FLIGHT COMMENT

JULY AUGUST 1974

Comments

Aircraft captains are required to brief passengers on certain aspects of a flight including the procedures to be followed in the event of an emergency. On many passenger aircraft this requirement is fulfilled to a great extent by having passenger briefing cards available which cover emergency procedures and the use of life support equipment. However, many CF aircraft carry passengers on an irregular basis and in these instances the aircraft captain, whether he be in control of a two-seater jet or a multi-seat helicopter must ensure that his passengers are properly briefed. There is nothing more disconcerting for an aircraft captain than to be faced by a group of passengers who, for one reason or another, are not interested in being briefed. At times it appears that a briefing on safety is an assault on an individual's manhood. The briefer is so often met with a "Yes, yes we know all that" attitude or the "I've flown before" response that he is tempted to forget the whole thing. Well don't! If you're an aircraft captain give that briefing no matter what the response is and if you are a passenger, listen to what the pilot has to tell you – it may save your life.

A recent aircraft occurrence report describes an incident where unauthorized and improperly prepared material, comprising controlled, restricted and incompatible items of dangerous cargo, was carried on a Hercules aircraft. In this particular instance the requirements of CFAO 20-21 and CFP 117 were not adhered to. It is also of note that the air cargo accepted for shipment was described as "miscellaneous hardware". This term conveys a totally inadequate description of the contents – just as the terms "military stores" or "ms" are equally inadequate and misleading.

An article on page 17 of this issue refers to a new series of posters called *Tiedowns* which will soon make an appearance in the field. The *Rotortips* series, directed towards helicopter operations, have been well received and their wide distribution is hopefully having some positive results in the sphere of accident prevention. *Tiedowns* will also be of great value, especially if the posters are kept interesting and are displayed in appropriate locations. Ideas and suggestions for this series and for any other flight safety educational material are welcomed by DFS. Dynamic accident prevention programs need the participation and interest of everyone involved in the air operation. Your ideas and your interest can help others to perform their tasks successfully, efficiently and safely.

Front Cover Photo by A Steadworthy, Dominion Observatory, taken at Britannia Bay, Ottawa in 1912.

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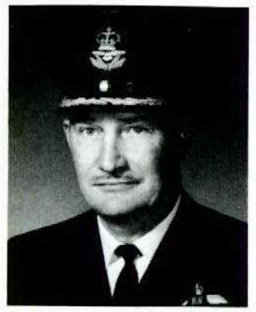
"Misuse is Abuse— —Mauvais Usage c'est Gaspillage"

There is nothing original in this title just as there is nothing original or funny in the way some people treat our aircraft and the maintenance support equipment. Who doesn't know of repeated cases where:

- aircraft were taxied too fast
- aircraft were landed overweight for no good reason
- drag chutes were not used
- excessive braking was used for questionable reasons such as practice short field landings, turning off at the first available intersection for convenience or because Tower called "expedite"
- aircraft were horsed around just to vent one's spleen
- forecasts of turbulence, hail, birds and other hazards were ignored
- aircraft were used for purposes in no way related to the assigned role
- ground handling equipment was punished unmercifully for some dubious reason
- it was too much trouble to get external electrical power so internal batteries were used regardless of the consequences
- engines were run up, including afterburner, without regard to time/temperature effect or without considering what could be sucked up and/or blasted
- wing and tail surfaces were cleared of ice and snow with make-shift tools such as the butt end of corn brooms.

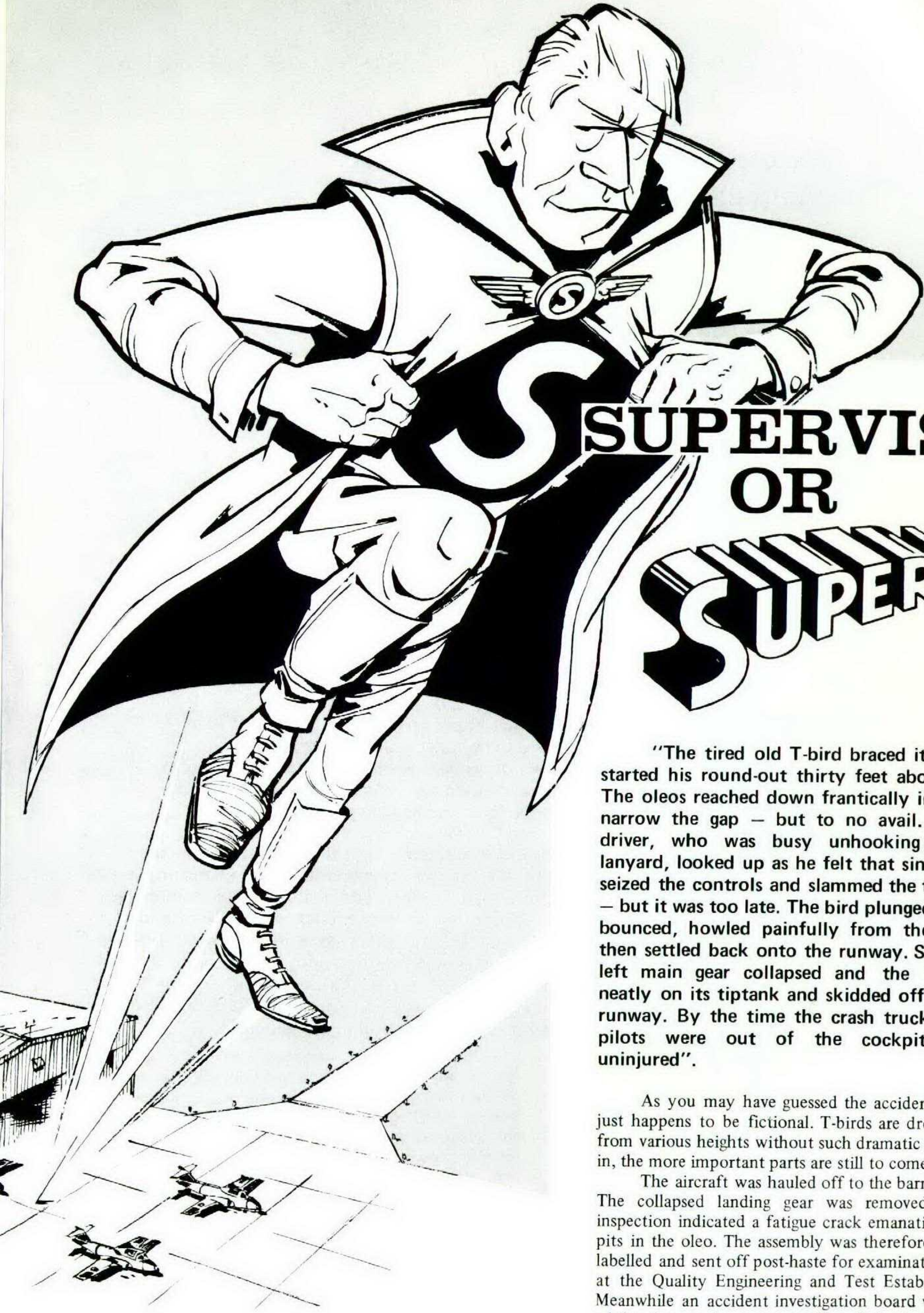
Regrettably I cannot put a loss of life or dollar figure on what it costs us to mistreat our aircraft in these and innumerable other ways, nor can I tell you how much it costs to repair or replace prematurely worn out support equipment and aircraft components that are run unnecessarily. I can tell you though that we pay a very stiff price for becoming charter members in our present day hyperactive "throw away" society.



Now that I have your attention I would like to put the issue of preserving our resources back into perspective. We expend a tremendous effort instituting flight safety programs aimed at preventing accidents and incidents. Our maintenance people work many extra hours to ensure that we have enough aircraft to meet our flying commitments. Why then don't we also mount a campaign to treat our precious resources with a lot more respect – thus prolonging the useful life of the equipment, be it a whole aircraft or a piece of test gear. You know what I am talking about and only you can take the steps needed to correct an unacceptable situation. Don't expect someone else to do it or it will just never get done.

COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

SUPERVISOR OR SUPERMAN



"The tired old T-bird braced itself as the pilot started his round-out thirty feet above the runway. The oleos reached down frantically in an attempt to narrow the gap – but to no avail. The back seat driver, who was busy unhooking his parachute lanyard, looked up as he felt that sinking feeling. He seized the controls and slammed the throttle forward – but it was too late. The bird plunged to the ground, bounced, howled painfully from the overtemp and then settled back onto the runway. Seconds later the left main gear collapsed and the T33 pirouetted neatly on its tiptank and skidded off the side of the runway. By the time the crash trucks arrived, both pilots were out of the cockpit, shaken but uninjured".

As you may have guessed the accident described above just happens to be fictional. T-birds are dropped in regularly from various heights without such dramatic results – but hang in, the more important parts are still to come.

The aircraft was hauled off to the barn and quarantined. The collapsed landing gear was removed and the initial inspection indicated a fatigue crack emanating from corrosion pits in the oleo. The assembly was therefore carefully crated, labelled and sent off post-haste for examination by the boffins at the Quality Engineering and Test Establishment (QETE). Meanwhile an accident investigation board was convened and whilst the members were packing their shaving kits at distant bases our two jet jocks had been released from the hospital and were in the mess, belly-up to the bar, describing the "good", "solid", "firm" landing which had almost resulted in disaster.

The fractured oleo duly arrived at QETE where the scientists leapt on it and subjected it to a battery of tests. By the time it had been dye penetrated, eddy currented, fractographed, photographed, mimeographed and autographed there was little doubt that the part had failed due to overstress – the stress failure originating at a corrosion pit. Three cheers for science and technology! The information was relayed to the Board of Inquiry and a Special Inspection was initiated for all T33 landing gear oleos. This was an obvious case of materiel failure but after some days of deliberation the investigators came up with three cause factors. Sure enough, MATERIEL failure was there and so was a PERSONNEL – pilot factor in that the guy in the front seat had rounded out too high, but there was another one – SUPERVISION –

First of all the technical analysis proved beyond a doubt that the bird's drumstick was going to collapse prematurely – even if it meant such an ignominious end. The oleo would probably have lasted through a few more "firm" landings and then one warm afternoon the old Lockheed racer could have just collapsed quietly on the ramp in the sun while no-one was looking. However, our two stalwart drivers were available to speed it on its way to the scrap heap.

There could be no dispute about the pilot involvement but what was the rationale behind the *supervision* cause factor which had been levelled against the flight commander? Well, it seems that the back seat driver was the aircraft captain and had not been monitoring his cohort's final approach. Why should he? you say. Well, it turns out that the front seat rounder-outer had not been current on T-birds for some years. In fact, he had just arrived at the squadron for a refresher course and had only flown a few hours. Not only that, but the aircraft captain was a newly graduated pilot – on hold-over – waiting for a posting. He was current but his experience on the aircraft was limited. Little wonder that the Board decided that there was a lack of supervision in the flight.

"...sent off to the human factors equivalent of QETE"

Now, lest we get tangled up in this tedious T-bird tale let's emphasize two points right away. First of all the wonderful world of science and technology has allowed us to eliminate many of the materiel failures which used to plague aircraft; our accident rate has decreased accordingly since we are not often confronted with situations where wings fall off or engines blow up. The outstanding work done by maintenance and NDT experts allows us to head off many otherwise certain failures.

There is however a fairly constant percentage of accidents and incidents where supervision or rather lack of it is listed as a cause factor. Doubtless our supervisory techniques are considerably better than they were some years ago but the decrease in materiel problems has now put the spotlight on other areas and supervision appears regularly. Second point: we are becoming more knowledgeable and sophisticated in our understanding of the man/machine relationship. We are beginning to realize, finally, that people cause accidents and that accident prevention means fixing people as well as fixing oleos. Unfortunately, we have only become really clever at fixing the cold, unemotional, inanimate oleo. A supervisory problem concerns people and we are notoriously bad at fixing people. Physical ailments aren't too much trouble but there's no handy-dandy remedy for those other areas which we like to class as "psychological" – (and if you can't put a band-aid on it then it's got to be "psychological"). The tendency is to accept causes like *management* or *supervision* as intangibles and forget about preventative action on the grounds that if we can't adequately define the problem then we can't really solve it. Let's return to our T-bird story to illustrate this. Once the cracked oleo was removed the maintenance wizards decided that the aircraft could be rebuilt – much to its chagrin – and within weeks the T33 was back in service with a shiny new oleo and a new bright red tip-tank, guaranteed for multi "hard", "firm", "good" landings. This effort combined with the SI could be termed a more than adequate response to the materiel breakdown. Similarly, the high round-out problem would soon be cured by a few dual instruction trips to get our pilot back to the correct attitude and altitude over the runway threshold. But what about the supervisor – in this case the flight commander – whose aeroplane had been bent. In some Orwellian air force of the future he would probably be crated, labelled and sent off to the human factors equivalent of QETE. On his return to the flight line the crate would be opened by the squadron commander and with a blinding flash of light and a great *shazam!* the new super-duper supervisor would leap – nay – fly from his box. Not just any old flight commander with a five minute epoxy fix, likely to crack under the first overstress, but a superman-supervisor, a new ennervating, invigorating force on the flight line.

