FLIGHT COMMENT

JULY • AUGUST 1972

How not to break your aeroplane — page 2

Comments

In response to the rash of ground occurrences during 1971 and the first half of 1972, one Commander's directive included the following remarks in reference to taxiing accidents: ". . . Professionalism entails the ability to function with responsibility and common sense when faced with decisions not specifically covered in orders."

Several times recently pilots have elected to start an engine without a proper start crew in attendance. The situations were similar, one engine was idling and the other had been shut down while passengers boarded. In one instance the pilot had been asked to wait, in another the start crew was approaching when the engine was started. The hazard this practice creates for line personnel is well known, as should be the requirement that start crews be on hand for all engine starts. Where they are not available, an aircraft crewman must stand by as fire guard.

Not long ago a pilot experienced some exciting moments while making his escape from a burning aircraft after a forced landing. When the wreckage came to a stop he found he had to extricate himself through the canopy, however he emerged with nothing worse than lacerated hands, although the aircraft was totalled. His experience once again makes the case for wearing flying gloves – *on every flight* – because chances are, as happened in this instance, the one time you don't wear them will be the time you need them most.

Two solo student pilots (from another air force) attracted attention not long ago when they had a midair – *while doing clearing turns.*

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Sincerity — or Hypocrisy?

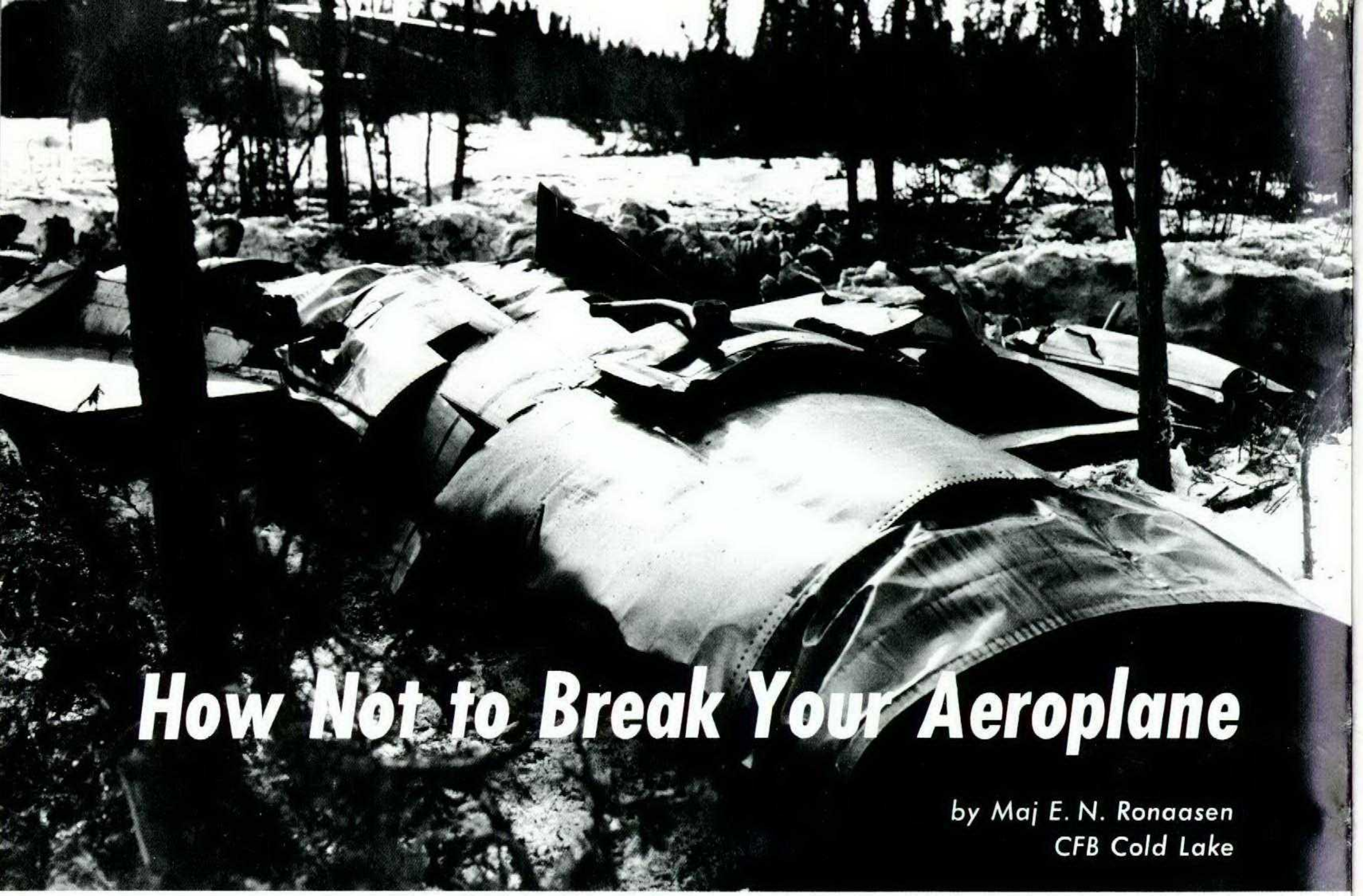
Are you a believer in the flight safety programme as an essential part of well managed air operations or do you really consider it just another impediment to getting the job done?

