helmet bag are potential FOD. You'd be amazed to see some of the things which have been pulled out of oxygen masks. The best procedure is to carry only your oxygen mask and helmet in the bag.

- The MAC Flyer

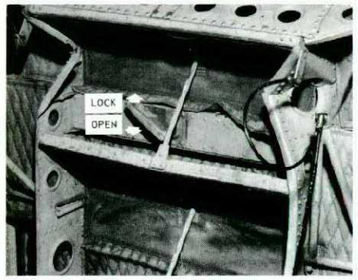
I wish I had . . .

...my low altitude flips

Gen from Two-Ten

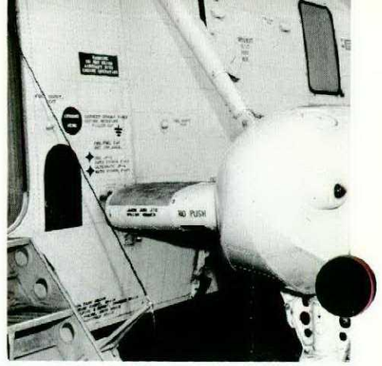
LEARN FROM OTHERS' MISTAKES—you'll not live long enough to make them all yourself!

CHSS-2, CREWMAN THROWN OUT The helicopter was leading a two-plane section back to Shearwater following a rescue mission at sea. After about two hours of high-speed cruise (130K at 300 feet) the crew were startled by a loud bang accompanied by a rush of air and a sudden yaw to port. At the same instant the captain of number two helicopter noted, "I saw the lead's personnel door, top and bottom sections, fly open and a man fall vertically. He was carried straight into the sponson support strut where he hung on..." Immediate action by the other crewman and a USAF para-rescue jumper, at grave personal risk, succeeded in hauling the man



back on board. The pilot meanwhile had quickly flared to about 10° and reduced speed to lessen the effects of windblast on the men. Back at base a medical examination revealed only minor bumps and bruises on the man.

The crewman had inadvertently leaned against the personnel door causing it to spring open. This door has been a recognized hazard for



Crewman clutched sponson support strut.

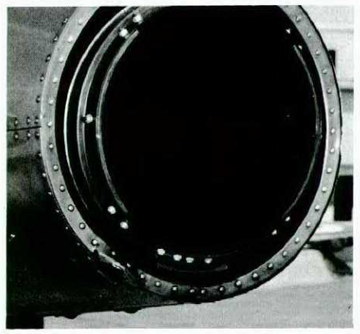
years because of the latch mechanism - 8 *reported* cases since 1965 of upper, lower, or both personnel doors coming open in flight. Faulty design in the latch permits the door to be closed and apparently locked when in fact it may not be locked. In these cases a slight jar or even normal flight vibration could release it.

As a result of this "close call" a UCR submitted in February '69 has *now* been upgraded from "routine" to "priority" in order to obtain a permanent fix before this long-standing hazard causes a fatality.

OTTER, HYPOXIA The pilot was flying as a communications relay between a ground search party and base. Because of distance, rugged terrain and radio problems, he was unable to establish adequate radio reception at any altitude below 10,000 feet. In order to establish positive communication he climbed to 12,500 where he flew for more than two hours. As he began the return flight to base, he experienced repeated chills, cold hands and feet and slight dizziness. He then descended to 10,000 feet and returned to base at that altitude ("to minimize fuel consumption"?). He informed the Tower of his problems and was met by an ambulance. This pilot, who had flown 45 hours during the previous 7 days, apparently felt that the urgency of the search operations justified exceeding without oxygen, the MSL limit of 10,000 feet set by CFP 100A.

This incident is one of several in recent months which clearly show, operational necessity notwithstanding, the impracticability of extending the operational profile of unpressurized aircraft beyond the physiological limitations of the crew.

Futhermore, during this same search, an H21 helicopter was destroyed, a CH113 was extensively damaged and the pilot of another Otter pressed on with two missions when generator failure shortly after each takeoff had rendered him ineffective. In some of these cases a margin of safety was dispensed with in the guise of operational necessity. But rather than increasing operational effectiveness, this actually had the opposite effect, a point that has been similarly illustrated frequently in the past. The needless loss of additional resources in fact reduced overall effectiveness.