Fortunately perhaps we have yet to reach this stage of science fiction. Unfortunately we are equally as far back in the dark ages in terms of assessing and then dealing with problems of supervision on the flight line. But we are making progress. We can at least isolate and home in on the specific areas where we continually encounter problems. The next step is to *do* something about it.

The supervision breakdown in our little story is apparently in the area of crew scheduling. The first step in setting up the accident was in allowing an inexperienced new graduate to fly cross-country with an out of touch "old hand". Both pilots were at less than optimum. The circumstances, reasons or excuses why the situation was allowed to develop may be myriad but the fact remains that someone failed to keep a grip on the operation. At some point in the chain of events the potential should have been recognized and in this case, a more experienced pilot put in the back seat.

One could suggest that the preventative action here would be for the squadron commander to take a close look at the way the flight commander runs his little shop. Certain questions will need to be answered. Who is responsible for crew scheduling? What are the currency requirements for mutual cross-country? If any changes in the programme come up what are the lines of communication? Who's talking to whom? Is anyone talking to anyone?

If these questions are answered and action initiated to cut out the chance of a recurrence there may well be a tendency to breath a sigh of relief and relax. The supervision cause factor has been adequately dealt with. But just how much has really been solved? All that can be said is that one area has been addressed and hopefully the problem solved. But only one loophole has been closed. This may just be the tip of the iceberg. Are we now to sit back and wait until another accident points out another deficiency in the operation? Supervision must be an ongoing everyday process. One incident will be quickly followed by another unless there is a dynamic, operationally oriented programme which picks up the hazard areas before they become part of the accident record. Supervisors have this responsibility and it's a big one and at times it seems that they are continually scrambling out from behind that big eight-ball.

A flight commander's job analysis probably defines his duties quite well but it doesn't tell him *how* to perform them. And yet, it is the *way* in which the job is done which so often determines how successful the supervisor will be. There is no formal "Flight Commander Course" as such nor is there a handy paperback book which details the path to success. What then does a flight commander have to use as a reference?

Even if our flight commander is a grey-haired expert with years of experience on the job he may still perform his supervisory duties in the way he has seen other flight commanders perform over the years. In many instances this accounts for the stagnation in a unit and the resulting brush-fire-fighting tactics which are employed when problems arise.

The flight commander is the first supervising level closest to the aircrew and his relationship with them is rather unique. As a pilot he flies with them and is therefore a member of that rather special flying group. However, he also represents authority and the establishment. He talks with the squadron commander behind closed doors and he also writes the assessments on the aircrew – so he belongs to another small group in which the line drivers do not hold membership. The flight commander is therefore in a position where he is – or should be – close to the aircrew but not really as "one of the boys". Flight commanders sometimes forget that there is no requirement for them to be "one of the boys" just as the "boys" sometimes forget the same thing. The art is to maintain active membership in the supervisory group without forfeiting membership in the flying group. This is fundamentally important if only for one reason – *Communication.* As the flight commander lets his membership in the flying group lapse he gets further away from the real life

"...dodging the slings and arrows"

of the flight line. If he allows his relations with the aircrew to be filtered through a number of in between semi-supervisors such as deputy flight commanders and operations officers he soon arrives in a position where the feedback he gets – and must have to do his job properly – from the aircrew has been edited and interpreted, sanitized and censored. He is in fact no longer in the picture. At this point events may take place which are of prime importance to his operation but of which he may be ignorant. He may only become aware that problems exist when they manifest themselves in an accident – something no-one can edit, interpret, sanitize or censor.

Obviously this is an extreme case where isolation from the operation is almost total. There is of course the other extreme: this is where flight commanders are busy sitting on everyone's knee and looking over everyone's shoulder to make sure that nobody slips up. This is the kind of supervision where the aircrew soon learn that if they just wait long enough the flight commander will do everything himself – for fear they will make a mess of it. The supervisor in this situation may be so frightened to relax that he also loses track of what's really happening. And he also will not be kept in the picture.

The communication and feedback process within a unit is emphasized because of its critical importance to the conduct of the operation. The supervisor can only react to situations if he knows what is going on. But let's be honest. Many things happen to and in aeroplanes and the only one who ever knows is the pilot. How many pull-outs from low level deliveries have been so close to the trees that . . . How many times have pilots been caught out by weather and just squeaked in on the fumes – refuelled and said nothing. How many times have altimeters been misread and lives saved by breaking out VFR. The list is endless. No one is suggesting that a suit of sackcloth and a bucket of ashes should be kept in Operations so that the guilty ones can shuffle down the flightline with great cries of "mea culpa" but the point is that situations with accident potential arise and no-one knows about them. The word may get out around the flight or at the bar during war story hour but let the flight commander appear and everyone immediately clams up.

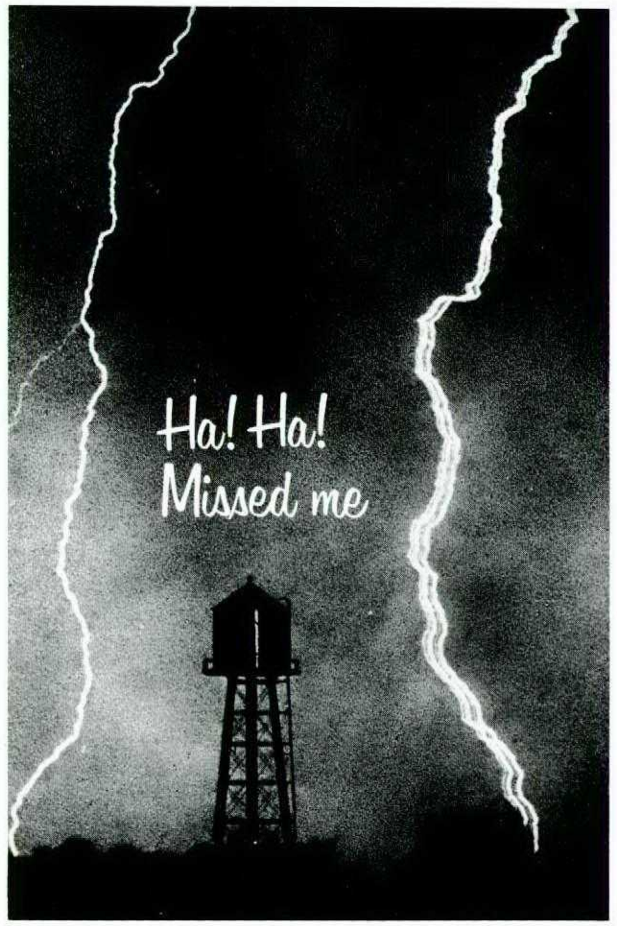
The only thing that can change this situation is a change of attitude on the part of the aircrew. If someone has a close call and learns a lesson from it and then passes the word on to some of his buddies – then a great deal has probably been achieved. There are many ways of passing on the lessons of experience without losing one's anonymity – if that is important.

Our loyalty to the service is best practised by supporting our immediate supervisors. But aircrew on the flight line are also loyal to each other and this can lead to some conflict. If Lt Schmuck knows that Lt Dingaling has a daily rendezvous beating up his girlfriend's house then he is confronted with a conflict. He isn't going to "tell" on Dingaling especially to the flight commander, but he is concerned that Dingaling will either be caught – or worse have a prang. Efforts to convince Dingaling are futile. What does Lt Schmuck do? Sit and do nothing and hope that everything will work out alright? Well this is a case of misguided loyalty. The flight commander has to know so that he can put a stop to this activity. In effect Schmuck will be *really* doing Dingaling a favour if he does advise the supervisor. If his peers in the flight then figure he is ratting then there is a serious problem of attitude all around. Somehow the aim of the game has been missed. There is no room in a squadron for thirty pilots all doing their own thing when and how they feel like it.

The flight commander – to be really effective as a supervisor and leader – needs the support of those upstairs as well as those downstairs. The aircrew in a flight can dictate how successful he will be by the attitude they have towards the operation. And it is easy for aircrew to forget how much responsibility the flight commander carries for them. Not only does he have to answer for their activities in the air but every administrative problem involving a pilot in the flight is an extra piece of paper for him to shuffle – another unnecessary time-consuming task which keeps him further away from the flying activity. If the aircrew aren't acting in a responsible, professional manner then the situation is bad. But all our flight commander needs now is a squadron commander who isn't sure what squadron commanders are supposed to do and he'll really be in trouble. Some flight commanders must spend half their time dodging the "slings and arrows" which come from above as well as below.

The flight commander's position is the supervisory level where the buck so often come to a grinding halt. The squadron commander who doesn't provide proper supervision and direction from his level but guarantees a chewing out when something goes wrong is just as guilty as the young pilot whose irresponsible actions create the problem situation. But it's the flight commander who so often gets caught in the middle – carrying all the blame and responsibility for other people's mistakes.

The flight commander isn't like a teddy bear. He doesn't ask to be cuddled and loved and it doesn't even matter if you don't like him – he's not in a popularity contest. He's trying to do a job and he needs help to do it properly. He can't exist in a vacuum and it's up to the aircrew and the commanders to recognize the problems and responsibilities which confront this level of supervisor. He'll never be a superman but he can become an effective and responsible supervisor – with a little help from his friends. ■



A Burning Issue!

After a CC137 sched flight landed at Ottawa this box of "strike anywhere" wooden matches was taken from a smouldering piece of luggage. The matches had ignited and then extinguished themselves. The baggage belonged to a civilian passenger who had *not* been briefed on items that are prohibited in personal baggage on DND aircraft. *Do you know the regulations?*

GOOD SHOW

MAJOR D.R. WILLIAMS

Maj Williams was the captain of a T33 on a mutual cross-country mission from Moose Jaw to Victoria. Approximately 50 nm west of Calgary the crew noticed intermittent loadmeter fluctuations, a weak intercom and a momentary flicker of the inverter fail warning light. Although the problems disappeared Maj Williams decided to return to home base since the west coast and Calgary weather was less than ideal and Moose Jaw was VFR.

As the T33 turned back the electrical problem re-appeared accompanied by a complete loss of radios and intercom. Maj Williams realized that, in the event of an electrical failure, insufficient fuel would be available to return to Moose Jaw. When the problem disappeared again, he declared an emergency and requested a single frequency PAR approach at Calgary.

During the descent into Calgary the compass and attitude indicator froze. Maj Williams continued the approach and landed safely in minimum weather conditions.

Subsequent detailed investigation revealed a serious electrical snag in the battery bus junction box. Maj Williams handled the emergency in a most professional and competent manner, demonstrating a thorough knowledge of aircraft systems and procedures. Furthermore, his perseverance regarding the snag was instrumental in discovering the cause of the problem.

CAPT H.A. VOS AND CPL W.K. TOMPKINS

Immediately after lift off on a Dakota post-maintenance air test, the left engine fuel pressure dropped and the engine failed. Since the aircraft was headed toward a built up area and little runway remained, the pilot, Capt Vos, elected to continue with the climb out and instructed the crewman, Cpl Tompkins, to change fuel selection. The engine failed to respond and the pilot ordered the engine shut down. Climb out to circuit altitude and an uneventful landing followed. The cause of engine failure was later determined to be an obstruction in the fuel delivery line to the engine.

The quick and professional actions of Capt Vos and Cpl Tompkins averted what might have been a disastrous situation, particularly in view of the timing of the engine failure.

Major D.R. Williams

Cpl W.K. Tompkins and Capt H.A. Vos

Capt G.H.S. Starks

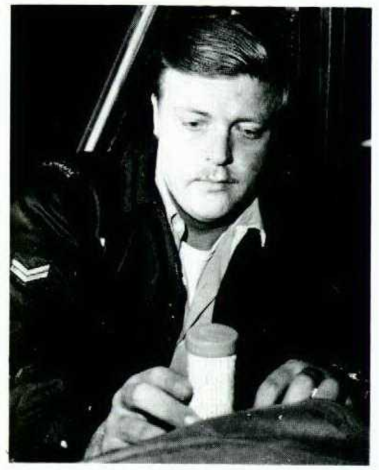
Lt J.F. Kleinschroth and Cpl S.C. Jackson

Cpl C.R. Gillis

CAPT G.H.S. STARKS, LT J.F. KLEINSCHROTH AND CPL S.C. JACKSON

A T33 was programmed for a long range operational flight from Gander. The aircrew weather briefing indicated particularly strong en route winds with maximum speeds to 186 knots. The flight was undertaken only after carefully co-ordinated arrangements with NORAD control agencies to shorten flight legs if fuel quantities became lower than calculated along the flight route.