There is evidence that some supervisors of aircraft operations let their aversion to the word safety influence them to such an extent that they leave the prevention programmes, such as they are, to the flight safety officers, without positive direction or support. Such an approach is guaranteed to fail because safety officers do not have the responsibility for getting the job done or for establishing policy on how it is to be achieved.

If you are one of the people, supervisor or not, who don't believe that a positive flight safety programme enhances mission accomplishment, then you are a safety problem – how much of a problem depends on your position in the organization and on the way in which you approach the issue. If you admit that you have reservations or are against the programme in principle, at least we know where you stand and can try to change your mind. On the other hand, if you make a pretence at supporting the programme without really believing in it, you are a hypocrite and such an attitude will surely have a negative influence on others. It is this cancerous influence which is of greatest concern because it can destroy the effectiveness of any accident prevention programme through the loss of trust and confidence on the part of everyone concerned.

We have over 50 years of experience that proves that a sincere approach to flight safety makes sense. How then can we afford people in the air operations organization who have a negative attitude towards accident prevention? We can't. So let's take the positive approach without qualification.

COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY



How Not to Break Your Aeroplane

by Maj E. N. Ronaasen
CFB Cold Lake

Load limits! Rolling G limits! We can read all about them in the flight limitations parameters of the dash one. But do we really understand everything these V-N or V-G diagrams have to tell us? With over 6000 hours flying time (mostly fighter), including over 2000 hours in the CF104, the author is well qualified to offer a straight-forward explanation.

Pilots, at an early age, get to acquaint themselves with the Part Four of pilots' notes. They have to write exams and impress their instructors by reciting limitations. This same pilot, by the time he has joined a squadron, still has to memorize numbers to four or five significant figures that often apply to readouts that can be read to two. He usually succeeds, but the question that arises is, "Does he really understand what the limits mean?" E.G.T., cylinder head temperature, oil pressure or hydraulic pressure are easily understood. Acceleration or speed limits? These are probably understood fairly well but what about "limit load" or rolling "G" limits?

One of the basic operating flight limitation parameters is illustrated in what is called a V-N or V-G diagram. You should have one in the dash one of the aircraft you now fly. They should look something like Fig. I. Some large transport aircraft may have several pages of illustrations to accommodate the many loading possibilities available.

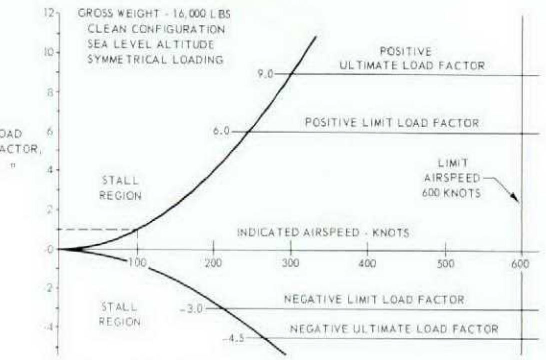
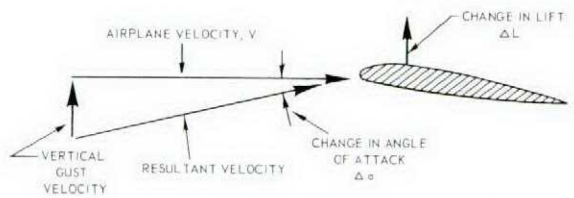


Figure I – Flight Strength Diagram

I have chosen a hypothetical aircraft which would represent a trainer or fighter type. This diagram (Fig. I) represents an aircraft's limits at a specific weight, configuration and altitude. Change any one of these and the diagram will change. Sometimes this diagram is called the flight envelope but, remember, any time it is referred to, the relevant conditions must also be specified.