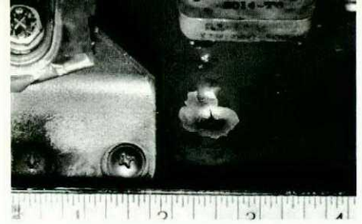


TUTOR, ATTACKED BY TOWING TRACTOR The driver was towing an energizer into position in preparation for starting the aircraft. Initially he approached the aircraft from the 4 o'clock position but he realized that on its present track, the energizer would possibly hit the tail pipe as he swung around the tail towards the external power receptacle on the left side. He stopped and began to back up, planning to position his equipment in the six o'clock position and approach in a more or less straight line from there. As he concentrated his attention on preventing the energizer from jack-knifing, he neglected to watch the position of the front end of his tractor - until the front tow rest had torn a 3-inch gash in the fuselage.

Ground personnel have since been reminded of the importance of obtaining marshallers when backing ground support equipment in the vicinity of aircraft. The lesson is straightforward for those who want to learn.

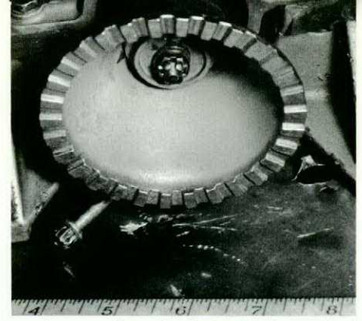
CUH-1H, TAILROTOR DRIVESHAFT FOD While conducting a daily inspection on a CUH-1H a technician found some unusual marks along one section of the tailrotor driveshaft. Looking further he discovered similar damage to the clamp bolts of another section and skin punctures at various places underneath the shaft. A bolt of the type used in the rotor shaft clamps was found lodged in the front end of the tailboom deck and two nuts were found under the driveshaft hanger bearing.

All the necessary clamp bolts



were in place along the shaft. Obviously this FOD was left by someone during a clamp replacement on the previous inspection, and it had gone undetected since.

This is an expensive way to find things you didn't know were missing. But it was also fortunate - other



services using the CUH-1H have had serious accidents caused by FOD left in the area of the tailrotor driveshaft. How good is your control of items removed for reinstallation?

OTTER, UNAUTHORIZED LETDOWN The pilot was dropping parachutists over an abandoned airfield when deteriorating weather forced him to cancel the mission and set up for a landing. Before he was able to get down however, the ground became completely obscured by cloud. He then asked the pilot of another Otter already on the field to transmit on 1630 kc, and using that ADF signal, he began a circling letdown. During the letdown his engine quit momentarily on two occasions, apparently because the carburetor temperature control was incorrectly set, but eventually he broke out at 800-1000 feet AGL and landed.

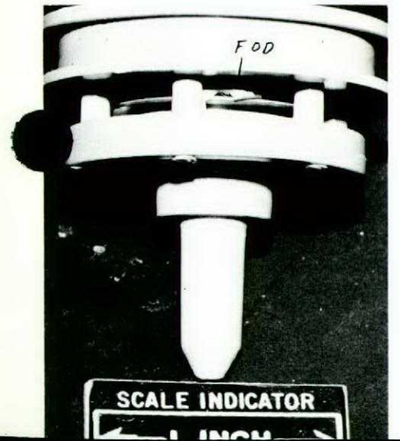
With a fully equipped IFR field only 18 miles away, the pilot's decision to resort to makeshift procedures seems hard to justify. Furthermore, CFP 100(A). 720. para 1. says...

ARGUS, HOT SEAT While flying lead in a three-plane formation, the crew detected an unusual odour in the cockpit. Unable to determine its source, they broke off formation and returned to base. After shutting down the pilot noticed smoke coming from a hole in the seat cushion between his legs. He quickly removed the cushion from the aircraft where it was extinguished by waiting firemen.

The pilot had been smoking a cigarette and inadvertently dropped a hot ember on the seat. Although the Argus seat cushions were originally treated with a fire retarding substance, this has apparently worn off. As a result of this discovery, new impetus has been given to the task of obtaining more effective fire-retardant materiel for CF aircraft cushions.

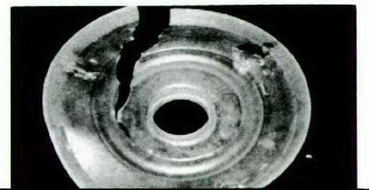
This incident which could have developed into a serious emergency, clearly emphasizes the point that formation flying demands pilots' undivided attention.