While crossing the Labrador coast, a transmitter failure occurred just before the aircrew could request shortened flight legs because of high winds and fuel consumption. Responding to the in-flight emergency, Capt Starks, the Controller at Goose Bay, together with Lt Kleinschroth and his assistant, Cpl Jackson, at North Bay immediately co-ordinated their efforts to provide for the safe recovery of the aircraft.



Cpl A.J. Barnhardt

Cpl G.C. Pitman and Cpl D.C. Law

MCpl T.D. Hickey

Employing a combination of skills, the Controllers quickly ascertained the nature of the emergency, and that the aircraft radio receiver was at least partially operational. The Controllers provided the aircrew with optimum headings, detailed weather information, ground speed checks, runway conditions, warning of other flights entering their flight path, clearances and handover to Chatham control.

The timely, accurate and co-ordinated efforts of this ground control team indicates professionalism of a high order which contributed significantly to the safe recovery of an aircraft in distress.

CPL C.R. GILLIS

While inspecting the engine area during an AB check on a CH136 helicopter, Cpl Gillis discovered two broken screw heads. In an attempt to determine the source of the broken screws he consulted the aircraft CFTOs and, with the assistance of an aero engine technician, determined that they were from the compressor scroll assembly. A special inspection of all CH136 helicopters revealed several other engines with the same defect.

Cpl Gillis is commended for his perseverance and keen observation during a routine inspection. Identification of this problem undoubtedly resulted in the prevention of an aircraft incident or accident due to an engine failure.

CPL A.J. BARNHARDT

While performing a Daily Inspection on a CH124 Sea King Helicopter on board HMCS ATHABASKAN, Cpl Barnhardt noticed a bulge at the bottom of the back pack on the pilot's seat. Although it was not part of the inspection, he proceeded to investigate the state of the contents of the survival kit located at the bottom of the pack. He discovered that a row of rivets on the seat had been rubbing against the zipper on the survival kit cover, which in turn had caused deep indentures on the smoke illumination flares. Further investigation revealed damaged flares in the copilot's and sonarman's back packs and a special investigation of all Sea Kings in the fleet disclosed that 40 percent of the flares had such damage.

Cpl Barnhardt's attention to details not specifically mentioned in the checklist and the thoroughness of his investigation enabled timely action to be taken to avoid a potentially dangerous situation.

CPL D.C. LAW AND CPL G.C. PITMAN

Cpl Law and Cpl Pitman were carrying out the "last chance" inspection on a CF101 when they detected a small fuel leak at the bottom of the starboard engine. The aircraft was shut down and further investigation revealed a cracked afterburner fuel sensing line.

The leak was in the vicinity of several fuel drains and could easily have gone undetected, especially in the poor visibility at night. Had this fault not been discovered the fuel line would have pressurized during takeoff, producing a severe leak and subsequent fire in the engine compartment.

Cpl Law and Cpl Pitman, by their alertness, technical knowledge and dedication prevented a possible aircraft accident.

MCPL T.D. HICKEY

While carrying out a "B" check on a CF101, MCpl Hickey discovered that the wire bundle in the right hand wheel well was chafed and that the bundle

GOOD SHOW

covering was torn. This damage was reported to the I & E Section and the bundle was rewrapped with tape.

Following the next flight MCpl Hickey again checked the wire bundle and once more found evidence of chafing. Further investigation showed that the linkage assembly was rubbing and pushing against this wire bundle. Chafing would eventually have caused bending and breaking of the electrical wires. Re-positioning of the wire bundle solved the problem.

This item is not part of the mandatory "B" check and would have been overlooked if MCpl Hickey had not shown a high standard of airmanship and professionalism. MCpl Hickey not only did a thorough inspection but followed up on his initial finding and averted a more serious situation.

CPL G.E. MUSFELT

Cpl Musfelt was replacing a tachometer generator on a Hercules when he noticed that the engine starter seemed loose on its mounting. On closer examination he discovered that the nuts holding the starter to its mounting pad were all loose and the starter could be moved up and down approximately one inch. He decided to remove the starter for further investigation and found that the starter studs were badly worn and the mounting plate holes enlarged. Starter and mounting studs required replacing.

Cpl Musfelt's alertness in this instance is indicative of the professional approach he takes to his duties.

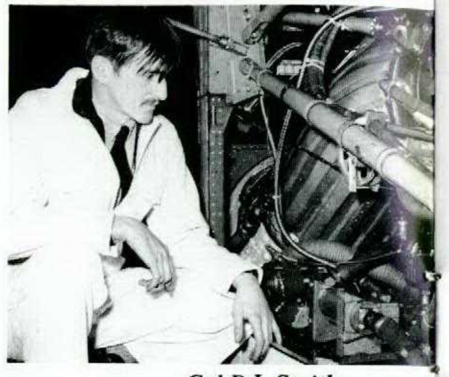
CPL B.I. SMITH

While working overtime on New Year's Eve, Cpl Smith discovered a partially failed component on the Fuel Control Unit of a CC115 engine. Cpl Smith is an aero engine technician just recently qualified on the Buffalo aircraft. His attention to detail in discovering this problem may have averted an inflight break down with a resulting engine failure and possible fire.

CPL V.R. SIMMS

Cpl Simms, an aero engine technician, was detailed to carry out an "AB" check on a CC137 Boeing. While inspecting the tail pipe area of No. 1 engine he noticed what appeared to be nicks and spots on the fourth stage turbine blades. On his own

Cpl G.E. Musfelt



Cpl B.I. Smith

Cpl V.R. Simms

MCpl G.N. Foster and Cpl J.A. Daigle

initiative, he entered the tail pipe for a closer examination and found that one blade of the fourth stage stator vane assembly had a piece approximately 1/8" deep missing from the trailing edge. The engine was removed and a subsequent inspection revealed extensive internal damage.

Cpl Simms displayed a commendable degree of alertness and initiative in thoroughly investigating what seemed initially to be insignificant damage.

MCPL G.N. FOSTER AND CPL J.A. DAIGLE

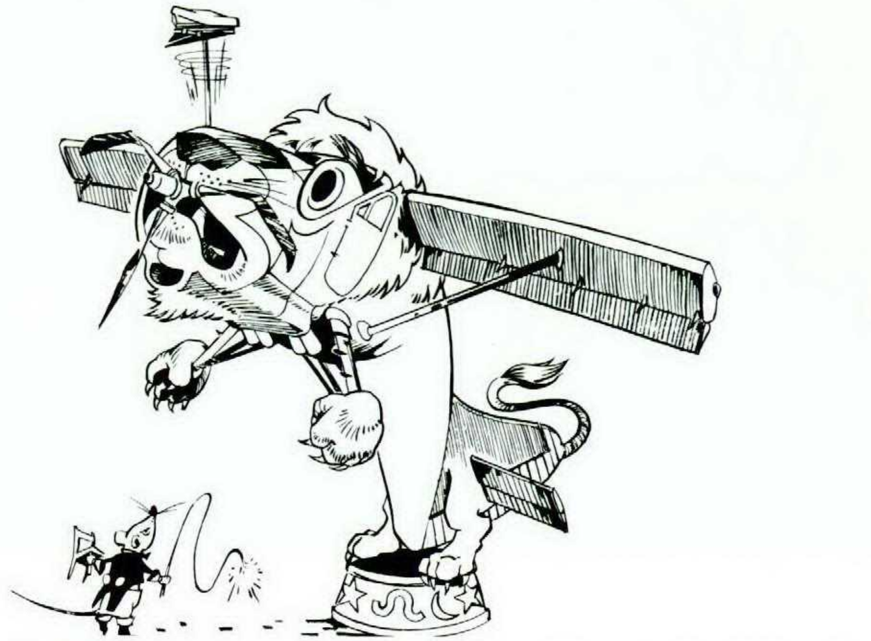
MCpl Foster and Cpl Daigle were completing a trim run on a CF101. MCpl Foster, in the cockpit, started both engines, advanced the port engine to military power and then selected left afterburner. The afterburner lit but Cpl Daigle noted flames from under the port engine. MCpl Foster immediately shut down the port engine and alertly left the starboard running until he had advised the tower of the emergency. MCpl Foster and Cpl Daigle then fought the flames with the extinguishers on the start units until the fire trucks arrived. Subsequent investigation revealed that the cause of the fire was a broken fuel line to the afterburner.

By their quick, calm and co-ordinated action MCpl Foster and Cpl Daigle prevented the loss by fire of a valuable aircraft.

ASTROLOG

leo

Jul 24 to Aug 23



Lions belong to the cat family and the Leo flier is some pussycat! Not that he drinks milk and just sleeps all day. Far from it! This feline is energetic, enthusiastic and self-assured. Like his jungle cousin he is – or acts like – king of all he surveys.

Leo is happy in any position which carries a promise of publicity or gives him scope for showing off. He'll try hard to be in the display team but he won't be too happy as a wingman – he much prefers the solo slot. The confidence and self-assurance which make him a very capable pilot can sometimes be too great and lead to a conceited, overbearing manner. Occasional flashes of pride and arrogance may lead him into trouble – he is considered accident-prone.

The big cat is very adept at organizing other people's lives and will cheerfully delegate unpleasant jobs to others. On that cross-country trip he'll let you do all the flight planning while he struts around the terminal in his fancy red dicky. As you taxi out he'll leave the canopy open and wave importantly to the "groundlings". Keep a firm grip or he'll talk you into putting on a quick display for his "fans".

At his worst the Leo flier is patronizing and pompous, interfering and intolerant. At the other extreme he is warm-hearted and overly generous. With the right kind of balance this strong individual is an asset to any squadron. Just be sure to give him credit for his work and you'll see what a professional pussycat he can be.

virgo

Aug 24 to Sep 23

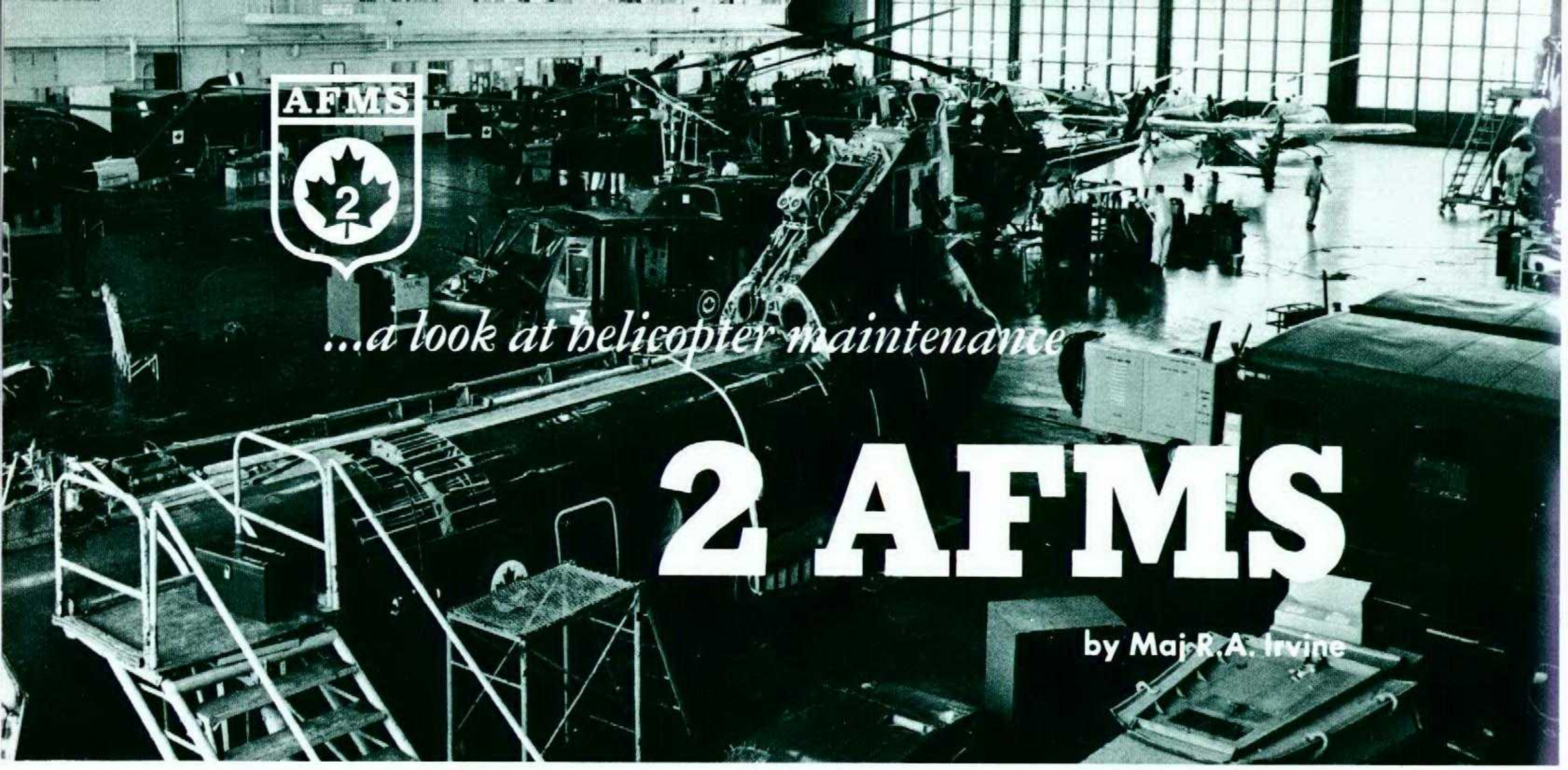
Who is that wiry looking fellow with the well-trimmed hair and the neatly pressed flying suit? If he's manicuring his fingernails or picking lint off his jacket then it's probably "Mr Clean" – the Virgo on your squadron.

