FLIGHT COMMENT

SEPTEMBER • OCTOBER
1971

The Devil at Six O'Clock - page 2

Comments

A couple of years ago at Cape Kennedy, three automobiles were engulfed by flames and destroyed while driving through an area that had become oxygen-enriched after a liquid oxygen tank ruptured. That accident should serve as a grim reminder to aviation personnel of the inherent dangers associated with oxygen and its handling.

A BATCO recently advised the Flight Safety Committee that on two occasions the fire hall had responded to fuel spills on the hangar line without informing the tower as to the nature of the emergency. Consequently during the wash down procedure a couple of aircraft had taxied through the area.

Aircraft limitations are not targets which should be aimed for and if possible surpassed. They are what they say they are — limits which should not be exceeded. The results of going over the top are not restricted to a few popped rivets or a slight rippling of the aircraft skin. They can be fatal. — Wing Commander Spry, Air Clues

The Flight Safety Committee minutes for the cold weather period last winter testified to numerous flying clothing delays and shortages. This perennial nuisance seems to stem from either end of the pipeline. Your job is to give the system time enough to respond to requests; the "other end" might well look into the condition that has apparently confounded military supply experts since at least, the Crimean War.

CANADIAN FORCES HEADQUARTERS — DIRECTORATE OF FLIGHT SAFETY

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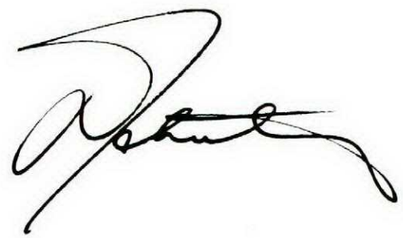
That Guilty Feeling

It is said that one's conscience never prevents anyone from doing anything, it just makes them feel badly afterwards. To escape this remorse, or that guilty feeling, we rationalize our mistakes and negligence through a complicated psychological process which allows us to maintain a favorable opinion of ourselves.

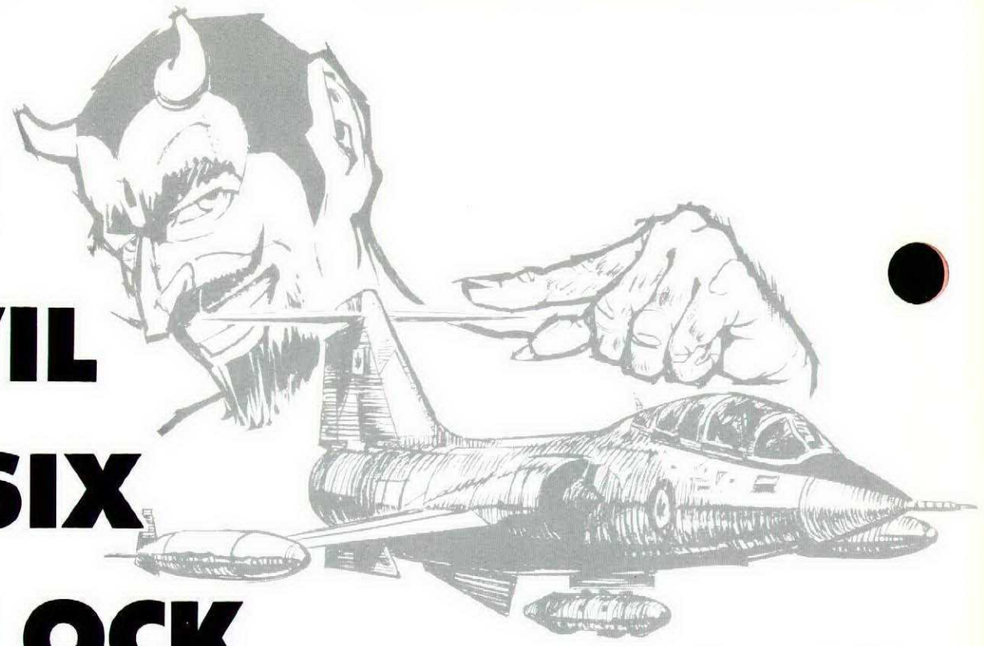
However satisfactory this process may be in restoring one's self image, we in the accident prevention business see all too often how a momentary negligence of the most common sort can prove a great deal more costly than its original significance would have indicated. Moreover, it is possible that we have made these minor mistakes and rationalized them so many times that we no longer consider them as mistakes, and consequently have no feeling of guilt. Forgetting a small detail because everyone else does, or ignoring our responsibilities because of a shortage of time, money, personnel, or whatever the excuse, is not acceptable. The penalties are too great.

It is important therefore, that we in the business of operating aircraft continuously examine what we are expected to do and what we are actually doing and never forget that there is no substitute for thoroughness.



COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

THE DEVIL AT SIX O'CLOCK



Capt J. D. Williams
417 OTS
Cold Lake

A new term and a new philosophy has captured the hearts of motor vehicle operators the world over in the past few years. The term, "Defensive Driving." The idea is great — it saves lives and preserves vehicles. Has no one ever thought of "Defensive Flying?"

We who fly might justly be accused of having some sort of phobia about the whole concept of safety. We know within ourselves that our way of life has its inherent dangers, but the old image of the "tiger" lingers in our minds from a bygone day, and what "tiger" ever worried about safety?

Well let's get just a little practical. We in the Canadian Forces will probably be working on a fixed budget for some years to come. The budget means in essence, that there will be no replacements forthcoming for seriously damaged or destroyed aircraft, and that in turn means fewer cockpits for all of us, tigers or otherwise, to fill. Now it's all fine and dandy for us to demonstrate the "aggressiveness" which all of us were taught to display as student pilots, but if that aggressiveness loses airplanes, then it seems to me that we are defeating our own purposes. The very term "aggressiveness" to me suggests that there is somewhere at least an "enemy." True enough. There is an enemy, an enemy to be fought at every opportunity, an enemy in the presence of whom it would pay us to be "defensive." WE, OURSELVES, ARE THAT ENEMY.

How many friends have you lost since you started military flying? If you've been at it for five years I'll bet that five guys you knew quite well have dug themselves smoking black holes in the ground, and if I'm wrong it's probably because my estimate was on the low side.

How many of those friends were shot down by enemy aircraft or by anti-aircraft fire? How many dies in actio[n] a combat theatre? Within our own forces the answer is obvious — none — yet they died nonetheless and nothing is going to bring them back, and the aluminum they rode in is good now only for pots and pans — if it was left in big enough pieces to justify picking up and melting down.

"The devil makes me do this" is a well understood excuse in all of our lives. Let me cite just a few examples of what I'm talking about and see if maybe they don't ring a bell.

An aircraft took off for a weekend jolly. Less than an hour later it was scrap aluminum in a farmer's field, two pilots were dead, and a lot of questions led to the not very satisfactory conclusion that the pressonitis had claimed two more victims. Chalk one up for the devil at six.

A T-Bird took off to have its picture taken. An unplanned loop with a ton or more of unthought-of fuel on board made the recovery a little low — a foot or so low, it seemed to those of us who were watching — not much, but more than enough to kill the driver. Another kill for the devil at six.

A real hot driver in a real hot high level bird impressed some icefishermen and probably himself and his navig[ator] also. We can't be sure about the crew, because the dev[il] six got to them before we did.

At least two drivers tried 180° turns after a power loss at low level in an attempt to reach a runway. Neither made it. Instructors since time immemorial have preached against this graveyard turn. The devil made them do it.

A young instructor drove into the ground on a low level nav trip, after much more experienced flyers had either punched up or turned around. He wasn't watching his six o'clock and the devil got another kill. If you haven't noticed, that makes the devil way more than an ace, and if I sound bitter it's because all of the guys mentioned were friends of mine, and there are more I could name.

"Hindsight" you may well say, "is noted for being 20/20." You'll get no argument from me on that count, but let's really be honest. How many of us know of at least one guy [who] is "an accident waiting for a place to happen?" I think [most] of us do, and if and when that accident actually does happen we'll sit around piously and roll our eyes and tell each other about poor Joe Blow's near accidents which finally culminated in the real one. Each of us will have had a hand in Joe's execution.

Why don't we prevent these accidents? Because pride goeth not until *after* the fall, in actual fact, and none of us wishes to destroy the pride of a fellow aviator. We'd rather defend his pride and let him kill himself — or perhaps kill us. We're the devil's wingmen.

I'm not saying that we should in some way "inform" on the guy, I'm saying that we should "inform the guy himself." Often I think that's all that would be needed. A short, serious talk, a little advice, and a lot of our problems could be prevented. Most of us are a little beyond the kindergarten stage. Sure we err, sometimes accidentally, sometimes purposely. Most of us, and I certainly include myself in this category, err, get "the word", and go forth presumably to "sin no more." We are the lucky ones; the unfortunate ones never get "the word" whether because everyone else is too "nice" to give it to them, or because their first big mistake is also their last. I suggest that "Flying Defensively" might [well] start on the ground when we're all on the war story [swing] kick. Some war stories indicate accident potential. [They] should be interrupted by a little well-directed preaching. "Unusual attitudes" don't always involve aircraft in wierd positions. Sometimes they are symptoms of forthcoming problems with pilots. Sometimes a pilot with a bad habit or two needs further instruction; sometimes such a pilot shouldn't even be flying. The only thing that can be said for certain is that doing nothing is not going to help. Talk defensively, the life you save may be your own.

In much the same way of thinking we could "Fly Defensively" through re-examining some of our time-honoured techniques. Two examples come to mind in the realm of formation flying alone: First of all the "joinup". All of us have seen some pretty near things in this phase of flight. Why? Because someone a long time ago decreed that it's more "professional" to zorch into position than to slide in nice and gently. That someone, probably long since dead, really put the ole devil in our six. Sure if you're very current you can get in quickly, but if you're a little rusty, do you have the guts to admit it and take your time? I doubt it in most cases, but what is more important, will someone please tell me what the rush is in the first place?

Secondly comes the question of formation instrument [flying]. We do them because it's a good way to get a lot [of] aircraft on the ground in a short time, and because we might someday lose our electics and have to get led down through the murk. The problem is that right from square one we don't get enough training and practice to be really proficient — and once again the devil's in firing position.

We do these things, and a lot more like them because we believe in the concept of aggressiveness. I could go on naming examples until the cows come home, but the point is that we're barking up the wrong tree. Aggressiveness in the best military sense of the word is an eagerness to do battle with the enemy. It isn't measured by how quickly you join up in peacetime formation (within reason) nor by what lousy weather conditions you'll accept. It involves carrying on at all costs to reach a target, and having reached it, carrying out a successful attack. We've been led into misplacing our standards because the real thing is so far away from us all. Ask our American friends what really counts. They've been the route. They know that outside the combat theatre the greatest pilot killer and aircraft destroyer is — the pilot himself. Now it has been proven that even in the combat zone, more aircraft were lost through accidents than enemy action. Heaven knows we can't afford to lose aircraft. If aggressiveness is the personality trait that gets the mission accomplished, then I submit that defensiveness is the trait that makes the manpower and hardware available for the mission in the first place.

If you don't flight plan correctly you'll never get a chance to be aggressive. Flight planning is defensive planning.

If you don't know your EOs cold and you encounter an emergency you won't have a prayer. Quick, correct reactions are defensive reactions.

If you don't follow the rational dictates of your mind, if you let your pride or desire to showboat lead you, you'll pay eventually.

Self discipline is defensive discipline. If you study flying in general, and flying your own particular aircraft in particular, until you know every possible facet of the business, you may just come to believe that knowledge is your best possible defensive weapon.

Defensive driving means anticipating every possible dangerous situation and either avoiding such situations or, where this is utterly impossible, at least being prepared to take the appropriate action.

Defensive flying requires the same level of anticipation and the same preparedness. Believe it or not, even tigers are known to keep their eyes and ears open and take the occasional whiff of wind. Defensive flying is simply a way of stacking the deck in your own favour in the never ending struggle with "the devil at six o'clock." ⊠

What Next?