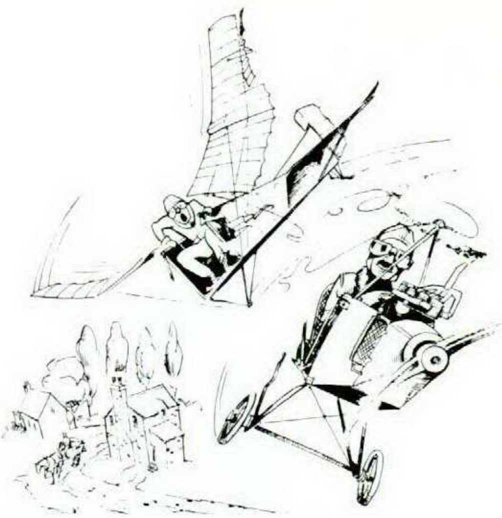
The aircraft shown has a positive load limit of 6 "G" and an ultimate of 9 "G" (6 x 1.5). The negative load limit is –3 "G" and an ultimate of –4.5 "G" is shown. The limit speed is 600 knots and the 1 "G" stall speed is 100 knots. The first obvious information this V-N diagram gives us is the minimum airspeed required for the wing to generate enough lift to produce the various "G" loadings. The first point along this maximum lift curve is its intersection with the load limit lines. This point represents the minimum speed at which the maximum load for normal operation can be generated. This is sometimes called the manoeuvring speed and can be useful for such things as penetration speeds. This allows you to fly at the maximum speed which permits maximum manoeuvre performance.

Let us look at the limit and ultimate load factors a little closer. Limit loads are those that an aircraft structure can sustain without permanent deformation. Loads above this limit will deform or damage the structure, and as we approach the ultimate limit, structural failure is imminent. Those limit loads are never exceeded! Or are they? "Not to worry!", you say. "We have a 150% safety factor." You are right about the safety factor but worry you must if you think flying into this safety factor is all right. Safety factors have been provided, because of sad experience over the years, to provide a certain amount of reserve strength necessitated by variations in the physical properties of materials, the approximations involved in aerodynamic and structural stress analysis theories, and variations in fabrication and inspection standards. It may just work to help you out of that rare situation where the limit must be exceeded to prevent disaster. If the "Nickel on the Grass" routine won't work for some of you fighter pilots, the safety factor may just save you. In that area, between the load limit and the ultimate limit, the aircraft receives permanent damage or deformation. If you persist and approach the ultimate load, disastrous failure is imminent. Why not make stronger aircraft? One could but this adds weight and reduces performance. A clever designer tries to do the opposite – reduce weight but not strength. This way he increases performance. Some of you may remember our famous MK V and MK VI F86 models. The engines had a little more thrust than previous models but a less obvious change was a reduction in weight. The result – a spectacular performance increase.



Effect of Vertical Gust

The airspeed limit is set for a variety of reasons. I will mention some of them. The one we may not easily understand is critical gust loading, Fig. II. Some aircraft, especially the slower flying one with high aspect ratio wings – Otter pilots take note – are very prone to overstress because of gust loadings. The V-N diagram for an Otter is modified considerably because of the possibility of a gust causing structural damage. This is caused simply due to the gust velocity vector being a large portion of the aircraft's velocity vector. There have been some tragic incidents where airliners have suffered structural failure due to critical gust loading.



Destructive flutter can be another reason for an airspeed limit. Aileron reversal with flexible wings presents a pilot with an interesting situation. Critical compressibility effects with stability and control problems. Overheating of surfaces or engines at very high speed. The list goes on, and any one will give the particular aircraft its speed limit.