Virgo is ruled by the still unseen planet Vulcan and he's basically uncomfortable in a crowd. But he isn't a loner although he works well without supervision. His critical, discriminating mind evaluates by facts and logic. His thorough, methodical technique makes him an ideal Standards Officer, ICP or Test Pilot.

This analytical attitude with its accompanying desire for efficiency and perfection is often coupled with a blunt, forthright manner. If the squadron commander doesn't perform too well Virgo won't have any qualms about lifting his ticket – positions and titles aren't sacred to him. And servicing crews better watch out if the aeroplane isn't clean and shiny. Virgo hates dirt and sloppiness to the point of being hypercritical and nit-picky.

Purity is important to the Virgo and he'll be the first to check any fuel cache for possible contamination – He'll also stay away from the "greasy spoon" – since he takes hygiene and his diet very seriously.

The Virgoan, with his natural interest in details and instinctive urge for efficiency and perfection, makes a good FSO. He'll never allow speed to replace cautious, methodical procedures. He's also a lover of punctuality but if he does keep you waiting for a flight don't worry – he's probably just taking his third shower of the day.



...a look at helicopter maintenance

2 AFMS

by Maj R.A. Irvine

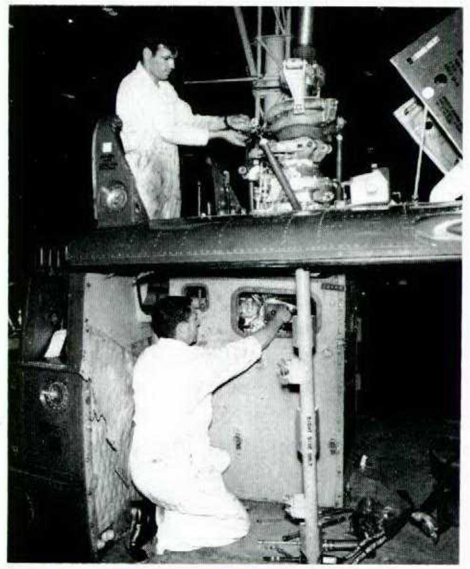
In recent years, helicopter flying within the Canadian Forces has increased significantly. With the acquisition of CH135 (Twin Huey) and CH136 (Kiowa) helicopters, the aviation component of FMC has blossomed into the largest flying Command in the Canadian Forces. Helicopter operations are conducted in all areas of Canada – including the Arctic Archipelago. FMC helicopter squadrons have also travelled further afield to exercises in the jungles of Jamaica, the desert areas of southwest USA and the fjords of Northern Norway in support of the Canadian Air Sea Transportable (CAST) Combat Group.

Mobile Command helicopter squadrons are based at Ottawa, Petawawa, Valcartier, Gagetown and Namao. Flying CH113A, CH135 and CH136 helicopters, the squadrons rely on two organizations for their second line maintenance requirements. These units are No. 1 and No. 2 Aircraft Field Maintenance Squadrons, at Namao and Ottawa. 1 AFMS is responsible for second level maintenance for 408 Sqn and 450 Sqn Detachment, co-located at Namao: 2 AFMS in Ottawa provides similar support to 427 Sqn Petawawa, 450 Sqn Ottawa, 430 Sqn Valcartier, 403 and 422 Sqns Gagetown.

Each flying squadron has integral servicing level resources for its day to day flying requirements and has a limited deployment capability. Field level maintenance (second level), because of manpower restrictions and fiscal restraints, is centralized and carried out on a regional basis by the two AFMS.

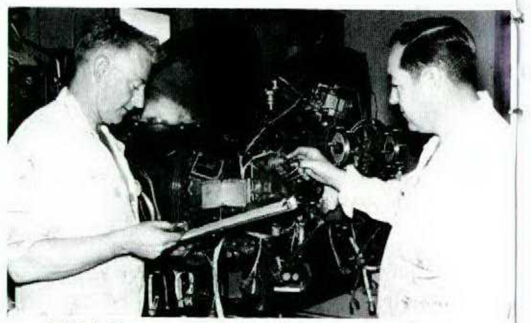
The AFMS are required to provide support to their respective squadrons on a 24 hour basis. This is accomplished by:

- dispatching Mobile Repair Parties (MRPs) when situations arise;
- augmenting the maintenance staff of the flying squadrons during their deployment;
- the AFMS, or a portion thereof, deploying as a unit to an operational theatre.



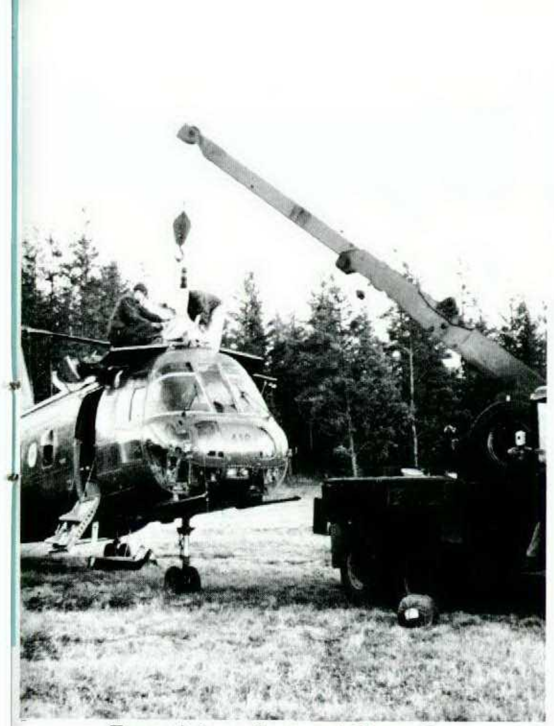
Cpls Richard and Conley perform CH135 1200 hr check

Lt McKenzie and Cpl Guyon check out a Kiowa Single Side Band radio in the telecom section



MCpl Garneau and Cpl Hynes at work in the engine bay

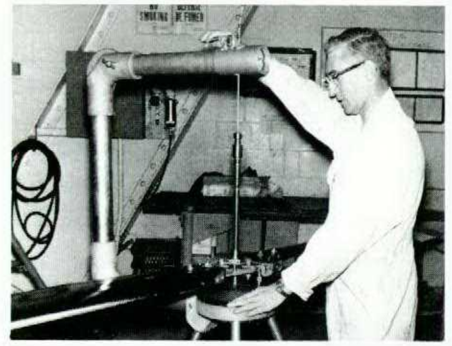
Changing a rotor head at Ho Hum Bay, Alert, NWT.



Transmission change at Bonnechere, Ontario.

Cpl Caverley repairs an "elephant ear" in the metal tech shop

In the I & E section Cpl Hollett checks continuity on a CH135 wiring harness



Cpl Auger balancing a CH135 tail rotor in the component shop

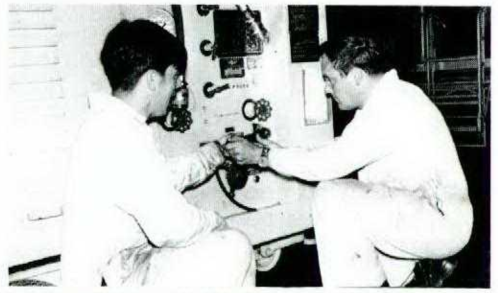
The main work load of 2 AFMS is performed at their home location at CFB Ottawa South. The squadron occupies 10 Hangar, the premises formerly occupied by AETE, and is self-contained with its own support shops, stores, and engine bay, as well as other sections organic to an aircraft maintenance organization. Aircraft are flown in for periodic inspections and major modification or special inspection programs. Where requirements arise, MRPs with tools and serviceable components are dispatched by first available transport, air or ground, to effect repairs to unserviceable aircraft at their home squadron or at the downed aircraft location. To facilitate limited deployment or large MRP capability, the squadron has a number of vehicles, including shop vans, which allow the technicians a degree of self-sufficiency at austere locations.

As a part of FMC, the AFMS aircraft maintainers must be capable of living and working under field conditions. Consequently, field orientation training, like technical training, is viewed as vital to their effectiveness. A significant amount of their time is spent in developing skills in weapons training, winter indoctrination, field craft and other similar techniques necessary for survival under emergency situations.

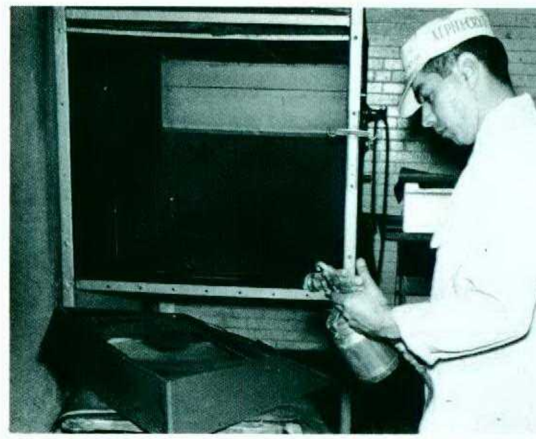
The AFMS entered their fourth year of operation in May of this year. Many of the problems associated with establishing new organizations and new aircraft programs have been overcome. The upcoming Chinook (CH147) helicopter program with deliveries scheduled for autumn 1974, will involve both AFMS as well as 450 squadron. Technician training for the program is already underway and will continue in accelerated amounts for the balance of the year.

The AFMS are a new version of the Base Maintenance concept expanded to what could be referred to as Command Maintenance. It will be interesting to note future progress of these squadrons to determine if the system is effective and economical. Their achievements to date indicate some modest success and the AFMS personnel possess a squadron spirit that points to many more successful accomplishments.

MCpl Dionne works on a tail rotor in the refinishing shop



Cpl Beauchamp and Pte Belville checking GSE



Cpl Fraser inspects his workmanship after painting a CH135 oil cooler cover

Safety Systems tech MCpl Steffler inspects a 10 man dinghy

Aircrew Life Support Equipment ...1974 style

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

AIRCREW KNIFE An aircrew emergency knife which has a shroud line cutter on one end and a short, sliding blade on the other end has had limited user trials. The original item is being modified and an additional small number are being manufactured for ALSEO user trials.

PYROTECHNICS The new rocket flares with an altitude capability of 1000 feet are being received off contract and the change over in the survival kits should be completed this summer. A word of caution on loading the flares into the hand-held launcher. When inserting the flare cartridge DO NOT hold the trigger at or near the top of its travel when you ensure that the cartridge is fully inserted. The present manufacturer's operating instructions will be amended to obviate the hazard.

SURVIVAL VESTS Several different designs of survival vests are under evaluation at DCIEM. This vest, to be worn by aircrew, will carry the signalling devices normally contained in the seat pack or survival kit. This allows the crew member to still have the signalling devices at his disposal even though he may be separated from his survival items.

DOUBLE FLOOR LIFERAFTS The new ten-man life raft is beginning to appear in service. The one-man version with the double floor has been available for about a year. Prototype four, six and 30-man rafts are being built and will be sent out on trial to such units as CFSTS Sea Survival School and the Maritime Command Sea Survival School.

LIFE PRESERVERS A new, water-activated, automatic inflation device has been developed for use on aircrew life preservers. A technical problem in the initiator of the device was discovered by the Quality Engineering Test Establishment during first article testing. Although a delay of several months was experienced, new initiators have now been qualified and the first article testing recommenced 1 May 74. A new, higher inflation pressure life preserver similar in design to that now used by jet aircrew is also being developed. This new preserver is made to be inflated ***under*** the parachute harness (QRB type).