Recently 25 fence posts were burned by a field fire bordering the west side of the aerodrome. This has left the field open to wildlife. One morning a horse strayed onto the aerodrome causing considerable annoyance to both aircrew and tower controllers.

Flight Safety Committee

1000-Foot Separation?

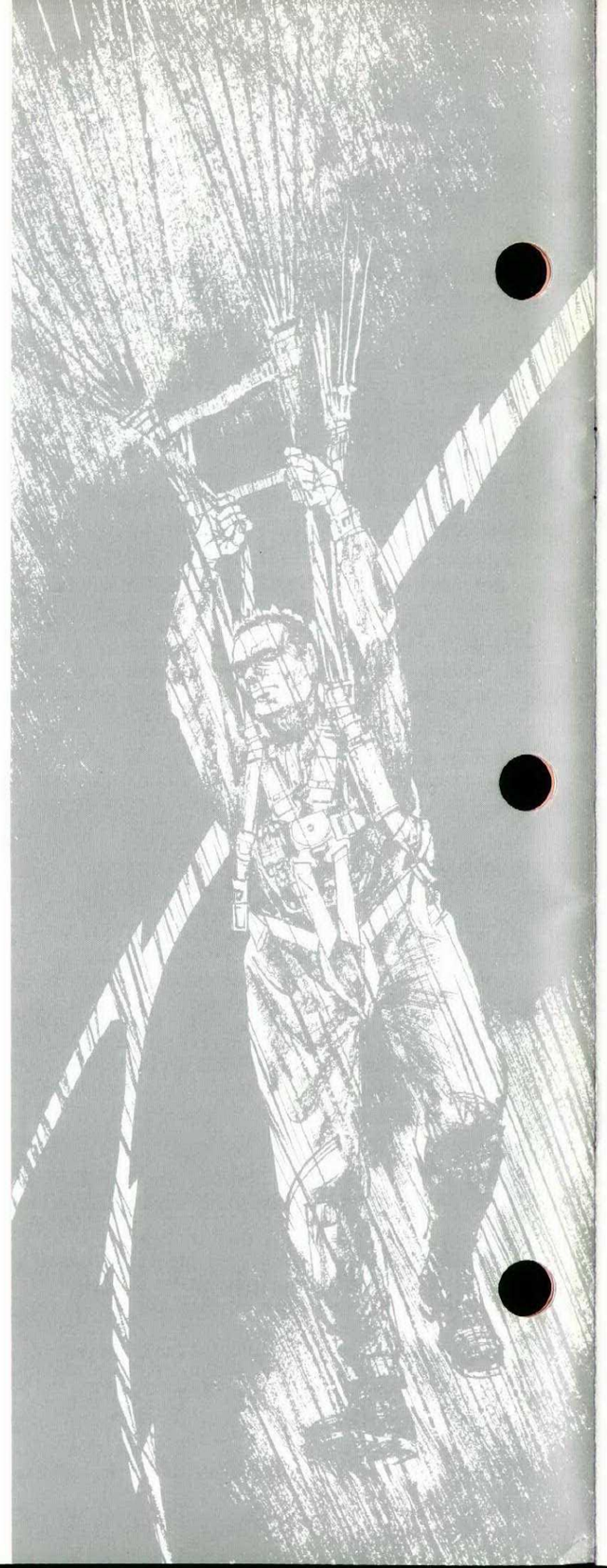
Two pilots on a mutual instrument training mission not long ago, flew half the trip before realizing that they had set their altimeters at 30.26 instead of 29.26 — an error of 1000 feet. An area of high pressure had been replaced by a low pressure system, and both pilots stated that they "missed it completely". Fortunately they were flying in VFR weather.

— Extract from message

CBs!
You lose when you tangle with these

In May of this year a CF100 took off from MacDill AFB, Florida, for the return flight to Ottawa following a NORAD exercise. Cloud tops along the route were forecast to be 36000 feet or below, except for scattered CBs extending to fifty-two grand along the first part of the route. The crew flight planned for FL 370 hoping to be "on top" where they would be able to pick up the big bumpers visually.

Thirty miles out of MacDill their clearance was amended, steering them clear of build-ups observed by Jacksonville Centre. About an hour later while crusing at FL 370, in cirrus, Centre again issued vectors to turn the aircraft away from severe weather, and almost immediately they were in it, encountering turbulence and a marked decrease in airspeed. Within two minutes the turbulence was so severe that the aircraft became uncontrollable. From that point we'll let the crew describe the events. Having read of their experience, chances are you'll avoid that next CB you meet.



THE PILOT —
by Capt G.E. Benson

"We were in a vertical dive in the midst of a thunderstorm, experiencing 1.5 to 2.0 negative "G". The controls were ineffective.

"Grasping the alternate ejection handle in my left hand, I said to my EWO (Electronic Warfare Officer),'I think we better get out, Bob', to which he replied, 'okay'. After what seemed like a considerable length of time I added, 'Are you .....?' when a windblast announced the EWO's departure. Bending my head slightly forward, I reached down and pulled the alternate ejection handle with both hands. After another considerable delay, I felt the seat start to move upward, then I blacked out.

"When I came to, I didn't know where I was. My face was wet and I covered it with my hand. It had lost my helmet. I then realized that I was falling in the seat which was stabilized by the drogue chutes and I was being buffeted by hail. Something went by to my right with a loud hissing roar, and then I heard occasional distant crashes of thunder. Other than that the free-fall was very smooth and quite enjoyable.

"The seat fell away from me gently at 15000 feet as the barostatic control operated and the main chute opened automatically. At this level I was in precipitation which was a combination of hail, snow and rain; there were so many up- , down- , and side-drafts that I wasn't sure I was making any progress towards the ground at all. Finally, after about ten minutes I noticed that the precipitation had become mostly rain, so I inflated my life preserver and began to give some thought to landing technique.

"I broke out of the cloud at about one thousand feet above ground. I could see moving cars and a shopping centre; I was heading towards the parking lot at about 15 mph. Preparing for the landing, I grasped the risers and brought my knees together. I was just bringing may head up to look at the horizon when I crashed onto the asphalt and immediately fell full length onto my elbow.

"I was taken to a bed in the back of a nearby store and [illegible] minutes later was on my way by ambulance to a nearby navy hospital."

THE EWO —
by Capt R. McKendry

"I think we better get out Bob." These words from my pilot, put a premature end to our flight from Tampa Florida to Ottawa. My seemingly casual, although perhaps high pitched reply of "OK", set the stage for a rather frightening close-up view of the inside of a thunderstorm.

"After my reply, I immediately pulled the overhead handle on my Martin Baker seat and left the aircraft at thirty-one thousand feet. My next sensation was a very strong wind blast and something hammering me on the face, all the while being tossed around violently in the seat. Wind blast and oscillations abated very shortly, at which time I noticed that my helmet and gloves were missing.

"When the seat drogues deployed I had a relatively smooth but long descent through cloud. At one point I considered using the manual override system to open the chute but decided the seat was doing a pretty good job by itself. Shortly after this, automatic seat separation occurred, followed by a very smooth chute deployment. When the chute canopy opened, I pressed my stopwatch.

"Moments later, a wild ride began. It started with a very strong updraft, exerting what I would estimate to be a force of three "G". This carried me up into the hail again and into what seemed to be the centre of the cell. The updraft stopped and I was suspended momentarily while the canopy started to deflate, then I started to drop and swing violently in the chute while being peppered by hail stones. I dropped out of the hail and went into an area of ice fog. There seemed to be no precipitation but everything became rapidly covered with ice. I had to flex my hands often to break the ice from them. Just when things seemed to smooth down I was caught in another updraft and brought into the hail again. The same procedure was followed this time until I was back into the ice fog. I don't know how often I made that trip, but at the time it seemed endless.

"During these ascents and descents there were numerous lightning discharges all around me. The thunder noise associated with this was very sharp and occurred at the same time as the lightning. Once I received a moderate shock which travelled through my entire body. (I later found that the lightning had burned several holes in the canopy).

"Finally I dropped into a zone of heavy rain and at last I had an indication that I was descending. I knocked the ice from my Quick Release Box and moved it to the unlocked position. Gradually the cloud pattern seemed to change and I broke out about one thousand feet above ground.

"The first thing I noticed was an area of grass and tall trees with a paved road directly under me, running parallel to the direction in which I was facing. I was drifting rapidly to the right so I pulled on the left risers. This seemed to slow the drift and I landed in a grassy area right next to some large trees. After landing I punched my stopwatch again. The time elapsed from chute opening at 15000 feet to landing, was 25 minutes.

"When I had myself sorted I undid my chute and walked out to the paved road, a distance of less than one hundred yards. I was standing there for about five minutes when two men came along in a pick-up truck. After the usual exchange of pleasantries they took me to the civilian hospital in Beaufort, South Carolina. Later my pilot and I were reunited at a nearby military hospital and admitted for ten days of true southern hospitality." ■

Midair?

Huey Pilot: "We had to wait awhile for the maintenance people to build up some sand bags to land on. Just on the right side, that's the only skid that was gone. The skid? Well there was this deuce and a half that came over the crest of this hill the same time we did, but in the opposite direction. No, we didn't report a midair. You couldn't have a midair with a truck could you ...?"

— US Army Aviation Digest

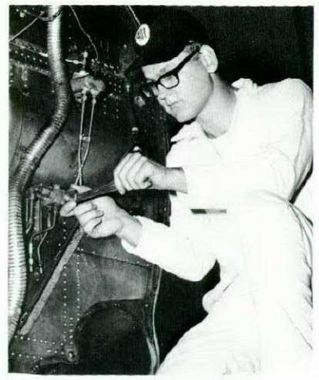
Strong Letter to Follow

"The lengthy list of references (44) shows clearly the frustration, difficulties and time delays that have characterized this project from its inception. It is nothing short of ridiculous that this minor component's unsatisfactory nature is preventing fleet fitment of equipment vitally needed for hearing conservation and flight safety. This particular project appears to be a perfect example of unbridled bureaucracy and red tape in action. Immediate acquisition and shipment of a suitable substitute assembly is mandatory. Advise."

— Extract from message

Good Show

Cpl M.M. Lesiak



Capt R.W. Stone and Capt J. Evans

Lt R.J. McIntosh

Capt E.R. Carscadden

CPL M.M. LESIAK

Cpl Lesiak was the crewman on an Otter which crashed and burned, killing the pilot, soon after takeoff from a dirt strip near CFB Gagetown. After the aircraft had come to a stop, he immediately instructed the passengers to evacuate the cabin, then he ran to the front of the aircraft to assist the co-pilot who was trapped in the wreckage. Using the aircraft fire extinguisher, he successfully fought a fire burning behind the seat and was finally able to extricate the severely injured co-pilot. Then he returned to the wreckage amid exploding fuel tanks and fire to try to remove the pilot. Again he used the fire extinguisher and when it was empty he continued his unsuccessful efforts to remove the pilot until the explosion of the remaining fuel tanks, and fire and heat finally forced him away.

Through his quick reaction and bravery in disregarding grave personal danger, and in spite of having suffered second degree burns to his hands, Cpl Lesiak undoubtedly prevented further loss of life in this accident.

CAPT R.W. STONE AND CAPT J. EVANS

Capt Stone and Capt Evans were flying the lead aircraft in a two-plane CF101 formation taking off from Val d'Or. Shortly after the formation became airborne and while still in afterburner, the wingman radioed that the lead aircraft was on fire. Capt Stone immediately initiated a climbing turn which directed his aircraft away from the town of Val d'Or and provided sufficient altitude either for a bailout or a return for an emergency landing. Simultaneously, he came out of afterburner and checked the engine instruments and fire warning lights for fire indications. Having no fire indication in the cockpit, Capt Stone requested his wingman to confirm that he was still on fire, while both he and Capt Evans prepared for ejection. The wingman again confirmed that the aircraft was on fire, but before Capt Stone and Capt Evans could take further action, he further advised them that the fire now appeared to have gone out.