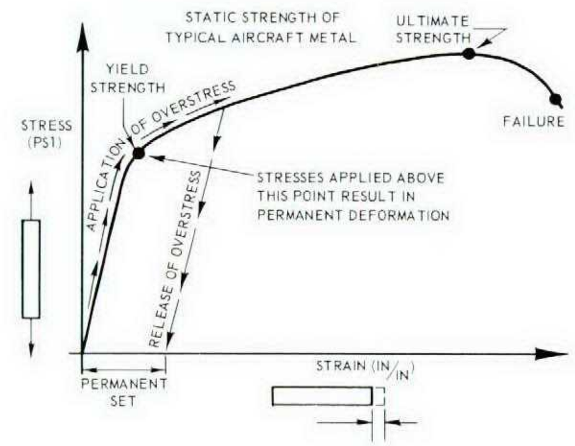


Figure III

The strength of metals is usually illustrated pictorially by a stress/strain diagram, Fig. III. It shows how much a square inch of material will stretch for the load applied. This stretch will be proportional to the load applied during the material's elastic range until its elastic limit or yield strength has been reached. If loaded beyond this point, the material will not fail immediately but it will stretch at a disproportionate rate and will not return to its original size or shape when the load is released.

You are right – it has been overstressed – sound familiar? Each metal type has its peculiar stress/strain curve and will have an ultimate strength and failure point.

How does this stress/strain curve relate to the V-N diagram? The 150% safety factor stress engineers use probably came from the fact that in most old type aircraft metals, the ultimate strength was 150% of the yield strength. The designer could give you that "Get you home" safety factor and exploit the material to the maximum. On the V-N diagram shown earlier, the 6 "G" represents the yield strength and the 9 "G" represents the ultimate strength. In other words, you can fly this aircraft under the conditions listed to 6 "G" without bending it. Above 6 "G", there would be physical evidence of deformation.

New metals made their appearance some years ago and designers rubbed their hands with glee. As we said earlier, better performance with a lighter airframe. Now all the designers had to do was exploit this stronger material. He could use thinner skins than before and still get the same strength. Sad to say, it was not that easy. Other more insidious problems had appeared.

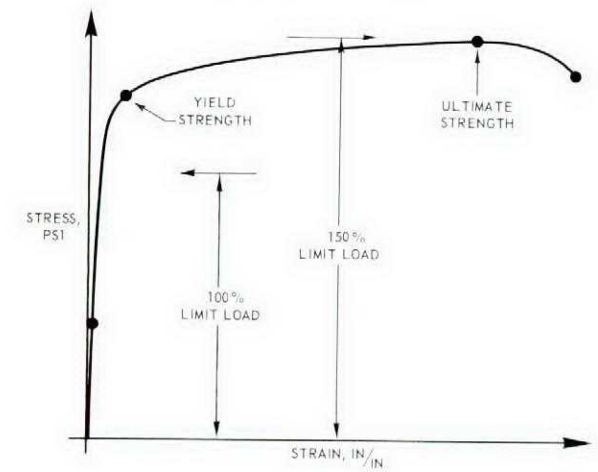


Figure IV – Typical Stress Strain Diagram for a High Strength Aluminum Alloy

One of the problems was that the shape of the stress/strain curve had changed, Fig. IV. The curve rose more sharply, but then, at the yield strength, it flattened dramatically. The ultimate strength was no longer 150% of the yield strength. In order to provide that same safety factor, the designer had to put the limit load factor in that stress/strain range below the yield strength. "What a waste!" you say. Perhaps you say to yourself, "Hmmmm – now I can pull more "G" than allowed and no one will know the difference!" We can flirt in this area and no tell-tale wrinkles will show up. Those old Sabre jocks had a hard life – Don't eat that Elmer! We are the ones who have the problems.

Now we must look at a monster that could be almost ignored in older type aircraft – now it is bigger than life. It is called Fatigue. These newer metals cannot cope with fatigue nearly as well as the older types. Fatigue, despite its menace, is still largely unknown. Its analysis is still called a "dark science", even by those who know it best. There are a few things that are known, however.

If a structure is subject to repeated or cyclic loadings that are well below the normal limit load, it will eventually fail. Naturally, higher loads require fewer applications to cause failure and lower loads will require almost an infinite number of applications to cause failure, Fig. V.