PILOT'S CLIP BOARD After a second user trial, the good aspects of a new pilot's clip board (or knee pad) have now been rated as marginal or poor. The technical design authority is to meet with the contractor to discuss manufacture of a modified model .... "back to the drawing board".

TUTOR BALLISTIC INERTIA REEL (BIR) AETE has prototyped a BIR installation for the Tutor aircraft and a project directive to initiate final engineering and testing is being prepared. Upon successful completion of this testing, the inertia reel will be approved for installation in all Tutor aircraft.

CF100 AIR DEPLOYABLE SEAT PACKS AETE have developed an improved deployment handle stowage method for the CF100 prototype air-deployable seat pack. Air deployment trials will be carried out before changes are incorporated.

AIRCRAFT SEATING (NON-EJECTION) DESIGN CRITERIA The Aerospace Life Support Equipment Engineering and Maintenance section within NDHQ is updating CF aircraft seating design criteria and is planning to evolve a Canadian Forces aircraft seat design specification policy.

AUTOMATIC LAP BELT DESIGN The present RPI Lap Belt is not compatible with a ballistic arming lanyard that would be used with a drogue gun deployed parachute or, in most instances, with a negative "g" strap. DAES has been tasked to produce design criteria for an automatic lap belt. This belt is to incorporate the features of positive separation; safe, positive parachute arming; and must also be compatible with a ballistic parachute arming lanyard and negative "g" strap. Once the design criteria are developed and approved, an engineering development contract will be negotiated to produce an item that will be the eventual replacement for the RPI lap belt.

ROTARY ACTUATOR (BUTT SNAPPER) WEBBING GUIDES – CF101 AND TUTOR A webbing guide for the Butt Snapper has been prototyped, tested, and qualified for use on the CF101. A similar guide is now being developed by AETE for the Tutor.

CH135 CREWMAN'S SEAT, PERSONNEL RESTRAINT HARNESS A new harness has been approved for the outer positions of the two-man forward facing troop seats in the CH135. The harness consists of a lap belt, shoulder harness and a negative "g" strap all fastened to an Autoflag GL-2 buckle. Studies are continuing on the feasibility of also installing inertia reels for the shoulder straps in these positions.

SURVIVAL TENT It now appears that a six-man artic tent will be available next fall for use in helicopter survival kits. The tent being considered has been tested by DCIEM in the Arctic for the past two winters and has received very high ratings. The six-man capacity vacuum packed tent body can be placed in the same space in the CH136 as the two-man Hellroy tent which some units have purchased locally.

AIRCREWMAN SAFETY RESTRAINT HARNESS A new safety harness is on trial in most Commands. This harness is designed after the three-point parachute harness (used by para-rescue) and provides greater security than the simple waist belt yet it will not slide off the shoulders like the cinching type harness. Initial reports show a favourable reaction with some reservations about the complexity of the harness. Thus, if the harness meets the safety and operational needs in all respects, crewmen will require training in the proper use of the harness or it will be considered too difficult to wear and be rejected.

DAKOTA PILOT/CO-PILOT SHOULDER HARNESS A shoulder harness installation for the DAK pilot/co-pilot seats has been developed. As soon as the prototype is approved, procurement and installation can be initiated.

HELICOPTER CRASHWORTHY SEATING The CF is closely monitoring the US Army developments in the design of crashworthy seats for use in the UTAS helicopter. These seats provide protection for a vertical crashload of up to 45 "g" yet provide comfort, are easily stowable and can be mounted in approximately the same area or space that present seating occupies. Investigations are being conducted into the feasibility of installing these seats in the CH135.

IMMERSION SUITS The design for a new model CF Immersion Suit has been sealed and an order placed for several hundred. These suits should appear in the supply system in the early summer and are intended to replace the present MK X suit on an attrition basis. Modifications include a newly designed neck flap, deletion of the expansion roll over the kidneys and an improved urination port.

PERSONAL LOCATOR BEACON (PLB) This program is progressing satisfactorily and the first beacons are anticipated off contract in early '75. As reported earlier, they will feature two-way voice communication on two channels, use an improved battery and be manufactured as a one piece unit.

LIGHTWEIGHT SUMMER UNDERWEAR A final design has been decided upon, incorporating a long sleeved turtle neck shirt, and lightweight bottoms. This underwear should be in supply sections by the end of May '74 for free issue to aircrew flying ejection seat equipped aircraft and helicopters. The possibility of having the underwear available for all aircrew is being investigated.

Non Destructive Testing

...or what you don't see is what you get

Capt B.J. Meindl
AMDU CFB Trenton

"Ubendum-Wemendum" was the motto attached to a newspaper produced by 6 Repair Depot, AMDU's ancestor, and although the Aircraft Maintenance Development Unit at CFB Trenton does not publish its own fish wrapper, if it did the motto would go something like "wefindum before theyfindu".

The concept of corrective maintenance or, repair after the fact, has its place in aircraft maintenance; however, all aircraft maintainers tend to emphasize preventive maintenance or, finding faults before failure. Like firemen who once waited for fires to happen but are now out inspecting for possible fire producing hazards, AMDU is in the business of developing inspection methods and techniques that will reveal flaws in aircraft before they can be detected by the unaided human senses. It is an interesting coincidence too that the NDT Branch at AMDU, highly involved in detecting hidden potential hazards, is located in the Old Fire Hall at CFB Trenton.

What does NDT mean to you?
(a)Nothing Doing Today?
(b)National Doubles Tennis?
(c)Non Destructive Testing?
(d)B.R.I.A.M.?

It could mean all of the above but applied to aircraft maintenance it should mean (c) and (d). Non Destructive Testing is an inspection process undertaken on a part or structure to determine internal or external flaws without simultaneously destroying its intended usefulness. It is particularly noteworthy that many NDT inspections may be performed without either removing or exposing the item. Because of these valuable characteristics NDT translates into B.R.I.A.M. or "Better Reliability in Aircraft Maintenance".

A search of the back files at AMDU has revealed that the process of Non Destructive Testing was first used approximately 1,000,000 years ago (back in the 6RD era) when the forerunners of the present day NDT disciples set up shop testing the integrity of their Cambrian weapons systems. At that time only two NDT techniques were available: the Mark I eyeball and the acoustic emission test. The eyeball test was easily performed but the acoustic emission technique required skill in interpreting the results. The procedure was to bang the trusty club against a rock and interpret the resultant sound. A solid reverberation indicated a serviceable system; however, one may appreciate that the training required to become skilled in acoustic emission was intense. Over the last 10^6 years great advances have been seen in the technology but strangely enough both the eyeball and the acoustic emission tests still have their roles.

This article is not intended to make instant experts, but it may serve to impart some idea of what the NDT technology entails and what the future holds.

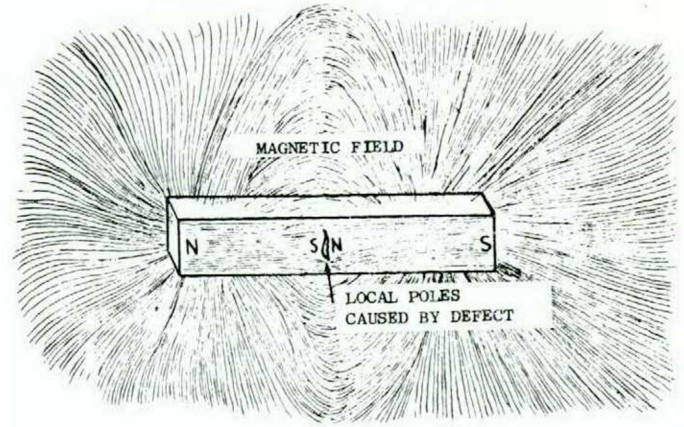
There are basically seven methods regularly used at the NDT development center and throughout the forces. The most obvious and important is still the human eyeball since not only is it used as an inspection method but also the Mark II (an advanced version of the Mark I) eyeball is necessary in interpreting the results of all other techniques.

PENETRANTS

The tendency of a liquid of low cohesion to be drawn into a crack in the surface of an object is the principle used in liquid penetrant techniques. The liquid may be either fluorescent as in the case of this Boeing main wheel which MCpl Affleck readies for inspection, or colour contrast (red on white, you will have to use your imagination) which MCpl Lipsett has utilized to reveal the otherwise undetectable cracks in a T33 undercarriage fulcrum fitting. After application of the penetrant the excess is washed from the part and a developer is applied acting as a blotter to draw the liquid from within the defect and magnifying its size.

MAGNETICS

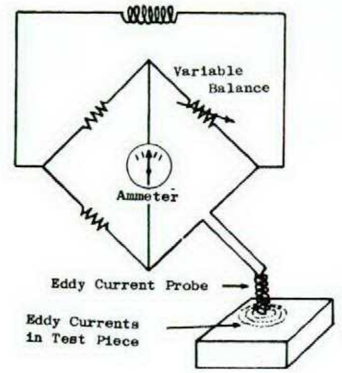
The technique of magnetic particle inspection will show defects on the surface or slightly below the surface of inspection items. The object in question, of course, must be easily magnetized. If a defect is present in such material it will produce its own north and south poles which will alter the magnetic field. If a dry ferrite powder or a liquid containing ferrite particles is applied to the magnetized part, the particles will align with the magnetic lines of force. The local poles produced by the defect will have abnormal concentrations of the ferrite material following its lines of force thus an outline of the fault will be seen. Either a fluorescent ferrite solution or a bright red ferrite powder is used to further amplify the defect.



EDDY CURRENT

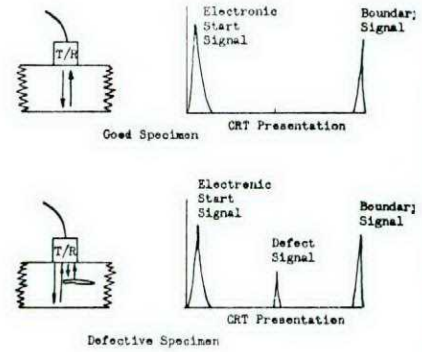
Eddy current techniques exploit the property of a metal to conduct an electric current. An AC energized coil will induce eddy currents in the material and the resistance offered to these currents by the material acts as one side of a balanced bridge circuit. A change in the material structure or conductivity caused by a defect will imbalance the bridge causing current to flow through the ammeter and giving an indication of the defect's presence.

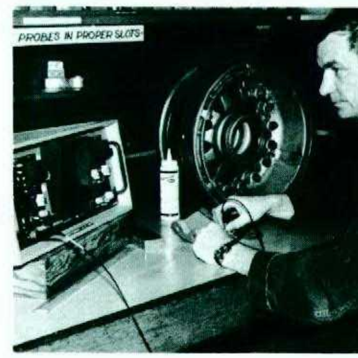
Cpl B. Hall is shown at work developing a technique to detect cracks in the main wheel of the CH124 helicopter.



ULTRASONICS

The piezo-electric principle states that if one applies a high electric potential between the faces of certain crystals, such as quartz, it will "squeak" producing ultra high frequency sound. Now if this sound is introduced into a meterial under the proper conditions and using a coupling agent, such as oil, it will travel through the material until it hits a defect or until it hits the material's other side. The sound will then be reflected from the defect back to the crystal probe, where it will be reconverted into electrical energy. By displaying these reflected pulses on a Cathode Ray Tube (CRT) a reading can be made as to the integrity of material.

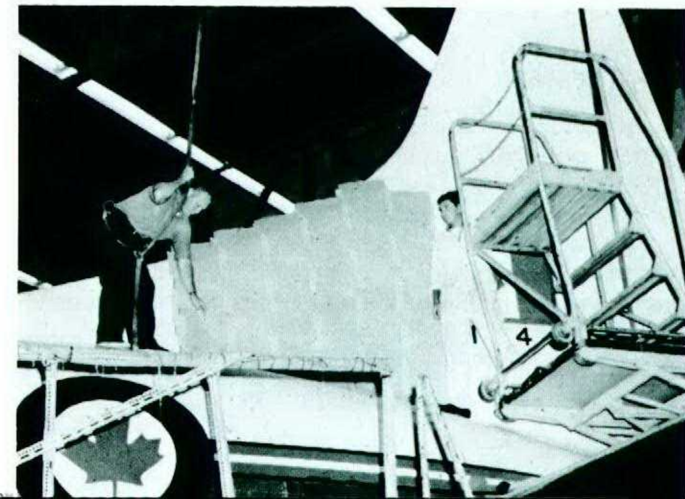


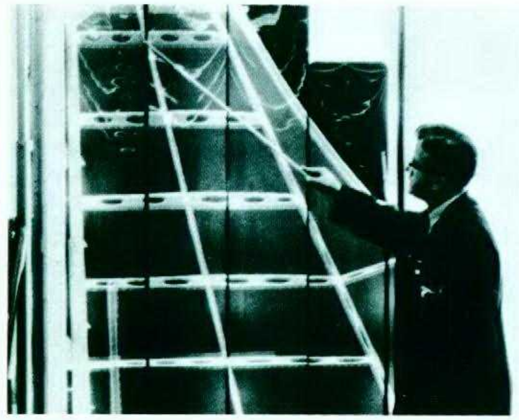


An ultrasonic inspection of a CF104 main wheel by MCpl McLeod requires the use of a test piece to calibrate the CRT presentation. The test piece is manufactured by sawing an artificial defect into a section of the wheel. The CRT is calibrated since the size and location of the saw cut are known.