Capt Stone then requested the wingman to close in and inspect his aircraft for damage, and when the inspection indicated that all appeared normal, he landed his aircraft safely at Val d'Or. Subsequent investigation revealed that the fire had been caused by a broken fuel line "pig-tail" in the afterburner section of the starboard engine.

Their calm response under stress enabled Capt Stone and Capt Evans to analyze their situation and make a successful emergency landing.

LT R.J. McINTOSH

Lt McIntosh, the Flight Engineer Leader on 436 Squadron, was detailed as engineer for a Hercules training flight. While inspecting the air intake on number two engine he noticed that the anti-icing shroud around the torque meter shaft (the drive shaft between the engine and the reduction gear) appeared to be out of alignment by ⅛ inch. He summoned help from the servicing crew and on closer inspection they found that only one fastener out of three was in place. The whole shroud would undoubtedly have become detached and entered the engine during the flight.

By discovering a minor misalignment and by his persistence in getting to the cause of the fault, Lt McIntosh undoubtedly saved the engine from damage and possibly averted an accident.

CAPT E.R. CARSCADDEN

Capt Carscadden was on a proficiency check flight, cruising at 4000 feet in VFR weather, when the Dakota's left engine suddenly stopped. Emergency checks were completed with no results, so the left engine was feathered. Maximum continuous power was applied to the right engine, but even though the instruments indicated it was developing the required power, it was very soon apparent that altitude and airspeed could not be maintained.

At this point, Capt Carscadden elected to fly to nearby relief airfield rather than proceed to home base which was only a few more minutes flying time away. A single engine pattern was established, based on the assumption that the right engine was developing minimum power, and a successful landing resulted.

At the completion of the landing roll, he advanced the right throttle so that a generator could be brought on the line to inform the control agency that the aircraft was down safely. The right engine then completely failed.

Investigation revealed that the left engine had failed internally. After considerable troubleshooting, it was discovered that the right engine had an intermittent dead short in the ignition system.

Capt Carscadden's professional handling of this emergency prevented a serious accident.

LT W.I. ADAIR

Lt Adair was instructing in the back seat of a T33, leading a two-plane section. On the overshoot following a radar low approach, a loud explosion occurred as his student applied power. This was followed by severe engine vibrations.

Lt Adair immediately took control and commenced a climbing turn towards the low key position of the forced landing pattern. With the severe vibration continuing and the engine developing less than full thrust, he raised the landing gear and flaps and declared an emergency. Then smoke began to enter the cockpit and the oil pressure started fluctuating. Lt Adair selected 100 per cent oxygen, and to ensure he was given landing priority, declared his intentions on tower frequency. The tower advised other aircraft to overshoot, clearing the way for Lt Adair to land safely after he flamed out the aircraft on final approach.

Investigation revealed extensive engine damage to the impeller blades, guide vanes and turbine blades.

Lt Adair handled this emergency with precision and good judgment, demonstrating under actual conditions, the high standard of professional ability required of Canadian Forces pilots.

SGT G.H. PIPER

While completing a pre-flight inspection on an Argus, Sgt Piper observed a small leak in a fuel line in the forward bomb bay.

He advised the servicing personnel of the condition, but they were unable to detect the fault during inspection of the area. Sgt Piper insisted, however, in pursuing the investigation, and assisted by the servicing tech, began pressurizing the fuel lines in what initially appeared as a hopeless attempt to duplicate the fuel leak. Fortunately, after numerous unsuccessful attempts, fuel was observed dripping from the defective line, and the aircraft was declared unserviceable.

Sgt Piper's initiative and perseverance in pursuing this condition prevented the development of a potentially hazardous in-flight situation

Sgt G.H. Piper

Lt W.I. Adair

CPL R.J. HAWES

Cpl Hawes was conducting a "B" Check on a CH112 helicopter when he noticed that the lock wire between the wobble plate and the retaining ring was broken. This discovery led to a closer inspection and the discovery that the retainer ring had backed off creating a dangerous condition. Further backing off of the retainer ring would have created a flight hazard since the wobble plate governs the directional control of the aircraft.

Cpl Hawes' conscientious effort in carrying out a routine inspection prevented a serious in-flight hazard.

CPL W.R. LANCTOT

While washing the wing centre section under the fuselage during a periodic inspection of a Dakota, Cpl Lanctot heard a slight thud when he tapped the skin. Sensing something unusual, he removed panels from the area of the flap hydraulic jack and found a four-pound steel rivetting bar lying loose in the centre section. This bar was marked "USAAF" which would indicate that it might have been there for some time — perhaps 25 years or more.

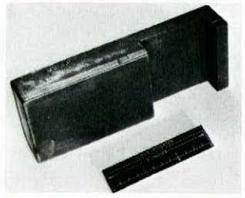
By his diligence in performing a routine job, Cpl Lanctot removed a potential hazard from the vicinity of the aileron cables and the flap hydraulic jack.

CPL D.A. WEATHERBEE

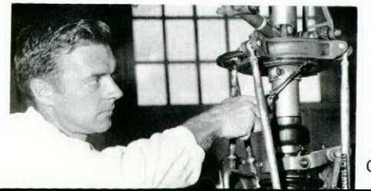
Cpl Weatherbee was working on a CF100 escape system, preparing to return a time delay firing mechanism for repair and overhaul when he discovered that the mechanism did not fire properly. This was due to a restriction in the travel of the firing pin, caused by oversize polyethylene washers which had been used on the cocking pin. The washers, oversize in both thickness and diameter, had jammed between the shoulders of the time delay mechanism, preventing it from firing.

Cpl Weatherbee's careful investigation exposed a hazard which would have made it impossible for aircrew to eject.

Cpl W.R. Lanctot



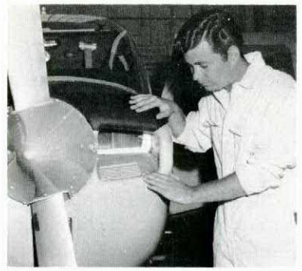
Four pound steel bar with markings of the United States Army Air Force may have been lying loose among the aileron cables for 25 years.



Cpl R.J. Hawes

Cpl D.A. Weatherbee

GOOD SHOW



CPL T.F. QUESNEL

Following the completion of an A Check on a Muskateer, Cpl Quesnel noticed that oil had reappeared on the lower left engine cowlings which he had wiped clean just a short time before. Upon making further checks, and discovering that oil was in the area of the oil cooler, he put the aircraft unserviceable.

Subsequent investigation revealed that the oil cooler assembly had blown at the upper welded seam. This had most likely occurred just prior to shutdown after the previous flight, since only a very small amount of oil had been lost. However, had the crack not bee found, it is probable that all the engine oil would ha been lost in flight.

The alertness and initiative shown by Cpl Quesnel prevented the development of a serious in-flight emergency.

How Lucky Can We Get?

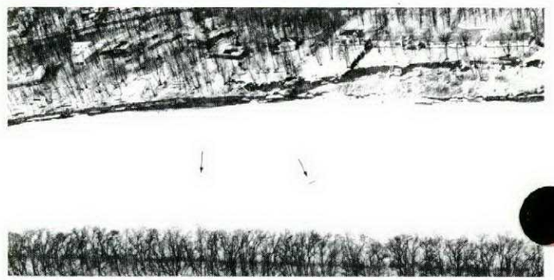
During recovery at home base after a unit check-out in a T33, the tip tanks jettisoned over the city of Winnipeg while the aircraft was at 3000 MSL on a radar vectored approach. The emergency jettison control was not operated by either pilot, but the jettison apparently occurred when the landing gear lever was selected to the "DOWN" position and the landing light was switched "ON". ATC was notified immediately and a straight-in approach completed without further incident.

The investigation following this incident was a second look into the tip tank jettison system of this aircraft, as a similar incident had occurred on the same aircraft approximately 9 months previous. The first investigation concluded that the jettison was caused by a short circuit in the tip tank jettison control circuit made by a foreign object which could not be found.

Following the second occurrence, close cooperation between the aircrew involved in both occurrences and the technicians working on the aircraft, revealed that both jettisons occurred simultaneously or shortly after the landing light was selected 'ON'. This resulted in an extensive investigation of the landing light and tip tank jettison circuits.

Investigation revealed that when the front "PANIC BUTTON" was actuated with the battery master switch "OFF", the right landing light came on. Similarly, with the landing light "ON", the jettison relay was closed and power was applied to the tip tank ejection solenoids. This indication of a short circuit between the landing light and tip tank jettison circuits was confirmed by subsequent investigation. Examination of a cannon plug in which these circuits are closest together revealed that a fragment of solder was the cause.

In May 1970 a new landing light wiring system was installed in this aircraft. It is possible that the solder found in the cannon plug during the second investigation resulted from poor maintenance procedures. The random movement of the solder in the cannon plug suggests that it may also have caused the first incident. Although the piece of solder was rounded in shape and could have been the result of faulty workmanship, the possibility also exists that it broke away from a solder patch at some undetermined time subsequent to installation.



Tip tanks lying on the Red River.

A few seconds sooner or later and the consequences might have been serious.

Although it is recognized that the area concerned makes work difficult, it is still possible to do the wo properly. There is no substitute for quality workmanship any area within aircraft and all trades should strive for th highest possible standards in work performed and subsequent inspections of that work.

Fortunately this occurrence did not have serious consequences. Although the jettison occurred over the city of Winnipeg, the tip tanks miraculously impacted a frozen river without damage to persons or property. Next time we may not be so lucky.

An FSO Speaks

Capt R. N. Cadorette
SOFS-2, MOBCOM

Fate and Flight

A famous sportsman (was it a golfer?) is reputed to have replied when someone commented on his good luck in winning a certain event: "Yes, and the more I practice, the luckier I get!"

There is too often a tendency to blame fate or bad luck for events over which we have a considerable amount of control. Can the following statement really be considered valid? "He was unlucky; he ran out of fuel."

In the same vein, do you consider you are unlucky because your engine stops while you're flying over a forest and the result is one bent aircraft and an upset pilot? Consider the following:

- Did you have to fly over the forest?
- Did you have to fly at an altitude which precluded autorotating or gliding to an open space?
- Did you know the best speed for maximum glide?
- Did you conserve height by balanced flight?
- Did you pre-flight your aircraft thoroughly?
- Did you correctly compute your flight and fuel consumption?

Etc ad nauseam.

If you as the pilot can answer a firm "yes" to all of the ove and other pertinent questions you may then feel ntitled to say that you have been unlucky. To stop our analysis at this point may be tempting fate, as there is a multitude of possibilities which might have caused the mishap, but have nothing to do with luck:

- Did the servicing technician who refuelled the aircraft contribute to the pilot's "Bad Luck" by allowing FOD into the gas tank?
- How about the engine technician, did he tempt Lady Luck by not using a checklist for an overhaul or installation?
- What of the authorizing officer? Did he shorten the odds against the pilot by failing to brief him properly?
- Did the meteorologist give an adequate weather briefing or was it confused by a profusion of imprecise terms such as "maybe", "risk of", "chance of" and "possibility of"?
- Did the passengers grossly underestimate the weight of their baggage?
- How about the Headquarters staff? Was a sense of operational necessity given to a purely routine flight?

One could continue this exercise forever but hopefully the point is made — human factors rather than luck are involved to varying degrees in most accidents. Problems can usually be traced back to MAN; man the designer, man the builder, man the fixer, man the manager, or man the pilot. Since the pilot is usually the last person involved with the aircraft, when the mishap occurs, he carries the brunt of the burden. To what extent have others shortened his odds by their actions though? The only factor that can be blamed on Fate is that you, rather than another pilot have been victimized by someone else's oversight by being in that particular aircraft on that particular day.