T33, HYPOXIA The pilot was enroute solo from Winnipeg to North Bay, cruising along at FL290 (cockpit altitude 18 thousand). Half way across Lake Superior he felt a light-headed sensation accompanied by a feeling that he was going to pass out. Familiar with this as one of his symptoms of hypoxia, having experienced it in the high altitude chamber, he quickly selected 100 per cent oxygen and immediately experienced some measure of relief.



Obtaining Centre clearance, he descended to FL250 but the symptoms returned again after a few minutes. This time he set up a max rate descent to 15000 feet (8000 cockpit altitude). He now seriously considered ejection, but his position, 100 miles north of Wawa, over the north shore of Lake Superior, induced him to press on. For the remainder of the flight to an uneventful landing at North Bay where a doctor was waiting, he continuously fought off impending collapse.

Investigators traced the source of the pilot's hypoxia and subsequent hyperventilation to a defective exhalation valve. They found a piece of rubber jammed in the valve holding it partly open. In addition, the flapper on the exhalation port check-valve was badly torn.



The mask had recently been trimmed down, a process during which the scrap of rubber apparently fell undetected into the mask. The two malfunctions combined, resulted in the pilot breathing oxygen diluted by unregulated cockpit air. The situation was not appreciably corrected by going to 100 per cent 0_2 because it also was diluted by unregulated air.

This occurrence, one of several in recent months involving safety equipment and physiological problems in flight, is another reminder that aircrew regardless of experience can ill afford to become complacent about such vital systems as oxygen or checking the operation of personal safety equipment.

Comments

to the editor

Ear defenders for guards of honour?

At CFB Winnipeg there are many signs that read "Hazardous Noise Area – Aural Protection Required". People who value their hearing take heed of the signs and wear suitable protection.

But what about the Guards of Honour standing at attention while a VIP Falcon or other aircraft taxis to a stop. I have seen these men as near as fifteen feet to a Falcon engine. Now I have nothing against Guards of Honour or VIPs, but after hearing my wife say to the children, "kick Daddy to get his attention", I started taking better care of my ears and gave more thought to the problem.

Unless some definite action is taken there is a fair chance that the problem will go away; the men will just turn down the volume control on their hearing aids!

WO K. Beckman
CFB Winnipeg

The answer to your problem can be found in CFAO 34-22 which, among other things, provides for Base Hearing Conservation Programs. A responsibility of the Base Commander, the programs may be implemented through the establishment of a base hearing conservation committee or the expansion of some other base safety committee to include hearing conservation.

Canvas sling questioned

A canvas sling! (Dangerous Procedures Jul/Aug 70, P.9) What is wrong with the time-proven procedure of pilots not shutting down until the landing gear pins have been installed?

An unsafe gear indication is not really a cause for concern *after* the pilot has landed and taxied his aircraft to the parking area, providing that he maintains hydraulic system pressure by keeping the engine running until landing gear pins or locks have been installed. Sling indeed.