RADIOGRAPHY

Depending upon the power used to generate them x-rays will pass through almost any material; however, the thicker or the more dense the material the less the x-rays will penetrate. X-rays are produced when fast-moving electrons strike a suitable target and are stopped. This braking action results in the conversion of the kinetic energy of the electrons into electromagnetic and thermal energy. The electromagnetic energy produced is of the x-ray type and a permanent record of the relative thickness or density of the object is obtained by allowing these x-rays to pass through the object and fall upon a photosensitive plate. Since a flaw will create a difference in





density, more or less x-rays will be passed resulting in a lighter or darker indication on the developed radiograph. MCpl Lipsett and MCpl Francescone are setting up the x-ray tube to shoot for side wall defects in a Boeing tire.

X-rays can also be produced using a radioactive source. AMDU's NDT Center maintains a capsule of Iridium 192 for jobs where power is not available to operate the x-ray tube and for techniques such as checking the Boeing engine for fuel nozzle guide vane deformation. The radioactive source is run down the center shaft and film is placed around the exterior of the engine.

SOAP

In any engine, transmission, or gearbox, there is always a certain amount of wearing of the contacting surfaces. The wear material is in the form of minute particles which cannot be removed by filters and remains in complete suspension in the lubricating oil. Through monitoring the amount of certain key metals present in the oil excessive wear rates can be detected and, in most cases, localized.

The SOAP lab at AMDU is equipped with an atomic absorption spectrometer to monitor wear metals from CF aircraft engines and other oil-wetted components. Here Cpl S. Choptiany is calibrating the spectrometer to measure the metallic content of an oil sample in parts per million.

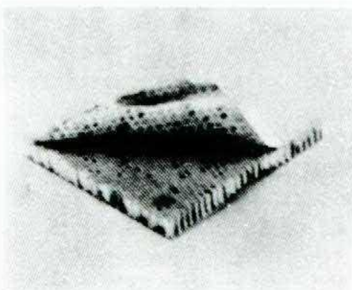
The methods and applications of NDT continue to expand but it takes time and money to improve each new technology to a point where it can be used in a cost-effective manner. As mentioned earlier the acoustic emission technique is still in use – in a more advanced form. Other additions to NDT are laser holography and thermal methods. At present we can only monitor their progress with a view to future CF applications.

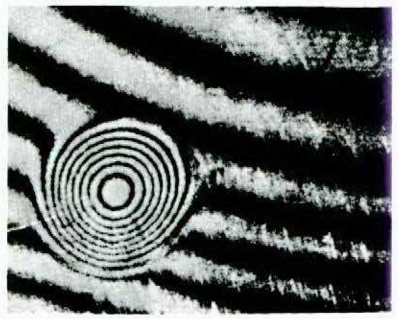
ACOUSTIC EMISSION

Acoustic emission is the term applied to "sounds" emitted by a material when it is deformed. Familiar examples are the creaking of timber when subjected to loads near failure, sounds produced by the failure of rock and "tin cry". Using sensitive transducers it is possible to detect inaudible sounds produced by deforming materials. Present studies into acoustic emission are aimed at resolving the sounds produced by the initiation and subsequent propagation of a crack. By triangulation methods the initiation site of a crack can be determined thus saving inspection of the entire structure. Continuous monitoring of structures will also lead to less frequent periodic inspections and thus less downtime.

HOLOGRAPHY

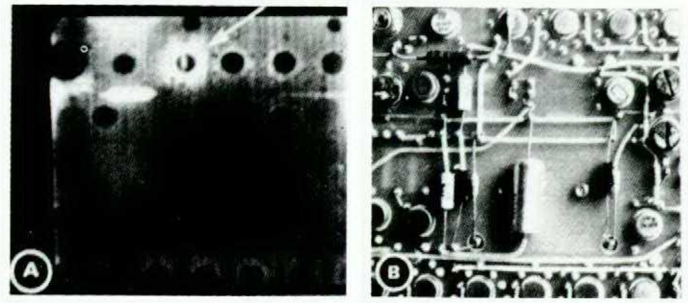
Holographic nondestructive testing (HNDT) is a relatively new NDT method which shows promise in the testing of composites and bonded structures. Holography, from the Greek "holos" meaning "the whole or entirely" is a lensless imaging process which allows the reconstruction of three-dimensional images. A comparison of two states (i.e. stressed and unstressed) of the object provides information as to the structural integrity of the system. The initial state is "frozen" onto the holographic plate, then by slightly stressing the object and superimposing the image of the object and the stressed object, a series of fringes appear. The shape or pattern of these fringes depends on the structural parameters thus a defect can be discerned as an irregularity in the fringe pattern. The fringe pattern caused by an unbonded area in a laminate structure is shown in the photograph.





THERMAL NDT

Infrared technology is finding uses in NDT, since it is known that defects in materials produce temperature gradients. These differences in the rate of heating or cooling can be detected by infrared camera systems or heat sensitive coatings. Discontinuities in bonded honeycomb structure would be evident because of their abnormal temperatures gradients. Infrared technology would provide a thermal map of the inspection item showing both defect size and location.



There is a philosophy in the field of aircraft maintenance that has been adopted as a goal to attain and it goes something like: "to satisfy the maintenance function on aircraft and aircraft systems it is essential to inspect before the fact. It is not enough to wait for symptoms before starting to look for problems. Faults must be found and corrected before reaching a point when they can be detected by the unaided human senses. The most modern technology available must be applied to the day to day maintenance of aircraft and systems". Although the goal has not yet been fully achieved the techniques of Non Destructive Testing are being directed toward that end. NDT technology is on the upswing since in this world of cost-effective B.R.I.A.M., something that provides effectiveness with less expense is snapped onto and pursued to its limit.

We haven't yet seen the limit of NDT, it seems in fact we have barely scratched the surface (no pun intended).

* A new Flight Safety poster series.

* Why? Because many of the items that fit into the back end or cargo bay of a transport aircraft or helicopter can become a hazard to the safety of crew, passengers and aircraft.

  * And! Violations of the safety requirements for airlift of vehicles and cargo are frequent – mostly because the personnel along the transportation chain who ship or carry by air overlook the special needs of flight.

* What? "Tiedowns" will illustrate some of the safety aspects of air shipment.

  * Who? The message is aimed at all personnel along the airlift chain. The posters will be useful for aircraft crews; AMU, MAMS and TAMS teams; Depot and Base Transportation and Supply organizations; Transportation technician training schools and flying squadrons.

* Ideas will come initially from Flight Safety reported occurrences. In the main the ideas must come from *you* – the people most closely involved in air cargo airlift. Let DFS know what you want illustrated.

  * Distribution will be via the Flight Safety Officer's monthly kit.

Cbs and Cirrus

I don't think I've ever gotten a summertime weather briefing without getting an accompanying warning of thunderstorm activity somewhere, and I never hear the warning without thinking, jokingly, "Okay, if you're going to forecast hazardous weather conditions, en route, I'm just gonna sit here 'til things get better! "

Oh, we'll sit down for severe squall lines, tornadoes, and the like. But for average everyday thunderstorms? No way, unless there isn't a way to avoid them. We flight plan around the few that are almost always present. Every once in a while, one of those average everyday thunderstorms jumps up and bites somebody. Usually the scenario calls for a forecast of isolated to few thunderstorms. En route, the pilots encounter haze, cirrus or some other obstruction to forward visibility and then they exhibit a pollyanna-like trust in the ability of ATC radar to keep out of trouble. Here's a good example from last summer.

The flight was conducted on an IFR stopover flight plan from Webb to Buckley with a refueling stop at Amarillo. At Webb, en route data indicated no clouds at planned cruise altitude (FL 220) between Amarillo and Buckley. The forecast called for few (3-15 percent) thunderstorms en route and isolated (1-2 percent) thunderstorms in the Colorado area. The pilots also received a military weather advisory calling for thunderstorms in the Pueblo area with max instantaneous coverage two percent, total area affected 15 percent, quarter-inch hail, and max tops to 44,000 feet.

The pilots updated their weather with Amarillo flight service, where the briefing indicated improving conditions in the Buckley area.

On their way after the refueling stop at Amarillo and back at FL 220, the pilots entered the tops of a broken, thin cirrus layer which allowed vertical visibility, but restricted horizontal visibility. They called Colorado Springs Metro for a weather check and were advised of a thunderstorm reported on radar south of Pueblo moving Southeast.

Their route appeared to be taking them between two buildups – they could see them through occasional breaks in the cirrus. Denver Center reported an area of weather showing on their traffic control radar on either side of the route being flown.

Just southeast of Pueblo, they entered heavy rain followed almost immediately by hail. They were in the hail only about five seconds, since the world's quickest 180 degree turn brought them into visual conditions. But even the world's quickest 180 didn't prevent a broken windshield, several anxious moments and an emergency recovery at Peterson. (The recovery was complicated by wind and water entering the cockpit, and also by a temporary loss of communication – both within the cockpit and with ground stations. Both crewmembers had their visors down when they encountered the hail.)

Remember now, that's just a sample – and compared to some, our sample had a relatively happy ending. I doubt that anyone knows how many times, even in recent years, that scenario has been played.

But I do know that it doesn't have to happen to me and it doesn't have to happen to you! One of the least painful ways to learn a lesson is by profiting from others' experiences – and by "learn" I mean to understand the lesson and alter behavior as a result. As I see it, this lesson has three parts:

- If you can't see, you can't avoid. Pressing on through a cirrus layer which obstructs visibility, in an area of known thunderstorm activity, without weather radar, are the most common elements, and they happen over and over, summer after summer. In the case above, a possible preventive action could have been a descent to an altitude below the cirrus deck.

- Weather forecasting is not a precise science. We continue to behave as though it were, but it just ain't so. The forecaster can forecast trends remarkably well – that is, if such and such occurs, so and so is likely to follow. But there are too many variables to expect 100 percent accuracy.

- Finally, ARTCC radar is not set up to paint weather returns. If requested, and if it's set right, they can tell you about the most violent activity, the areas of heavy precipitation. But they can't see it all, and there's been many a pilot who's been lulled into a false sense of security because he didn't realize this. Here's one case where what you don't know can really put a dent in you.

This summer somebody will drone along in cirrus, a good forecast tucked in his pocket, chatting with ARTCC – and run smack into hostile conditions.

It's not going to be me. How about you?

courtesy Mark Hunter,
USAF *Aerospace Safety*

ROTORWASH

Fuel Cache

...checking for contamination

A CH135 was refuelled from a cache of fuel drums. No. 1 engine started normally with all instruments in the green except for the fuel quantity gauge which was indicating incorrectly. As the pilot looked up to check the circuit breakers, the engine stopped. Cause: fuel contamination. Investigation revealed that the first three of five drums were checked for water contamination and used to fill the auxiliary fuel tank but the last two drums were not checked and were used for the main tanks. One of these drums must have contained water.

The incident referred to above could easily have been an accident if the helicopter had been airborne before the engine failure. This prompts the question: What are your procedures for refuelling from drums? Do *you* always check for water contamination?

Supply Directive 3-73, 8 Nov 73, defines a reserve fuel point as an *"NDHQ authorized holding of aircraft fuel pre-positioned in isolated or remote locations and designated primarily for use by the CF".*

Staff instructions to custodians of these sites state--*"the desirable method of stockpiling is to have the drums standing on end, slightly tilted with the head facing up. The bungs should be located at the 9 and 3 o'clock positions when viewed from the low side of the tilt. If the above is not possible, the drums may be stacked on their side not more than three drums high, with the bungs positioned at 9 and 3 o'clock i.e., parallel to the ground."*

Standard dye colours are used for visual identification in the field. Listed here are the colours of the fuel to be found in the CF reserve fuel points. In no case is the colour alone to be taken as positive proof of grade.