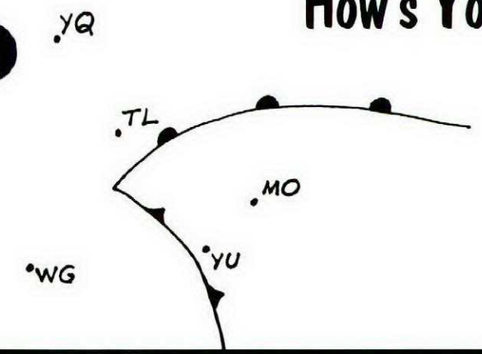
I don't know of any pilots who would carry a rabbit's foot as a substitute for an external inspection or weather briefing. Similarly, maintenance procedures, Squadron SOPs and pilot training all contribute to make flight an exact science rather than an art dependent of the fickle finger of fate.

These techniques and procedures have not eliminated the effects of fate altogether. However fickle she may be, Lady Luck certainly seems to have an uncanny ability to strike at embarrassing times. Why is it, for instance, that when hangar doors are blown into aircraft wings, the towing crew is usually undermanned? Why is it that when a pilot takes off with partial fuel load for a cross-country, winds are inevitably stronger than predicted ... and on the nose? Why is it that a radio becomes unserviceable in flight after being ground checked serviceable that same morning?

Can it be that the more conscientious *all* personnel involved with aircraft are, the luckier the pilot will be? Sounds like a good bet.

In any case good luck!

How's Your Wx?



Here are some actual weather situations. Your problem is to match the weather reports with stations on the map.

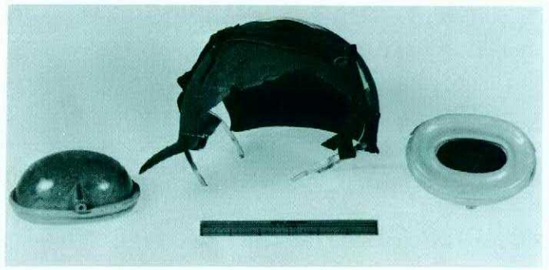
A. M13⊕2R--L-F 984/33/33/0412/943/NS10 830
B. P14X1 3/4 S- 039/27/25/3121G28/960/S10 008
C. E90◐12 069/66/53/1520/972/AC8 617
D. E28⊕2S- 158/30/28/0620/000/SC10 832
E. ○15 083/68/54/1612/977 816

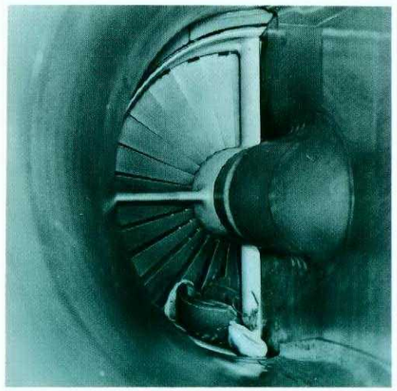
Answers on page 24

LOST AND FOUND

. . . the '71 collection

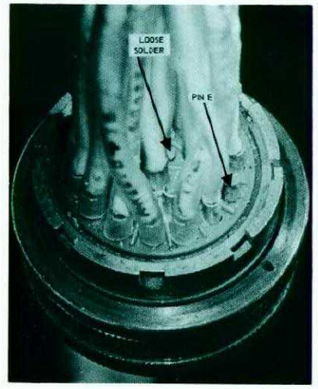
What: A punch
How: Left in a CF104 engine area by someone, it was subsequently ingested.





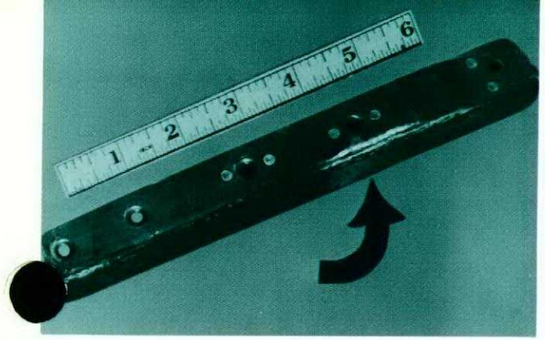
What: A protective helmet
A pair of ear defenders
A toque
How: This ensemble was sucked into a CF104 engine when a technician (unencumbered by the chinstrap which he had fastened over the top of his helmet) walked in front of the intake.

What: A drop tank pin
How: The pin was snatched from a technician's hand by the right engine of a Voodoo *running at idle power.*



What: Fragments of solder
How: Somehow these got loose in a T33 cannon plug and caused a short circuit between the landing light circuit and the tip tank jettison circuit. When the pilot selected the landing gear "DOWN", the tip tanks jettisoned!
(See story page 8).

What: A pin and flag
How: When the CF104 pulled into the line, a technician climbed the ladder, removed the pins from the pin bag at the top of the seat, and dropped them to the ground. One didn't make it to the ground.



What: A drag angle (stiffener)
How: A technician working with a crew changing a Tracker stabilizer, left a drag angle in the aircraft work area when he removed the fairing assembly to the workshops for reworking. A new crew replaced the reworked panel and, assuming that the old drag angle had been left in the workshop, employed a readily available spare.

The old drag angle made its presence in the tail section known during a subsequent flight when the pilot felt the rudder binding during a bombing exercise.

A Challenge — to

EXCEL

Capt J. A. Martin
SOFS-2, ATCHQ

The world-wide proliferation of "Excel" stickers has fostered much curiosity as to their intent, and raised the eyebrows of ecologists and pollution-fighters everywhere. The decals have mysteriously appeared in Gatwick, Rio de Janeiro, Santiago, Mexico City, Bangkok, Dar es Salaam, Trinidad, and Moose Jaw. The word "Excel" doesn't really mean too much to the people of foreign lands; but what does it mean to the personnel of Air Transport Command?

The Command Flight Safety Motto was derived from an article presented by BGen Peters when he was Base Commander at CFB Winnipeg, in which he stated, "Freedom from accident or loss in any organization is directly proportional to the desire of the top executive and his management team to excel, and their impatience with mediocrity." From this phrase, we in ATC extracted the single word "Excel". It was printed on a symbolic diamond of excellence and issued as a challenge to every individual within the command.

The challenge is simple and direct: each manager, supervisor, operator, and technician is responsible for a personal contribution toward the achievement of a zero accident rate. In fact, nowhere are zero accidents more expected than in ATC operations. When someone boards a service flight, whether it's from North Bay to Winnipeg, or Comox to Shearwater, they assume that no effort has been spared to provide a safe journey. Every individual connected with Transport Command aircraft, no matter how remotely, can make a contribution to the high safety standards that are demanded of us. So there's the challenge: EXCEL, in every area of endeavour. Can you meet it?

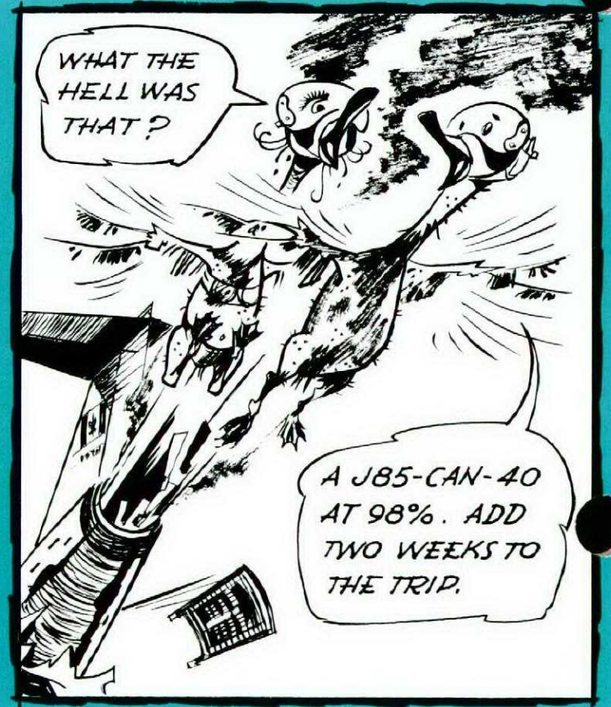
Murphy is There

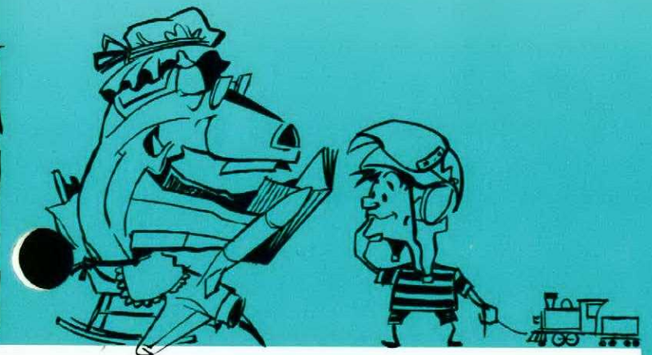
After almost ten years of operating CF104s, we find two experienced technicians who can't decide whether a hydraulic pump is the number one pump or the number two pump. The airframe tech says it's number two because it supplies the number two hydraulic system. The aero engine tech says it's number one because it's the first one clockwise from the top looking from the rear of the engine. The airframe tech is right, but let's look at it from the aero engine tech's point of view. His training from basics on tells him to look at an engine from the rear and count clockwise starting at the top. So using that long-established rule of thumb, he makes the incorrect conclusion that number one pump is the number two pump.

To further complicate matters, take a quick look at the applicable EOs and you'll find the same two hydraulic pumps referred to as the right and left pumps.

We can't change the design of the CF104 now, but we can make sure that the terminology we use is getting the right meaning across. The responsibility for this lies with every technician in every trade on every aircraft. Murphy is there, somewhere, waiting to cause trouble if the extra care isn't taken to be sure, not only of your own terminology, but the other guy's too.