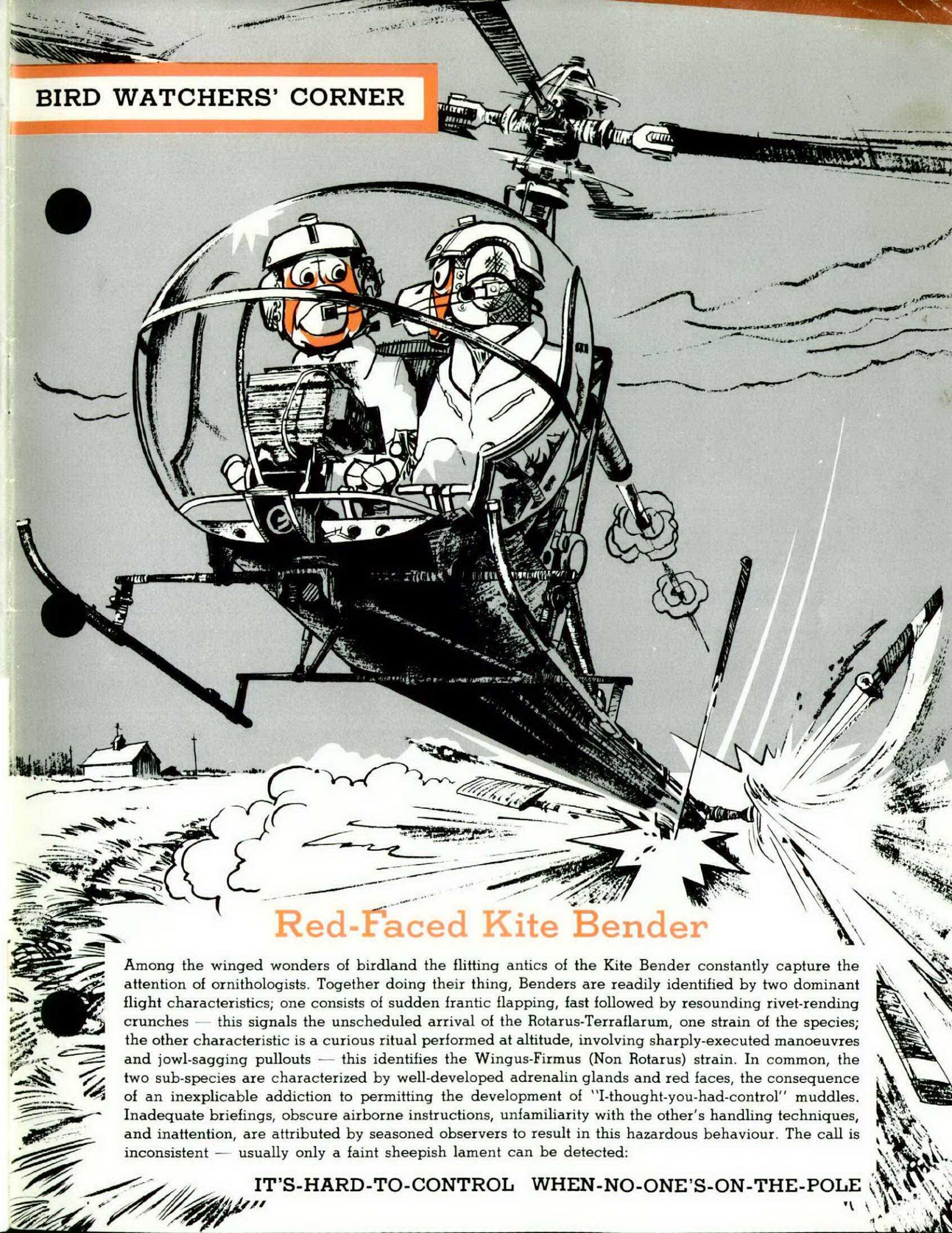
Sgt G.R. Hess
CFB Cold Lake

The hazardous situation p[re]sented by an unsafe landing g[ear] indication applies to all types o[f] aircraft. It is one which calls primarily for the use of common sense. The only hard and fast rule that need be applied is to treat all unsafe indications as an actual unsafe gear until confirmed otherwise. A visual inspection from a safe distance can usually confirm that the gear is safe. As long as hydraulic pressure is maintained then there is little danger in entering the wheelwell to insert the pin. The real hazard occurs when technicians become complacent to the point of automatically treating all unsafe indications as indications only.

In cases where doubt exists about the safety of the gear the use of a sling may have some merit. Perhaps a better idea would be a simple prop that could be carried o[n] a mule.

Neck hazard

Here's a buckshee article of flying clothing that aircrew should discard. The one that we tested (bib type-aquamarine blue) ignited easily and was soon a melting mass of flames. Actual experience has shown that cotton neckwear such as a rollneck sweater affords protection from serious burns. Exposure to fire wearing the type of dickie shown in the photos would probably result in severe burns to the area of skin covered by it.



BIRD WATCHERS' CORNER

Red-Faced Kite Bender

Among the winged wonders of birdland the flitting antics of the Kite Bender constantly capture the attention of ornithologists. Together doing their thing, Benders are readily identified by two dominant flight characteristics; one consists of sudden frantic flapping, fast followed by resounding rivet-rending crunches — this signals the unscheduled arrival of the Rotarus-Terraflarum, one strain of the species; the other characteristic is a curious ritual performed at altitude, involving sharply-executed manoeuvres and jowl-sagging pullouts — this identifies the Wingus-Firmus (Non Rotarus) strain. In common, the two sub-species are characterized by well-developed adrenalin glands and red faces, the consequence of an inexplicable addiction to permitting the development of "I-thought-you-had-control" muddles. Inadequate briefings, obscure airborne instructions, unfamiliarity with the other's handling techniques, and inattention, are attributed by seasoned observers to result in this hazardous behaviour. The call is inconsistent — usually only a faint sheepish lament can be detected:

IT'S-HARD-TO-CONTROL WHEN-NO-ONE'S-ON-THE-POLE

CONTENTS 1970