Engineering Order 45-5A-2C basically covers the precautions and procedures to be used when refuelling from drums and caches. To check for water the following should be used:

1. Water finding paste NSW 6850-21-106-6834
2. Water detection kit which includes:
   Syringe – NSW 6640-21-809-4599
   Capsule – NDN 6640-21-809-7133
   Colour intensity card – NDN 6640-21-813-1636

The above mentioned items may be obtained by routine supply requisition action. The following has been submitted as an amendment to EO 45-5A-2C.

Aviation Fuels Handling

Regardless ct the method used to transfer the fuel from drums to the aircraft, a water detection test is to be carried out as follows:

Turbine Fuels – by using the Shell water detection kit in accordance with EO 00-50-21 or with water finding paste in accordance with the directions found on the container.

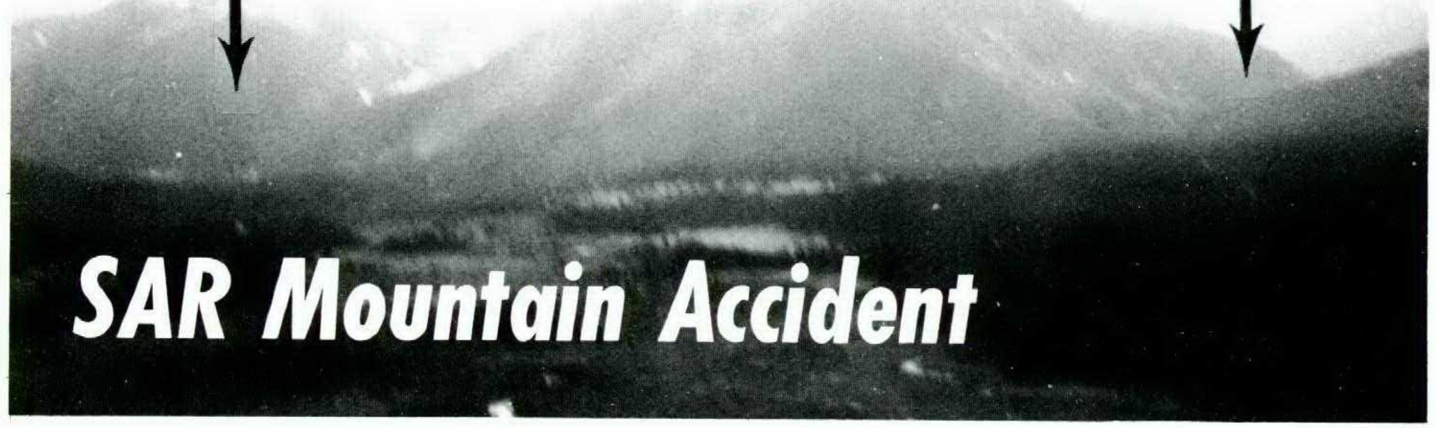
Aviation Fuel – by using water finding paste in accordance with directions found on the container.

The kits are available, are you using them!

NATO STOCK NUMBER	NOMENCLATURE	FUEL COLOUR	DRUM COLOUR
9130-11-000-2000	Avgas 80/87	light red	red, white top and black markings
9130-11-000-2003	Avgas 100/130	green	red, white top, red markings
9130-11-000-2004	Avgas 115/145	purple	all red, white markings
9130-11-000-2007	Avtur JP4	straw	blue, white top & centre band, red markings or red white top, blue centre band, and red markings
	Avtur JP5		blue, white top, yellow centre band, blue markings

entrance of valley leading to crash site.

entrance to Telkwa Pass.



SAR Mountain Accident

On 18 Sep last year a Stinson 108 went missing between Quesnel and Terrace B.C. The SAR operation, with the Searchmaster's headquarters established in Prince George, was offered the services of a CAF Tracker aircraft, which was one of three on detachment at Pat Bay. The Tracker was on a routine coastal patrol and after refuelling at Sandspit took off to search its assigned area – a track crawl commencing at Terrace, up the highway via Hazleton to Smithers and back to Terrace via the preferred VFR route. (The preferred VFR route between Smithers and Terrace follows the Telkwa River to Telkwa Pass, through the Pass then along the Zymoetz and Skeena Rivers to Terrace.)

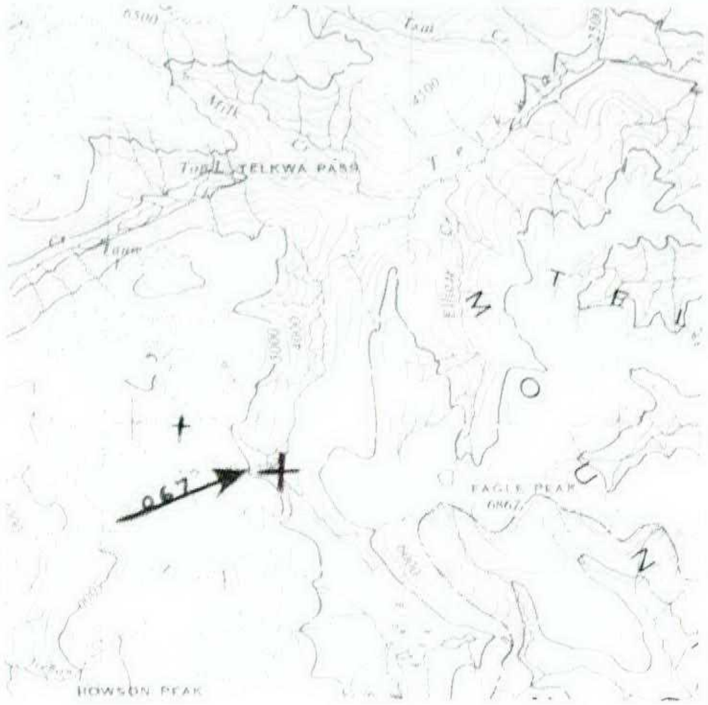
The Tracker was observed searching along the Skeena River and the aircraft later reported that the weather was deteriorating in the vicinity of New Hazleton and that he was departing the area. The next and last report from the Tracker positioned him five miles south of Smithers where the reported weather was 500 scattered, estimated 3000 broken, 8500 broken, twelve miles.

The Tracker was never heard from again. A full scale search was initiated and a Board of Inquiry convened. Seven days later, on Sep 28, the wreckage was discovered at the 3600 ft level on the side of Howson Peak, a 9050 ft mountain, 34 miles from the Smithers airport. All four crewmembers were killed in the crash.

The Board of Inquiry members conducted an on site technical investigation which failed to reveal any aircraft/engine malfunction which could have caused or contributed to the accident. From the evidence available, however, the Board was able to reconstruct the most probable sequence of events which culminated in the tragic loss of this aircraft and its crew.

Variations in weather conditions over short distances in the mountains are a common source of hazard to aviators. It is therefore impossible to state with certainty what the exact weather was in the valley where the crash occurred. It is assumed, however, that as the aircraft cleared the New Hazleton area improving weather conditions were encountered which permitted a detailed, time-consuming search. When the aircraft reported by Smithers he expressed no concern about the weather nor did he state that he was not able to continue his search. (The Tracker had travelled only 45 miles in 47 minutes when the Smithers position report was made.)

From Smithers to Terrace the Tracker had flight planned and later reported his intention of searching the preferred VFR route. He therefore followed the Telkwa River valley towards the Pass which is located about midway between Smithers and Terrace. Approaching this area from the east the



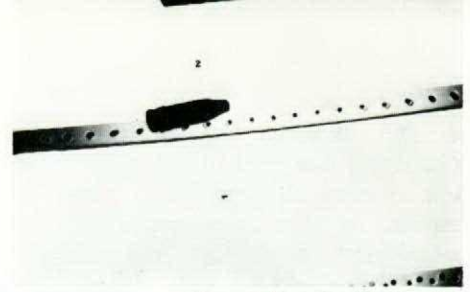
Pass can be difficult to find – especially if the weather is down. Just short of the entrance the river enters a wide valley which bends towards the south. At this point the entrance to Telkwa Pass is a narrow opening set at a level higher than the floor of the valley. In poor weather it is possible for the river valley and the Pass to be open but for the entrance of the Pass to be concealed by cloud. For whatever reason, the Tracker did not fly into the Pass but continued in a southerly direction, following the Telkwa River valley. Shortly after entering this valley the floor begins to ascend and the walls narrow between two peaks. It is most likely that the Tracker favoured the western side either seeking the Telkwa Pass or carrying on his search. As the aircraft followed the contours of the valley it would be naturally forced into a left turn. In an attempt to maintain, or perhaps regain visual flight conditions, the aircraft turned and crashed into the eastern side of the valley.

Over the years the mountains of B.C. have become the final resting place for many aircraft, both civilian and military. The SAR role provides much satisfaction in terms of helping others and perhaps saving lives but it is a role which demands a great deal from everyone concerned; in particular from the aircrew.

GEN FROM 210

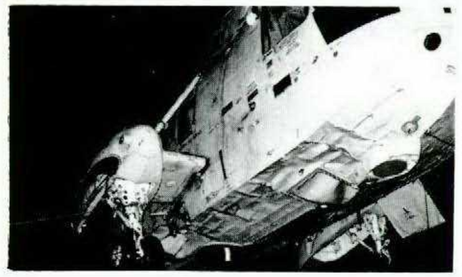
CF104, RICOCHET A Starfighter returned from a range armament mission which had included two strafing passes. After shutdown the ground crew found evidence of damage to the port intake and the subsequent investigation determined that a projectile had creased the left side of the fuselage above the gun inspection door and then hit the inboard leading edge of the left intake. The projectile then continued into the intake for approximately 12 inches and entered the skin on the outboard side of the intake, finally lodging itself between the two layers of skin.

The projectile was recovered and identified as a 20mm target practice round. The dormant round had been lying on the range and had been struck by an active round fired from the CF104. The round was propelled into the flight path of the aircraft, resulting in the ricochet strike.



X-ray of projectile in situ.

DGAO/NDHQ is presently conducting a study on all aspects of CF104 and CF5 strafing with the aim of establishing standardized procedures that strike the best balance between operational effectiveness and safety.



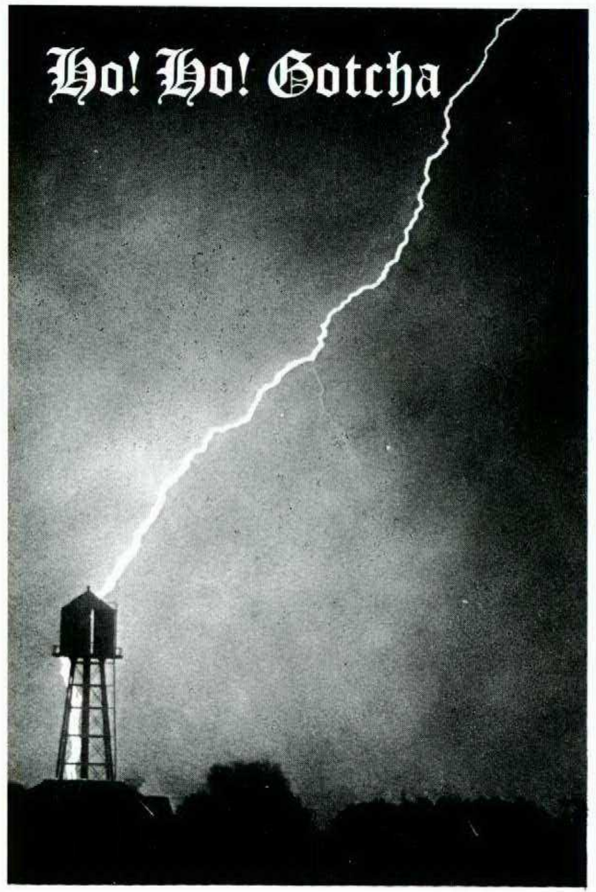
SEA KING, SINKS The Sea King was on a training exercise and established in a forty foot hover when the crew heard a noise followed immediately by a settling of the aicraft. The co-pilot could not overcome the uncontrollable down motion of the collective although all other controls/indications were normal. The helicopter settled on the water, rolled to the left and sank rapidly. The crew evacuated the aircraft and were later rescued by helicopter.

The recovery of the aircraft wreckage was made possible by use of the Pisces submersible and a thorough technical investigation determined that:

a. no control failure or malfunction was evident; and
b. the right hand engine failed in the hover and was producing little or no power prior to impact.

During a previous engine overhaul/repair, the contractor inadvertently installed an undersized static seal. This precipitated No. 2 bearing disintegration, contaminated the lubrication system and caused the engine to fail in flight.

The pilot failed to recognize a single engine emergency and did not take the proper corrective action to accomplish a safe water landing. The collective was inadvertently and/or unwittingly lowered to the fully down position.