— *CFE Flight Safety Bulletin*





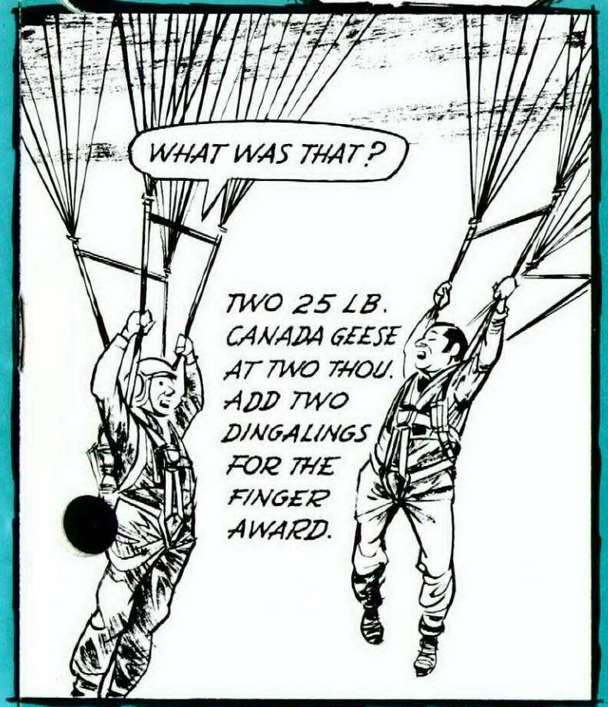
AIRSOP'S FABLE

EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT BIRDS*

* THEY VACATION IN FLORIDA — IF THEY ARE LUCKY

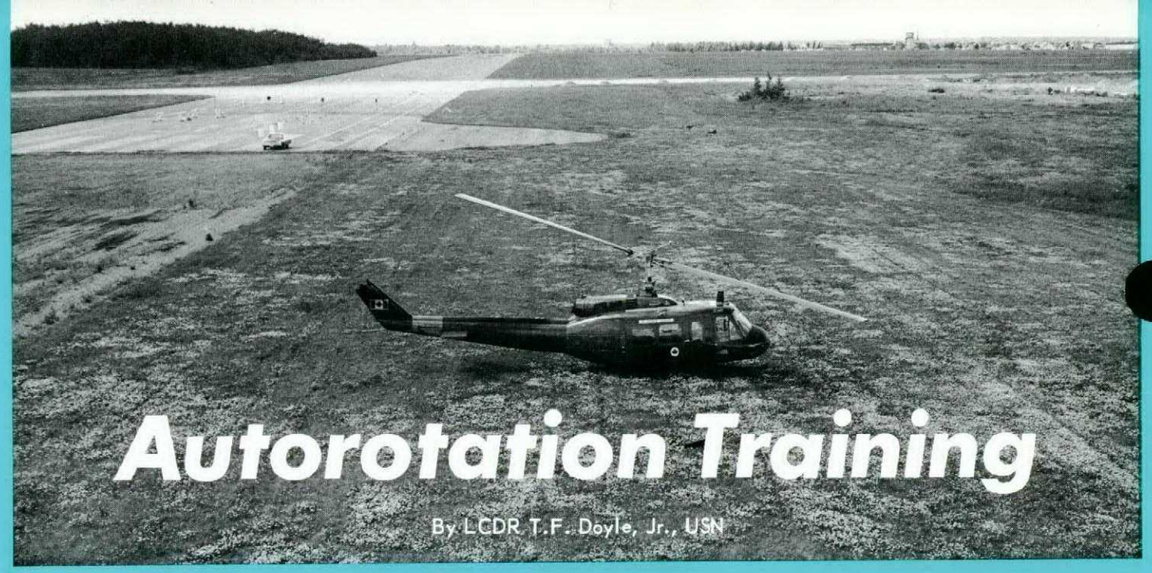
FLAP
FLAP
FLAP
FLAP
FLAP
FLAP
FLAP
FLAP

SPLAT!



MORAL:

PLEASE LET THE BIRDS GET TO FLORIDA ON TIME



Autorotation Training

By LCDR T.F. Doyle, Jr., USN

The subject of full autorotations in certain helicopter models arises from time to time. The author presents in this article some cogent reasons for a new look at this manoeuvre. Whether readers agree wholeheartedly or just in part, there is justification for serious consideration of the ideas which are discussed.

The helicopter community is suffering a costly and needless loss of lives and aircraft because of the lack of training and practice in autorotations. With the introduction of large, sophisticated, twin-engine helicopters into the military inventory, and more to come, a complacent attitude among pilots regarding the need for continuing training could develop.

In order that we in the military not expose ourselves to an inordinately high accident and fatality rate, due to lack of expertise in autorotation practice, a few points in favour of autorotation training should be examined.

It is acknowledged that certain models eg, CUH-1N and CH113 should not be subjected to wide-spread practice autorotations but authorization for full autorotations should be permitted, encouraged and practiced in the other models which constitute today's inventory. Importantly, autorotations should be regularly practiced throughout a prescribed percentage of that particular helicopter's H/V (height/velocity) envelope — including day and instrument conditions. Training procedures should ensure that each pilot remains proficient.

Autorotations are often considered to be just another routine standarization check-flight item to be completed. The standard procedure is to enter autorotation with plenty of altitude, airspeed and no loss of rotor RPM and recover without excessively frightening the check pilot. Manoeuvring during autorotation to land on or recover over a particular spot is often neglected; yet helicopter pilots often have to fly over mountainous terrain and high density areas — where powerplant or tail rotor failure imposes very exacting demands, because of the necessity to reach a suitable landing spot within the gliding range of the helicopter. Throttle chops with UP collective at various attitudes and different airspeeds are nearly always neglected. Yet, who has ever had a powerplant or tail rotor failure in a single-engine helicopter at an opportune time? High speed, low-altitude autorotations are seldom practiced even though many reconnaissance and attack missions require operating regularly in this environment. It is not suggested that service pilots get into H/V test work. What is suggested is that H/V diagrams be constructed for each model that would show areas of the H/V envelope where skill in the performance of autorotation is to be required of all pilots.

Correct procedures for practicing autorotations to land on a spot are important. The manoeuvre should be commenced at a relatively high altitude. During the descent the pilot should demonstrate his ability to autorotate at desired airspeed and RPM yet still position his aircraft for a recovery over, or touchdown on, a predetermined spot. The development of judgment in estimating how far the helicopter can glide and how this distance is affected by manoeuvres is one of the important aspects gained in this manoeuvre. Demonstrations of this capability requires skill, training, and practice.

There are a surprisingly large numbers of helicopters pilots who have not experienced a throttle chop with UP collective. They have little or no appreciation for yaw and rapid RPM decay. Generally 200 or 300 feet altitude is required for single rotor helicopters to regain normal rotor RPM after a throttle chop with UP collective. Wild manoeuvres by the uninitiated, to regain RPM after actual engine failure, have caused more than one fatal accident. If the throttle chop is given when not suspected, the pilot is placed in a "real" engine failure situation. He learns about the yaw and fast rotor RPM decay and should be better able to institute corrective action under actual emergency conditions. Appropriate corrective action for rapid rotor RPM decay is vital and must become second nature to pilots and it can only become second nature if it is fully understood and experienced many times under simulated conditions.

Low-altitude, high-speed autorotations are not as demanding as they seem — as long as proper corrective action is applied. To begin the manoeuvre the throttle is rolled off with the collective at cruise power. After the throttle is chopped the nose is raised simultaneously and coordinated with lowering the collective. A landing attitude is maintained until airspeed dissipates and as the helicopter begins to settle, collective is used to slow the rate of descent until the helicopter touches down — either zero groundspeed or roll-on depending on the surface. This manoeuvre can also be done with power recovery instead of touchdown.

In most autorotations the flare is important. The amount of flare, speed of application and entry altitude vary with different situations. Judgment and skill must be developed by training, and then constantly honed. It should be noted that the flare is not necessarily an integral part of every autorotation. For example, a landing attitude may be assumed at about 200 feet and the landing cushioned entirely using collective. However, this technique requires considerable finesse in the use of collective. The no flare also reduces the capability of the pilot to manoeuvre to a precise landing. Of the two methods the moderately executed flare is preferable.

Widespread authorization of full autorotations in twin-engined helicopters is not advocated but for single-engine helicopters the situation is quite different. Opponents of full autorotations traditionally argue, "There's nothing to be learned in the last 10 feet." Not so! One of the most important things to be learned is the effect of forward speed and the increase in induced drag with decreasing rotor RPM. It is interesting to note that many autorotation mishaps are caused by improper touchdown speed. Thus it would seem that regular training in this area is sorely needed. There are other items of training interest in full autos, not the least of which is confidence building.

Full autorotations are just one concept of helicopter training which should be subjected to the scrutiny of modern management techniques — such as operations analysis. Is there a strong correlation between a pilot's autorotation proficiency and his potential helicopter performance? Perhaps a quantitative analysis would show it. Realistic autorotation training has a carryover of other facets of helicopter operations. A proficient pilot has a good chance of surviving all but the most catastrophic emergency. A pilot who regularly practices autos is continually conscious of rotor RPM, is mentally accepting the fact that an emergency may occur and is developing conditioned response to deal with an actual emergency. An operations analysis may prove that a policy of restricted and highly conservative autorotation training is a mistake. It is within the learning capability of the average pilot to land without damage (excepting rugged terrain) following simple powerplant or tail rotor failure if given a descent landing area within gliding range. It is believed that with increased pilot proficiency in the autorotation manoeuvre through realistic training the helicopter major accident rate could be decreased.

There are two methods that could permit a higher level of autorotation proficiency training without increasing flight time. A training program can be achieved by utilizing an occasional few minutes of flight time at the end of operational missions as well as training flights. Autorotations, for example, take only about 20 seconds! The other proposal is the suggestion that flight time for autorotation training be extracted from part of the block of time allocated for airways flight proficiency. Care must be taken to distinguish instrument flight training from airways training. To say, however, that a helicopter pilot must have the same proficiency in flying IFR cross-country flight as fixed-winged pilots is stretching a point. Helicopters are poorly designed for IFR airways flights and seldom is there a military requirement for such flights. With the present state-of-the-art of helicopter de-icing equipment helicopters are, and will be for the foreseeable future unable to operate on airways during the winter, throughout a large part of the U.S. and most of Canada, where there is visible precipitation and low freezing levels. Actually, helicopters nearly always go under the weather. Shipboard operations require low level IFR flight and approaches, hence helicopter pilots require tactical instrument training including marshall procedures, tacan approaches, GCAs and CCAs. However, the present system of equating helicopter pilot instrument needs to the needs of other pilots is perhaps depriving helicopter pilots of much needed training in other areas.

An increase in expertise in autorotation is not a panacea for all mishap causes. Other important areas need attention, such as operations around non-aviation ships, obstacle clearance practice and high terrain operations. However, an increase in autorotation proficiency is available for the asking. If there's one thing fairly certain, it is that for the remainder of the seventies helicopter procurement will increase, so let us benefit fully from the unique survivability of this aircraft by a fresh look at our autorotation policies and training programs.

— adapted from USN APPROACH

Fog!

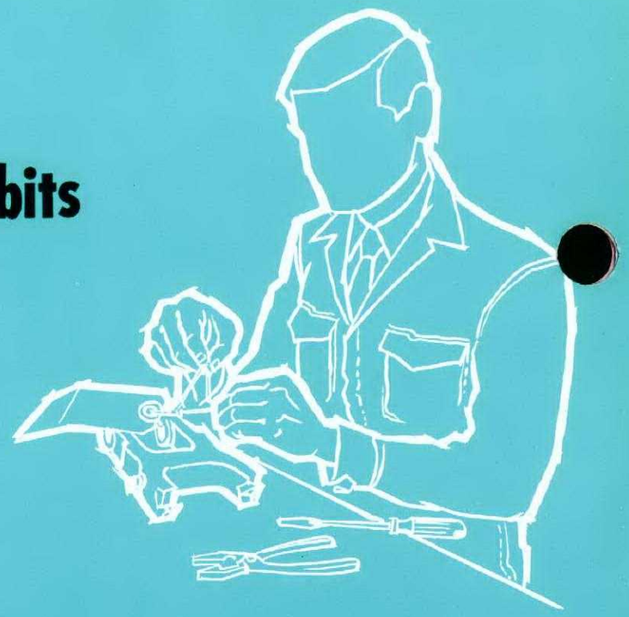
1. CAUSE ASSESSMENT

PERSONNEL — PILOT — HUMAN FACTOR (Disorientation)

While manoeuvring on water in a strange lake environment superimposition of topography obscured the intended takeoff path and resulted in disorientation with respect to the proven takeoff path. The water course which presented itself was of a similar direction and because of ground phenomena was into wind as would have been the water course of choice. The unproven course was used for takeoff. After lift off, contact with hydro wires which were not visible soon enought to institute evasive action resulted in damage to the upper surface of the air rudder.

— CF210 Extract

Protect the Exhibits



Late in 1970 an incident occurred after which a reasonable amount of sleuthing uncovered the offending component and it was UCR'd and supposedly sent off to the overhaul contractor. Further tests were delayed until a few weeks later when it was discovered that the wrong component was suspect. The real culprit was quarantined awaiting disposal instructions. The instructions were sent within days and acknowledged by the unit a week later. *Two months later* the component had still not been received by the contractor! Tracing action took another month and finally the part was delivered to the overhaul contractor. A lot of correspondence plus even more labour had been involved getting this component to the contractor. In addition the investigation was delayed for a long period of time — time during which other similar incidents could have happened, time during which corrective action could not be taken.

To prevent these unnecessary delays of lost exhibits, components involved in an incident or accident and requiring a strip investigation, must receive expeditious and careful handling. Personnel who handle these exhibits must be alerted to properly tag, mark and address, and give these items the utmost care. Only then can the system work properly and everyone learn from the occurrence. Having an incident without finding the cause is frustrating and unfruitful, adding nothing to our knowledge.

THE FLIGHT SAFETY STAMP

READ ATCTI 00-80-4/3

The investigation of aircraft technical failures is a continuing and vital aspect of Flight Safety. Flight Safety investigations, per se, result from submission of formal accident and/or incident reports which detail particular occurrences. Frequently these occurrences result from obvious materiel failures of minor ancillary components. The investigator, nevertheless, must document and prove beyond doubt the causes of the failure, if the best interests of Flight Safety are to be served. Accordingly, it is important that he have available any materiel that could be relative to the occurrence under investigation. Let us, presume, for example, that a hot-air duct retaining clamp fails in flight with the result that a fire warning circuit is activated by the escaping hot air. The situation results in the shut-down of a vital aircraft system, followed by an emergency diversion to a nearby base. Although a successful recovery may be effected, this portion of the mission has not been made without a degree of compromise to its safety. The occurrence, therefore, is reported by means of an aircraft occurrence report (CF215). Additionally, the crew documents the failure in the aircraft maintenance servicing set. Now let us further presume that in attempting to rectify the "snag", a technician quickly recognizes the problem as a broken retaining clamp on the hot-air duct. The faulty clamp is then discarded, a new one installed and the aircraft is quickly returned to service. The subsequent Supplementary Report (or Flight Safety investigation) into the occurrence has unwittingly been compromised, for in discarding the broken clamp the technician may well have destroyed the "key" to the cause of its failure — a fatigue crack — which could have been detected by close inspection. Analysis of the failed clamp may have revealed a manufacturing defect that could have safety ramifications throughout the entire fleet.

The point is, that if we are to learn from our failures we must be able to recognize their causes. This is the sole purpose of Flight Safety reporting and investigation.

All of this has been a means of introducing the Air Transport Command Flight Safety Stamp. The stamp is used to identify those entries in the aircraft maintenance servicing set which will result in the dispatch of an aircraft occurrence report. Recognizing the specially marked entry, any technician working on the reported "snag" will be alerted to the fact that a Flight Safety investigation will be conducted to determine the causes of the malfunction. Accordingly, he will be expected to safeguard any components or materiel associated with the failure. It may also be deemed necessary by supervisory personnel to photograph, x-ray or otherwise document affected components. In essence, the Flight Safety Stamp affixed to a maintenance servicing set will, hopefully, reduce the number of "undetermined" cause assessments that are presently assigned to technical failures.

The responsibility for ensuring that the stamp is used must be shared jointly by maintenance and aircrew personnel to guarantee the success of this procedure. The following administrative guidelines for the use of the stamp have been established for Air Transport Command:

- Air Transport Command Technical Instruction (ATCTI) 00-80-4/3 relates to the subject. Its contents should be given wide distribution among aircrew as well as technical personnel.
- The stamp will be held at every servicing or repair desk where servicing sets are kept and aircraft are signed in and out by aircrew.
- The aircrew member making the servicing set entry is responsible for ensuring that the stamp is used when he intends to submit an occurrence report. Additionally, he is responsible for informing the NCO in charge, of his intention.
- The positioning of the stamp in the Aircraft Servicing Set and the applicable responsibilities of the NCO in charge of the servicing desk are detailed in ATCTI 00-80-4/3. Aircrew and Technical personnel are encouraged to familiarize themselves with this Instruction as soon as possible.

Mercury Contamination

"CF personnel may be unaware of the ability of mercury to significantly weaken structure even though this product is classified hazardous in CFP 117."

— Extract from a Message

The first the Britannia captain knew that anything was amiss was when he received a telephone call at one of the staging points overseas. The aircraft had left England with a load of freight and passengers, which were off-loaded at the initial port of call in Canada. The Britannia then continued to a second airfield. It was here that the captain was informed by 'phone that his aircraft was probably contaminated by mercury. After unloading at the first landing point a cargo check revealed that a large mercury filled barometer was broken and that a quantity of mercury was missing. Chances were that it was running loose somewhere in the Britannia — hence the urgent telephone call to the captain.

The aircraft was inspected and traces of mercury were found throughout the cabin. It was therefore grounded while cleaning and treatment operations took place. Clearance was then given for the Britannia to return to the UK where a further thorough inspection was made. This inspection revealed Cat 4 damage which necessitated repairs at the manufacturers. As a result, the RAF lost the use of a valuable aircraft for some months.

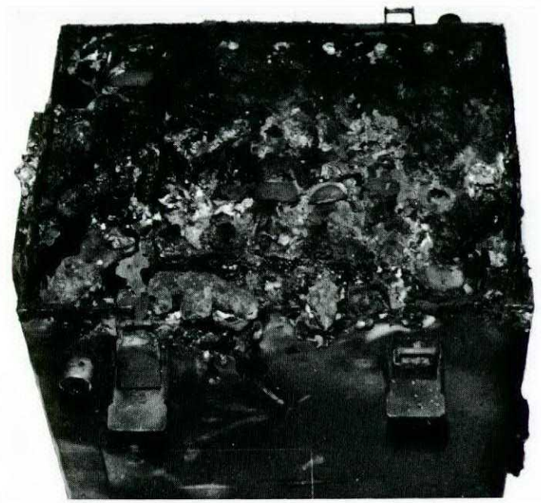
Air Clues

Things Have Changed

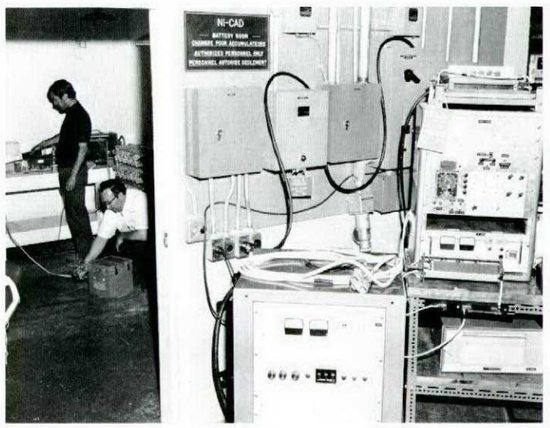
Like all novices, we began with the helicopter but soon saw that it had no future and dropped it. The helicopter does with great labor, only what the balloon does without labor and is no more fitted than the balloon for rapid horizontal flight. If its engine stops it must fall with deathly violence for it can neither float like the balloon, nor glide like the airplane. The helicopter is much easier to design than the airplane but is worthless when done.

Memo from Wilbur Wright 15 Jan 17
Dayton, Ohio

Batteries are usually considered harmless, but when mistreated they can react violently. This aircraft battery compartment shows the extent of damage caused by a Nickel-Cadmium battery failure.



The damage was caused by this battery going into thermal runaway, a result of high ambient temperature and electrical overstressing.



The Quality Engineering Test Establishment has developed and made operational a complete Ni-Cd battery test facility. The capability now exists for performing temperature, altitude, humidity, shock, vibration, high-rate charging and discharging, explosion and life tests, singly or in combination. Current projects include the evaluation of a 22AH battery for the Tutor and LOH helicopter.

QETE

Electrical Laboratories

This fifth article in a series on the Quality Engineering Test Establishment in Hull, relates the capabilities of its Electrical Section to the needs of flight safety. As described previously, a Special Projects group coordinates tasking and provides the focal point for contact with the Directorates of Flight Safety (DFS) and Aerospace Maintenance (DAM).

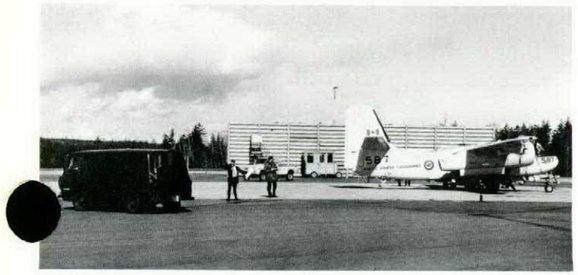
The Electrical Laboratories are staffed and equipped to make timely and meaningful inputs to flight safety investigations and related programs. For example, in some aircraft, pilots use the PB20 autopilot system extensively in a low-level environment. During field inspection of the electronic equipment, corrosion was noted on some of the printed circuit boards and as this could possibly have resulted in equipment failure a UCR was raised. The boards eventually arrived at QETE where investigation revealed that acidic electrolyte had leaked from the tantalum capacitors leaving a conductive corrosion path across the boards. Recommendations were made for replacement capacitors and immediate inspection of all aircraft boards.

Field testing services are available from the Electrical Laboratories on request. A team of engineers and technologists, together with portable test equipment, may be airlifted to COMOX to perform an R.F. field strength survey or to Lahr to investigate an electromagnetic compatibility or interference (EMC/EMI) problem. Extensive back-up facilities for this type of operation are maintained in the laboratory. The shielded enclosure measuring 20 ft. x 20 ft., shown in the photograph, is available for testing the latest Federal (FED) and Military (MIL) specifications. Calibration of associated test equipment is performed in-house against calibrated signal generators and attenuators whose accuracy, in turn, is traceable to the National Standards held by National Research Council. Modern facilities are available in the laboratories to test a wide variety of electronic and electrical equipments, devices, component parts and materials. The Nickel-Cadmium battery testing facility is illustrated. Other facilities exist to test, evaluate or investigate relays, switches, synchros, connectors, cables, semiconductor devices and the many items of hardware found inside airborne equipment. Microwave and microelectronic test facilities are in an advanced stage of development. Test equipment required for a special purpose or not available commercially is designed and built in-house.

Consultation services are also available on request. Time and money can sometimes be saved by calling in test specialists at the early stages of project development. The laboratory input can include suggestions on alternative approaches to problem solving, assistance in setting up testing programs and advise on the initiation of engineering studies and surveys.

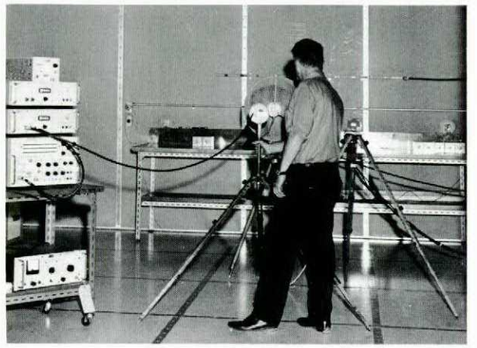
The mailing address for enquiries on electrical or electronic matters is:

Superintendent
Quality Engineering Test Establishment
Department of National Defence
Attention: QETE 4
Ottawa, Ontario
K1A 0K2



One facet of the QETE Electrical and Electronics Laboratory operation is the provision of field strength and electromagnetic compatibility testing services in the field. Extensive back-up facilities for this type of operation are maintained in the laboratory.

A QETE team performs an R.F. field strength survey at CFB COMOX. Calibrated test equipment accompanied the team in this airlift operation.



The Electronics Laboratory also performs electromagnetic compatibility tests on prototype equipment which is to be installed in aircraft. This ensures that the equipment does not generate any signals which will influence the operation of other equipment in the aircraft and that it, in turn, is not susceptible to extraneous signals which may be present.

Tacan Tips

HOW often do you tune in a tacan station and accept any signal which will activate your receiver? Do you always check to make certain that you are clearly receiving the 2-letter Morse code identifier for your intended station? If not you may be "betting your life" on a system which may or may not be providing the information you need to navigate safely. For example, are you, as a pilot, aware that regulations require that a facility's identifier be taken off the air when maintenance is being performed? Absence of the identifier could, therefore, be your warning that tests are being performed which would alter the signal beyond usable tolerance. Do you listen for this warning?

The identifier can also be a tip-off to another system malfunction — Adjacent Channel Interference. If one of the two adjacent channel ground stations happen to be mistuned the result will be a spill-over of azimuth signal. A garbled identifier, or a mixture of identifiers, should alert the attentive pilot to a possible degradation of tacan service. Sometimes it is the "little bit of knowledge" which is dismissed as trivial that can be a dangerous thing.