Murphied Messages

"1. Ref A omitted Reference C. Below Ref B of Ref A please insert Quote Ref C.
2. In para 3 line 4 of Ref A please delete Quote Reference A Unquote and substitute quote Annex A to Reference C Unquote.
3. Inconvenience regretted"

"Cabin pressurization failure. During takeoff, cockpit seemed nosier than normal".

"Fluctuations were plus or minus 2.0 per cent and worsening. Engine shot down during landing roll with RPM indicating 97 per cent".

"Investigation revealed that one wire was broken at the gear downlock switch. This wire was resoldered and numerous restrictions carried out serviceable".

"A noise was reported in the ASW and tactical compartments similar to a quote helicopter shkuagy puneyaroaapt cylinder, No. 1 engine breaking down".

"Charges against a 2 year old army helicopter mechanic".

"As a result of SI-136, a batch of 40 volts were sent to NDT and 37 of them were found to be cracked".

Cockpit Smoke

plane poison

LCol R. Fassold
NDHQ/DPM

The hazards from smoking have been well publicized in recent years and as it says on the cigarette (but not cigar or pipe tobacco) package, the "danger to health increases with amount smoked". These warnings are based primarily on the correlation between cigarette smoking and the occurrence of certain respiratory diseases. There is, in addition, an often overlooked but potentially serious flight safety hazard when *aircrew* smoke too much. The culprit here is *carbon monoxide poisoning.* The incomplete combustion of any organic material, including tobacco, produces carbon monoxide (CO). We are aware from newspaper items that carbon monoxide poisoning from engine exhausts can be fatal, but we rarely give much thought to the effects of CO produced by burning tobacco. By volume up to 2.5% of cigarette smoke and up to 8% of cigar smoke is CO. This gas can be absorbed by the body through inhalation of the smoke directly or indirectly. By direct inhalation we mean by the smoker when he inhales a drag from his cigarette, cigar or pipe. By indirect inhalation we mean the breathing-in of tobacco smoke from the environment by other smokers or by *non-smokers.* In a confined space (e.g. an aircraft cockpit) tobacco smoke can produce a high concentration of CO in the air. Following a recent CF helicopter incident it was demonstrated that, with two pilots smoking, the CO concentration of the cockpit air was as high as 100 parts per million (ppm). Breathing cockpit air with a concentration of CO of over 50 ppm may be hazardous for aircrew as will be seen below.

Why is breathing CO dangerous? It is not so much the CO itself that is the problem, but rather the deficiency of oxygen which it causes. We know the oxygen O_2 is an essential element for life, with the brain and eyes (prerequisites for aircrew!) being the most sensitive to any O_2 deficiency. Oxygen is transported to wherever it is needed in the body by the hemoglobin (Hgb) in the blood. Hgb unfortunately has an affinity for CO of over 200 times that for O_2. That means that if CO is inhaled, the Hgb will combine with it rather than with O_2 and the blood then cannot carry enough O_2. Also the Hgb releases the CO very reluctantly and, therefore, even if no more is inhaled, this Hgb is not available to carry O_2 for a significant period of time. It is estimated that it takes six hours for the blood to release *one half* of the CO it has taken up. Consequently, there can be significant amounts in the blood even 24 hours after very heavy smoking. To complicate the situation further the presence of CO interferes with the delivery to the tissues of whatever O_2 is available in the blood. Carbon monoxide poisoning then is really a form of hypoxia and can have a marked effect on performance of aircrew, particularly at altitude.

We should here define another term we will use, and that is **physiological altitude.** This is really a term used to describe the oxygenation status of the blood. A healthy individual with the proper amount of normal hemoglobin, breathing uncontaminated air and who is at a true altitude of 10,000 feet will also be at a physiological altitude of 10,000 feet. However, if for some reason, i.e., CO poisoning, the individual's blood has an impaired oxygen carrying capability, his physiological altitude will be higher than his true altitude. In the case cited above a *non-smoker* breathing air containing 50 ppm of CO would, at 6,000 feet true altitude, be at a physiological altitude of 12,000 feet. The smoker would be at an even higher physiological altitude.

How much CO is too much? The combination of CO and Hgb is called carboxyhemoglobin (CO Hgb) and the amount of CO absorbed is usually expressed as percent CO Hgb, i.e., the percentage of the total blood Hgb that is in the form of CO Hgb. Night vision is the first thing affected by oxygen lack and this occurs with a CO Hgb level of about 3%. Headaches, nausea and other systems of CO poisoning may not occur until about the 20% level. One cigarette can produce a CO Hgb level of about 2% and smoking cigarettes for several hours a level of 10% or higher. Cigars and pipes can produce even higher levels. A 10% CO Hgb level at sea-level puts the individual at a physiological altitude of 12,000 feet. Or, expressed another way, *one cigarette* at sea-level can put the eye at a physiological altitude of 8,000 feet (where night vision is significantly impaired). To make matters worse, the hypoxia resulting from CO poisoning and from true altitude are additive. A pilot flying a non-pressurized aircraft at an altitude of 10,000 feet and who has been smoking enough to have a CO Hgb level of 10% is at a physiological altitude of 15,000 feet and a potential hazard to flight safety!

Besides the CO from smoking, the nicotine also has deleterious effects. Nicotine absorbed from smoking tobacco can do the following – further impair vision; impair an important part of the nervous system and thereby increase susceptibility to stress; increase the metabolic rate and therefore the O_2 requirement by 10-15%; and increase the pulse rate and blood pressure and cause the heart to work harder (more frequent contractions against a greater pressure). Smoking can also increase hand tremor and fatigue; have adverse effects on the digestive tract; and irritate the upper respiratory tract rendering the individual more suspectible to barotrauma.

Ideally, pilots should be abstainers from alcohol and non-smokers. It has been rumoured, however, that there are some pilots in the Canadian Forces who still smoke. In view of the well-documented effects from smoking, even the most sceptical of us should concede that, *especially for night flights,* the safety conscious pilot should not be a heavy smoker; should cut down on his smoking in the hours before flight, and should not smoke during the flight. Tobacco sold to aircrew should probably carry a warning on the package – "the hazard to flight safety increases with amount smoked".

GOOD SHOW

Lt G.C. Chute and MCpl D.E. Bews

LT G.C. CHUTE AND MCPL D.E. BEWS

Lt Chute, the duty terminal controller at Comox RATCON, was advised by the Control Tower that a Cessna 150 on a VFR flight from Victoria to Campbell River was unsure of his position and was requesting assistance. Radio contact with the aircraft was established by Lt Chute and the obviously distressed pilot stated that he believed his position to be between Comox and Campbell River and that he was flying between cloud layers at 1000 ft. He also stated that he had a total of 50 hrs flying experience and that he was unfamiliar with IFR procedures.

Utilizing radar together with VHF/ADF readings, Lt Chute located a weak and intermittent target 8 nm west of Comox which he radar identified as the distressed aircraft. At this point in time the aircraft was overflying a range of hills and was within 2 nm of a 1900 ft hill. The aircraft was given climb instructions and immediately vectored away from the high ground.

Vectors were then provided to direct the aircraft on a flight path which would cross the approach corridor of the runway in use in the hope that the aircraft could establish visual contact with the sequenced flashing strobe approach lights. When visual contact with the approach lights was not established the aircraft was given the option of accepting radar vectors to an airfield 20 nm from Comox where VFR weather prevailed, or radar vectors to a PAR approach at Comox. When the pilot elected to attempt a landing at Comox, MCpl Bews, the duty radar controller assumed control of the aircraft.

Recognizing a lack of experience on the part of the pilot, MCpl Bews, using layman's language, gave the pilot a thorough briefing on PAR procedures. In order to instill confidence in the pilot, MCpl Bews planned an approach which would avoid all but simple maneouvering of the aircraft. Further assurance was afforded the pilot through the use of clear, concise and easily understood control instructions. This astute manner of control enabled a novice pilot to complete an unfamiliar approach in unfavourable weather conditions. Weather at the time of recovery was at limits.

The alertness of Lt Chute and MCpl Bews and their professional response to an emergency situation assured the safe recovery of an aircraft in distress.

Comments to the editor

ROTORWASH RAPPED

While the Rotorwash series published in Flight Comment are valuable with our enlarged helicopter fleet I feel that for them to be of benefit they must be researched in detail and accurate in every way. This has generally been the case however, the March-April 1974 article missed the boat in four areas:

(a) Height velocity diagrams are computed and then actually flown by test pilots. When the test pilot initiates the throttle chop he delays lowering the collective for up to 3 seconds. This results in a rotor decay that must be recovered if a successful landing is to be carried out.

(b) Area B of your H/V diagram should be avoided primarily because if a power loss occurs in this area the aircraft will make ground contact before the pilot realizes he has had a power loss. This is decidedly different from the case of a practice low level forced landing where the pilot initiates the throttle chop himself.

(c) H/V diagrams shown in AOI s are usually for a specific weight and density altitude (not always the worst case).

(d) Most twin engine helicopters only have H/V curves for double engine failure. This leads aircrew to believe that they are reasonably safe when operating in the avoid areas of the H/V diagram because the chances of a double engine failure are minimal.

Capt A. Cooper
422 Sqn
CFB Gagetown

On receipt of your letter we rushed off and checked our hand-tooled, leatherbound, gold leaf embossed copy of Mar-Apr Flight Comment and we do not agree that our Rotorwash article "missed the boat".

First of all, let us say that we do not raise issue with your remarks in para (a). Rotorwash simply stated that the determination of the curves is done by the manufacturer – and we still feel that the performance of a company test pilot proving the "dead man's curve" will be superior to that of the average line driver.

We do not agree with your statement in para (b). Although some pilots might hit the ground before recognizing an engine failure most would probably be alerted by RPM warning systems, changes in noise levels, yaw or just that sinking feeling. We maintain that area B is depicted for the reasons we gave.

Your para (c) is additional information which we think most pilots would already be aware of.

Finally, we are not convinced that twin engine aircrew believe they are reasonably safe operating in the avoid areas of the H/V curve. For example, rapelling or hoisting briefings always contain a reference to the action in the event of an engine failure – even though twin engined aircraft are used. This would indicate that aircrew are sensitive to H/V problems no matter what type of helicopter is involved.

(Ed Note: It is gratifying to know that at least some parts of the magazine are being scrutinized. We get letters. All we need now are some articles from the field – and we don't even demand that they be "researched in detail and accurate in every way". Just send us your views.)

DANGEROUS CARGO

I was more than pleased to see an article on dangerous cargo in your March/April issue. However, I would like to clarify the answer to your question: "What are the dangerous articles you may have in your baggage? Reservoir lighters, "strike anywhere" matches, aerosol cans and photoflash bulbs are among the objects that qualify".

These are all dangerous! Aerosol cans, however, are the only articles of the group mentioned which you may have in your CABIN BAGGAGE only – and they must not be used in flight. "Strike anywhere" matches, photoflash bulbs and lighters that have fuel reservoirs where the fuel is visible through a plastic case; the catalytic type which burst into a flame when the cap is removed and the throw away type (Cricket) which, when ignited in a decreased pressure environment, give off a torch-like flame, are prohibited and shall not be carried on board service aircraft in baggage or on person.

Sgt J.J. Emond
SOAM 2-4-2
ATC HQ
CFB Trenton

Our "may" in March seems to have created something of a maya and Sgt Emond is congratulated for rescuing us from the ambivalent alleyways of ambiguity. The "may" in our question "What are the dangerous articles you may have in your baggage?" referred to the ***possibility*** *of passengers carrying dangerous articles. We did not intend our "may" to be interpreted in the sense of* ***permissible.*** *However, Sgt Emond's point is well taken and those responsible for this lack of clarity have been suitably punished. The author, Maj Davidson, has been promoted to LCol and posted. The editor will be rapped on the knuckles every morning for a month with a bunch of blue pencils.*

secondary growth

The BCEO was advised that second growth control in this area solved only part of the problem. Then bushes must be cut and removed as dead stubs are more dangerous than live ones as far as flying is concerned.

The Flight Safety Committee

BIRD WATCHERS' CORNER

WEATHER WATCHING WAGTAIL

Every flying base has a special nesting area set aside for weather-watching-wagtails. This unique species spends all its time, weather-eye cocked, searching the sky for the signs and symptoms of approaching systems. The wagtail family exchange information every hour and thus are able to brief other flying birds on met conditions everywhere. Some fliers choose to disregard the wise warnings of the wagtail—a fateful and sometimes fatal decision. Others are reluctant to trust in his prophecies and rely solely on their own judgement—another foolhardy move. Those birds who complain about the wagtail's words are usually the ones who never bother to transmit Pireps. Without airborne avian assistance in the form of Pireps the wagtail continues to warble wistfully:

HAIL-RAIN-OR-SNOW-I'M-THE-LAST-ONE-TO-KNOW

Don't forget to pull the plug!