— *Approach*

On the Dials

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

Aerodrome Lighting

One part of the Instrument Check Pilot's Course deals with Aerodrome Lighting. What has this got to do with instrument flight techniques? Well let's look at a couple of definitions from GPH 209 (Manual of Criteria for Instrument Approach Procedures).

Minimum Descent Altitude (MDA) — "The lowest altitude, in feet above mean sea level, to which descent is authorized in procedures not using an electronic glidepath. An aircraft should not manoeuvre below MDA until the *runway environment* is in sight, and the aircraft is in position to descend for a normal landing".

Runway Environment — "The runway threshold or lighting aids or other marking identifiable with the runway".

As you can see, this can also include runway approach lighting which may extend 3000 feet, giving new meaning to your visibility figures. For example, one statute mile visibility will actually put you in visual contact with the runway environment at approximately 1½ statute miles from the threshold of the runway, if the approach lighting extends out 3000 feet.

So much for definitions. Let us now discuss the physical uses of runway lighting before we cover the requirements for specific approaches. There are, of course, obvious points such as visibility at night or line-up on final, but there are also other important items. For example have you ever considered roll and attitude guidance bars as an aid to transition from instruments to visual flight? Or have you considered that the cross bars in approach lighting are placed at specific distances from the threshold? By knowing the lighting system you can make use of this information.

Three additional uses of runway lighting — touchdown zone lights, centerline lights and taxi guidance lights — designed for extremely low visibility (Cat 2 — 100-¼) situation, aid pilots on the flare, during roll out, and in the taxiing phase.

The question is, "How do *you* use lighting to get the most out of it?" At the ICP school we use a simple test which illustrates how uninformed most pilots are. Care to try it? Turn directly to the lighting legend in your GPH 200 or 201. Without referring to your approach plate, pick out the type of lighting on the primary instrument runway at your own base. If you *guessed* it correctly or if you did not know it at all, read on MacDuff, you can be shown the path to glory and understanding. Maybe you think, "so what, lighting is lighting." But is it? Let us take a hypothetic situation where you find yourself directly over a *single row* of lights. Question: Are you left of the runway centerline, right of centerline, or on the centerline? Answer: Well, that depends. For confirmation check the AB on Runway 31, at Winnipeg, AD Runway 25 at Winnipeg and AG Runway 30L Portage.

For your own sake, before you start an approach, study the plate, and learn all the facets of the approach, including the runway approach lighting. What exactly are the lighting requirements? ICAO says:

- Non-instrument runwa — very low intensity run way-edge, threshold and end lights.
- Instrument runway (ADF-TACAN, etc) — Low intensity approach lighting 1400 feet long.
- Category I runway (200/½ — High intensity approach lighting 3000 feet long.
- Category II runway (100/¼ — Category I requirements plus side row barrettes* over the inner 1000 feet. Cross bar at 500 feet and touchdown zone lighting fo the first 3000 feet of th runway. Centerline lighting for the entire length of the runway.

* *Barrette — a row of 3 or more lights.*

These systems are illustrated in the following diagram. FIGS 1-4

However, in practice these requirements are not followed. There are numerous airports with instrument approaches to runways having little or no approach lighting. These airports are important to our day-to-day operations so an equalizing table called the Approach Minima Table has been adopted. (Table 7-2 Page 42 GPH 209) FIGURE 5.

The way it works is this: if the aerodrome does not meet ICAO standards for lighting, the pilot determines the type of approach and the degree of runway lighting and other aids to the approach, and the table gives him the lowest DH or MDA and visibility.

An example which is fairly common is a precision approach to a runway with no lighting. Normally, radar minima would be 200 feet and ½ mile. If we check the table we find that the decision height becomes 250 feet and ¾ mile. This is somewhat like the procedure for landing at an unfamiliar or short runway. The pilot's first tendency is to be set up early, preferably on a straight-in approach to allow more time to adjust to the unusual surroundings. This is what is accomplished by raising the decision height and increasing the visibility requirements.

This article has merely skimmed the surface. There is much more: strobe lights, taxiway lighting, programmed taxi routes and traffic control on the runway. When you're reading the various magazines in the crew room, keep an eye out for some of the developments in lighting. There is also an excellent film available, called "Approach and Runway Lighting".

One last word. You wouldn't land VFR without knowing the runway; therefore, don't land IFR without knowing your lighting.

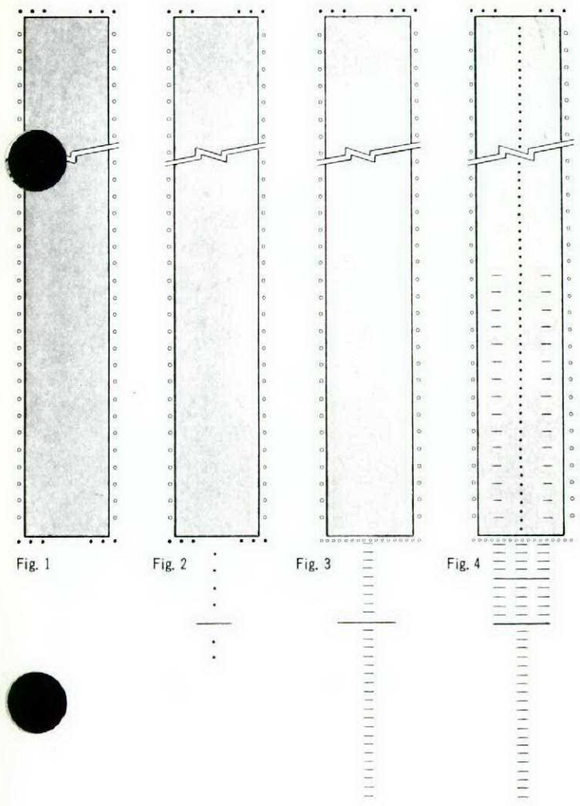


Fig. 1 — Non-istrument Runway

Fig. 2 — Instrument Runway

Fig. 3 — Precision Approach Runway (Category I)

Fig. 4 — Precision Approach Runway (Category II)

Fig. 5

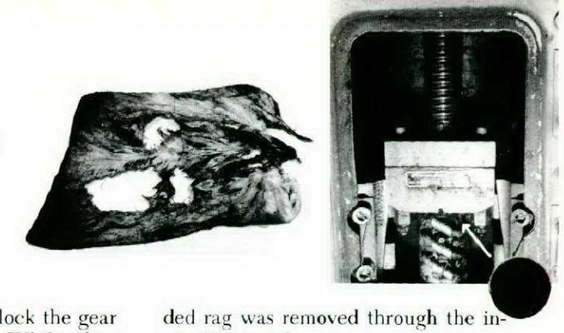
TABLE 7-2

APPROACH MINIMA

Operative Components Required	Lowest DH & Visibility
LOC;GP;OM;MM; Hi Int Centreline ;App Ltg; Hi Int Rwy Ltg. PAR ; Hi Int Centreline App Ltg; Hi Int Rwy Ltg.	200-½
LOC;GP; One Marker; Hi Int Centreline App Ltg; Hi Int Rwy Ltg.	250-½
LOC;GP;OM;MM PAR	250-¾
LOC;GP	250-1

Operative Components Required	Lowest MDA & Visibility
LOC; One Marker ; Hi Int Centreline App Ltg; Hi Int Rwy Ltg. PAR w/o GP ; Hi Int Centreline App Ltg; Hi Int Rwy Ltg. ASR ; Hi Int Centreline App Ltg; Hi Int Rwy Ltg. TACAN ; Hi Int Centreline App Ltg; Hi Int Rwy Ltg. VOR/DME ; Hi Int Centreline App Ltg; Hi Int Rwy Ltg.	250-½
LOC; One Marker ; Hi Int Rwy Ltg. PAR w/o GP ; " " " " ASR ; " " " " TACAN ; " " " " VOR/DME ; " " " "	250-¾
LOC; One Marker ASR TACAN VOR/DME	250-1

Gen from Two-Ten

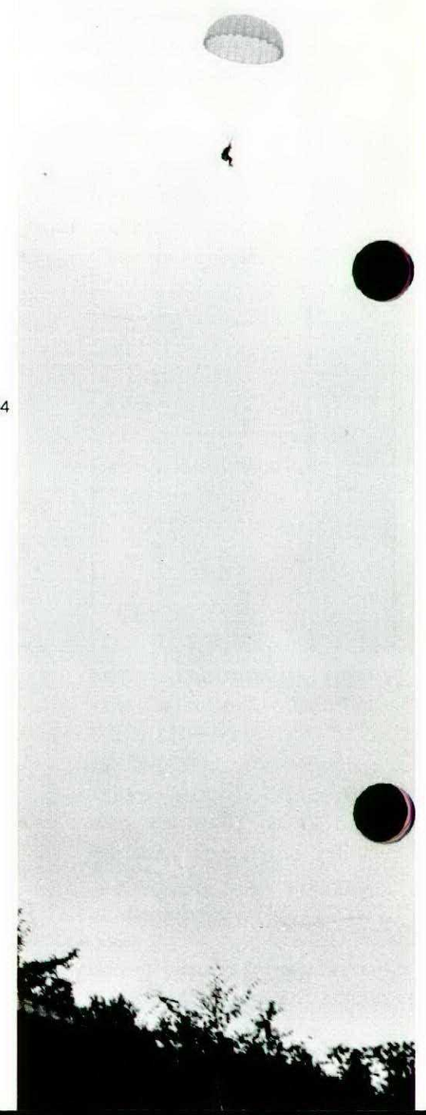


HERCULES, LANDING GEAR FOD When he selected the landing gear "down" on the pre-landing check, the pilot received an "unsafe" indication on the left main gear. A recycle resulted in the same indication so the crew set about to lock the gear into position manually. While they were doing this they found a shop wiper rag entangled in a screwjack bearing housing. The partially shredded rag was removed through the inspection panel.

With the obstruction removed, all the wheels locked down and the Herc landed uneventfully.

CF104D, THROTTLE CABLE FAILURE While he was pulling off the target during a simulated bombing attack, the pilot selected afterburner for the climb back to the downwind position when he sensed that his airspeed was low. The AB failed to light and the RPM held steady at 85%. A quick, complete relight procedure brought no relight response, and with the aircraft losing airspeed and altitude rapidly, both pilots ejected successfully. The aircraft crashed seconds later into a heavily wooded area.

The investigation traced the cause to a material fatigue failure in the throttle cable, which prevented the power from being increased. When the pilot selected AB, the power remained at 85%, the setting it was at prior to pulling off the target; when he then went to idle during the relight procedure, the power dropped to idle and remained there, even after the throttle was moved forward. In either case a bailout was inevitable since the aircraft could not have flown back to base at 85%. Corrective action taken as a result of the accident included replacing all CF104D throttle cables and, since the inspection techniques used prior to the accident would not have uncovered the breakdown of the cable, a more thorough inspection technique has been devised.



Another successful low-level ejection from a CF104

CF104, 180° COMPASS ERROR The pilot was leading a four-plane section on a bombing training mission at the Suippes range in France. When he was pulling up on a LADD manoeuvre after the last pass, he entered cloud and simultaneously the MAI (main attitude indicator) failed to 30 degrees nose down, and the LN3 indicated NO-GO. Because the MAI was very slow to slave to the "standby" system, he recovered using the standby attitude indicator, after which he selected the LN3 to "compass only."

The pilot then turned to 090 and headed for the pre-briefed join-up point, an abandoned airfield, but when he was unable to find it, he elected to climb to high level on a home-bound heading rather than remain below cloud in the reduced visibility.

During the climb he checked that the DR bearing and distance to home base (Soellingen) were correct, but he was unable to receive an en-route tacan which he had used on the way to the range. He then made the usual communication contact with radar, but they were unable to identify him, and to his further dismay he found he could not receive any of several other tacan stations that he selected.

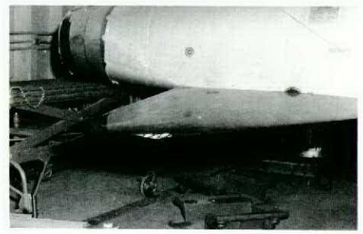
Finally, after squawking emergency, another radar identified him, far to the east of his estimated position.

By this time it was apparent to the pilot that his compass had been approximately 180° in error, a fact he had not been able to determine by the sun because it was high in the noon sky. Low on fuel by now, he was forced to divert to a nearby French base just north of Paris.

Technicians had great difficulty pinpointing the exact source of the LN3 NO-GO and it recurred periodically on subsequent test flights — always under conditions of applying G, which cannot be simulated on ground checks. Finally they traced it to intermittent wiring connections which were causing the LN3 NO-GO whenever G was applied. A similar breakdown at the aft section disconnect caused the C2G Compass errors.

CF5, DAMAGED BY FALLING HOIST Two men were working in a hangar replacing coils in the building's heating system. Because of the weight of the coils, hoisting equipment was being used. However, the hoist was barely adequate to lift the coils and inherently unstable when swinging heavy loads. In due course the hoist tipped, dropping its load onto the horizontal stabilizer of a nearby CF5. Reconstruction of the events leading up to the occurrence revealed that:

- The men undertook the hoisting job in a very congested area, using equipment with which they were not familiar. Aircraft, ground support equipment and ballast sandbags were all in the vicinity of their work area.
- The hangar staff were not asked to clear the area.
- The work was not adequately supervised.
- The hangar staff failed to show concern about what was "going on" in their hangar.



- The task was being performed with too few people.

Fortunately no one was injured and damage to the aircraft was slight.

Comments to the editor

Photo Queried

As an avid follower of your Flight Safety and Education Programs, I am somewhat disappointed by the photograph on Page 23 of your May-June issue. This photograph shows Maj Arnott apparently preparing to go flying. However, his helmet and facemask are laying on the tarmac (you can pick up dirty little things that way), he is wearing permanently affixed spurs (a flight safety NO — NO), his parachute cable is not properly buttoned, and the flap over the Mae West inflation bottle is done up (not recommended by DFS). Come come now fellows, your slip is showing, n'est-ce pas?

Maj R. Elder
CFHQ

Occasionally, because we don't have a staff photographer, we are forced to improvise when deadlines press. This usually entails cutting or touching up a not quite up-to-date photograph. The oversight of not cutting the one in question higher, was not one of those errors we deliberately slip in from time to time to keep our readers alert.

Omission

The quality of Flight Comment is always enjoyed by all members of VU-33, but as is nearly always true, the only letters the Editor receives are to point out errors or omissions. This letter is no exception, as it brings attention to an omission.

Page 10 of the Mar-Apr issue carries a very informative and worthwhile article, but it has been drawn to the attention of our pilots that there is a word omitted. In the paragraph concerning 'Aircraft Minor Defect Records', the sentence pertaining to operating from other than home bases should read "AWAY from its parent base ..." The omission of the word, "away" changes the meaning entirely.

Maj G.D. Westwood
CO, VU-33
Sidney, B.C.

That's right. The word was inadvertently dropped in copying the sentence from the AMO.

Subtle Requests Not Appreciated

The Mar-Apr "On the Dials" states that the military Air Traffic Control organization is slow to adopt new procedures and suggests two ways that a pilot may "speed things up".

First of all, let me point out to the author that the procedure he mentions was used by the military controllers at CFB Bagotville as long as 4

years ago. I personally feel that it worked very well, but it was neither desirable nor necessary to be used in all cases all of the time. This should refute the statement that we are slow to adopt "new" procedures.

Secondly, the author's suggestions of ways to "speed things up" will only create animosity between the pilot and the air traffic controller. If you have a proper suggestion, any Base Air Traffic Control Officer, Base Instrument Check Pilot or Base Flight Safety Officer will be only too happy to listen to it.

Animosity between pilots and controllers is one sure way to endanger flight safety.

Unfortunately, this article has already received wide distribution. It was poorly researched and showed a lack of common sense. I hope that it still isn't too late to stop a barrage of "subtle requests" from CF pilots to the CF air traffic controllers.

Captain G.F. Stokes
Air Traffic Controller
CFB Greenwood

The article in question brought reaction from controlling agencies across the country. The following is the essence of the reply from the ICP school:

The article was prompted by an incident involving four departures from a Canadian Airport which at the time was reporting minimum weather conditions consisting of low ceilings, blowing snow, icing and so on. As each aircraft became airborne, the tower advised, "change departure frequency", and immediately, Departure Control began calling the aircraft on guard.

The departure phase of any flight is equally as critical as the arrival phase and the work load at these critical times should be kept to a minimum. The article was not intended to infer that the change to departure frequency while on the runway should be made at all times at all airports, however, if the frequency change must be made soon after takeoff, then why not make it on the runway?

The problem of flight safety while controlling both VFR and IFR traffic is appreciated; however, it is the IFR situation to which the reference was intended. The Single Departure Frequency is used at many airports (O'Hare, Gatwick, Dusseldorf and Lahr, for example) although not necessarily when VFR conditions exist. A future issue of Flight Comment will carry some further comments on this subject. While it is still felt that the procedure is sound, the suggested method of implementing the system by "subtle requests" was a poor choice of words.

Inadequate Flying Clothing?

The article "Northern SAR Operation", on page 5 of your Mar-Apr issue, has prompted me to write. Although the outcome was a happy one, it could have turned out quite the reverse.

Would the two smiling crewmen be smiling if in fact they had jumped? Their flying clothing was hardly adequate for northern Canadian operations – especially winter operations. From personal experience I know, "brother it's cold outside!"

H.W. Baak
VP 405 Greenwood

The two crewmen would be the first to agree. They were in fact dressed for the occasion, but unfortunately, we were unable to have a photographer record the scene first hand and had to settle instead for a photo taken in the more temperate climate in front of Hanger #9 at Trenton.

Something Wrong Somewhere

"There must have been something wrong with the aircraft to make it bounce so high. I think the pilot had to wait to make his go-around until after we quit bouncing. By then there was not much runway left."

— *US Army Aviation Digest*

Lucky Bounce

"After we bounced up onto the runway the pilot did a fine job of getting control of the aircraft."

— *US Army Aviation Digest*

Answers to Wx Quiz

A-TL B-WG C-YU D-YQ E-MO

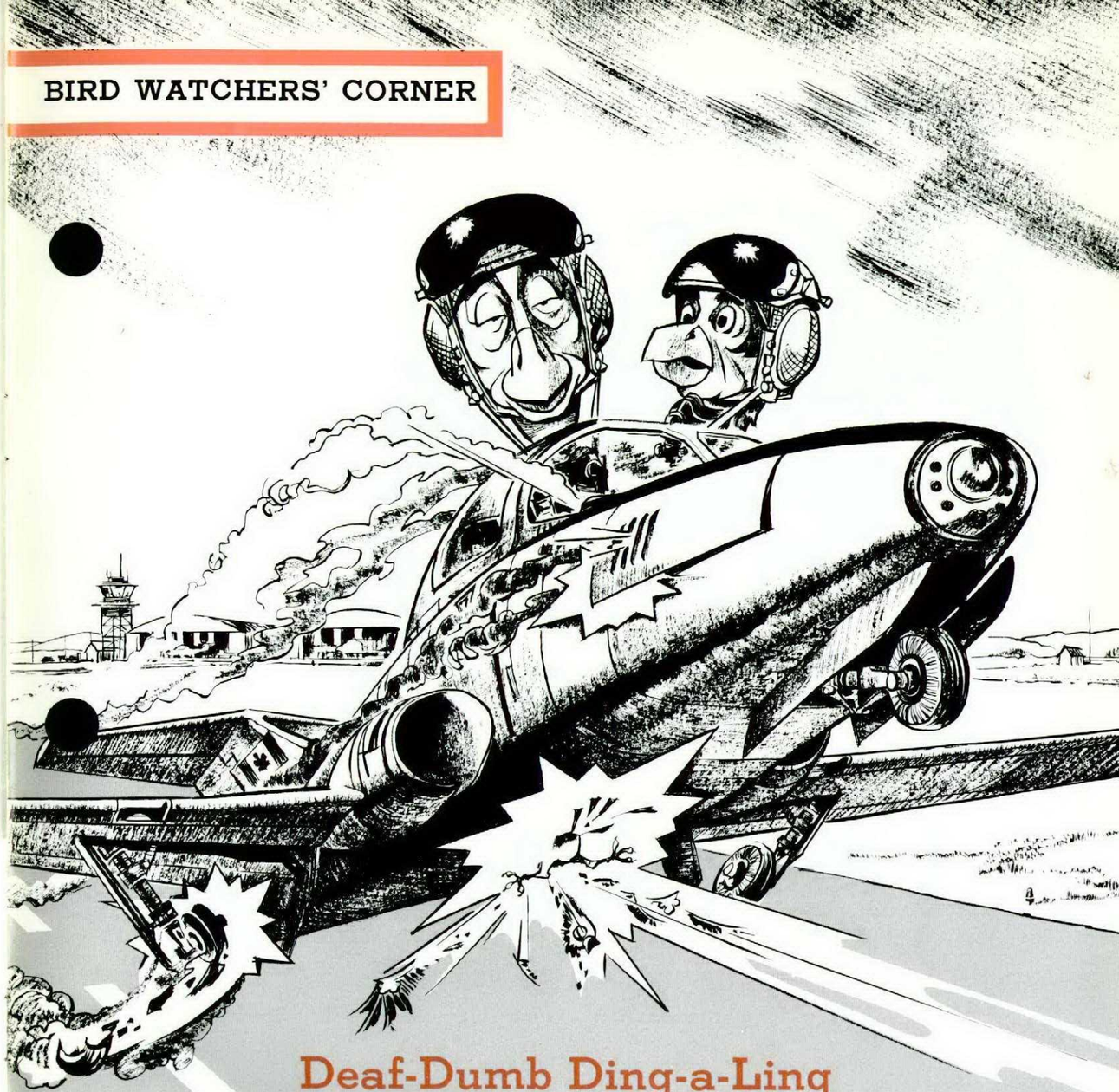
BEST BANG OF THE MONTH

During a refuelling stop on a cross country the pilot noticed that the spring in the external canopy latching switch was weaker than normal, although the latch closed properly. While climbing through 14000 feet on the next leg of the flight, an engine rumble developed for two or three minutes, followed by a slight "pop". Then the rumble ceased. All indications were normal so the pilot continued the flight, attributing the noises to the cockpit pressurization system.

When the aircraft landed the external canopy switch door was missing and there was a small hole in the fuselage near the intake. Later, damage was discovered on the compressor blades.

Contributions to this feature are welcome. It provides another opportunity to learn from the experience of others.

BIRD WATCHERS' CORNER



Deaf-Dumb Ding-a-Ling

This well-known winged wonder seemed to be nearing extinction, but keen birdwatchers say that it continues to thrive. A curious denizen of the air, the Deaf-Dumb Ding-a-Ling is renowned for his insensitivity to bumps, bangs, pops, hums, in fact, all the signals which alert the average member of the feathered tribes to the possible onset of a flight hazard. Old Ding-a-Ling matter-of-factly dismisses all signs and presses on. Once he has performed his preflight rites and launched into the blue, it's going to take a sizeable sound to force him to forego finishing his flight. With Ding-a-Ling, the mission comes first, whether it's an intercept, student training, or just hustling homeward for bird call. When at last he is aroused, as the real dimensions of the problem become apparent, the rising pitch of his characteristic birdsong becomes clearly audible:

EVERYTHING-LOOKED-OKAY NOW-I'M-SCREAMING-MAYDAY

LEAVE-TAKING