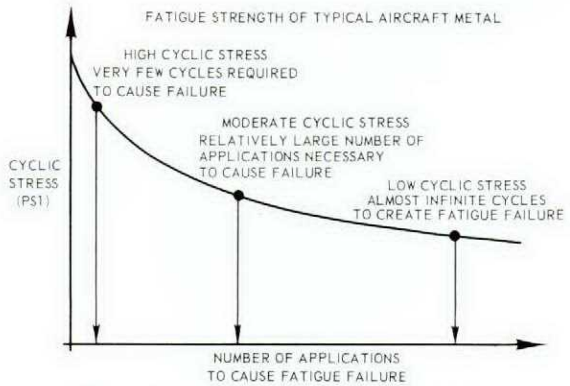


Figure V – Strength Characteristics

This failure is caused by minute cracks which grow slightly during each load application until the cross section is reduced and finally this lower than ultimate load will cause failure. This over-simplified look at fatigue is only meant to show you we have a problem – but it is not a simple one to control. As I said earlier, these new metals do not stand up well to fatigue especially when cyclic loads are high. When we add to this that no deformation or evidence of exceeding the limits occurs until we approach the ultimate load factor, you can see what a box we are in. Our maintainers trust that you and I will not exceed the limits and that if we inadvertently do, that we will report it. Treat your charger with tender love and care – you and I will be glad we did.

If we look at the pictures in the pilot's notes of our hypothetical aircraft, we will see a "G" meter with a red mark at 6 "G". That is the limit. If we bother to read the fine print on the next page, it will say that if drop tanks are carried, the limit is 5 "G" and if now we roll and pull "G" at the same time, we are down to two-thirds of 5 "G". Is it really true that our 6 "G" hot rod is now a very mild 3.3!? – Yes Sir, 3.3 "G" is now the limit load and 5 is the ultimate. Why – that's not performance!

Our poor designer is faced with many problems. The wing, for example, has ideally an eliptical spanwise lift distribution. Bending moments for spars and root fittings can be calculated but, add those drop tanks, put an aileron down into the breeze – pull some "G". The lift distribution along the wing has changed – it is probably being twisted because of aileron loads and at a time like this the drop tank is adding its complication. Things

"Our poor designer is faced with many problems."

like high tails or those employing the "T" configuration were probably designed to solve a longitudinal stability problem or to correct some yaw problem. Can you imagine the loads these configurations suffer at a high rate of roll? A tail can easily be the critical factor.

Our problems may be more than structural. The normal stability we are accustomed to may be reduced at high speed or at high roll rates. If we let this roll wind up or back off on the "G" at the same time we could be in big trouble. Read and heed all those limits.

We, as pilots, should not be put off by all these horror stories. There are many sources of information on the topics I have tried to introduce you to. The lectures and studies you did as student pilots are probably a little vague by now. Your aircraft's limitations will make more sense if you take the time to study them a little. Give it half a chance. We will all have healthier aircraft and some of us will sleep more comfortably.

I probably still have a few readers – engineers – picking this article to bits. Just for them, I would make one more plea. Give us a "G" meter that works. One a little more scientific than a spring and bob weight. It should make Friday night a little friendlier.

I am going on leave! Please don't "bend" my airplane while I'm away!

Maj Ronaasen, a graduate aeronautical engineer, joined the RCAF in 1950. After obtaining his wings he joined 441 Sqn at North Luffenham flying F86s. He then attended the Empire Test Pilot School and from 1956 to 1966 was employed as test pilot with the National Aeronautics Establishment and CEPE, flight testing on the early CF104 program. He later served as SOFS in 1 Air Division, followed by a tour on CF104s with 430 Sqn at Lahr. He is presently deputy to the senior test pilot at the Aerospace Engineering Test Establishment, Cold Lake. Maj Ronaasen has accumulated over 6000 hours flying time on forty different types (mostly fighter), including more than 2000 hours on the CF104.

Get Home Itis — Again!

Within the past few months two accidents have occurred in which aircraft sustained damage when landing away from home base. In both cases, the pilots assessed the damage in consultation with available technical personnel (not qualified on the particular type) and decided that the aircraft was serviceable for the return flight. When the aircraft returned both were found to have sustained structural damage necessitating replacement of major components.

In several other recent cases, aircraft have developed unserviceabilities while away from home base and the pilots involved have made the decision to return home without consulting qualified technical personnel.

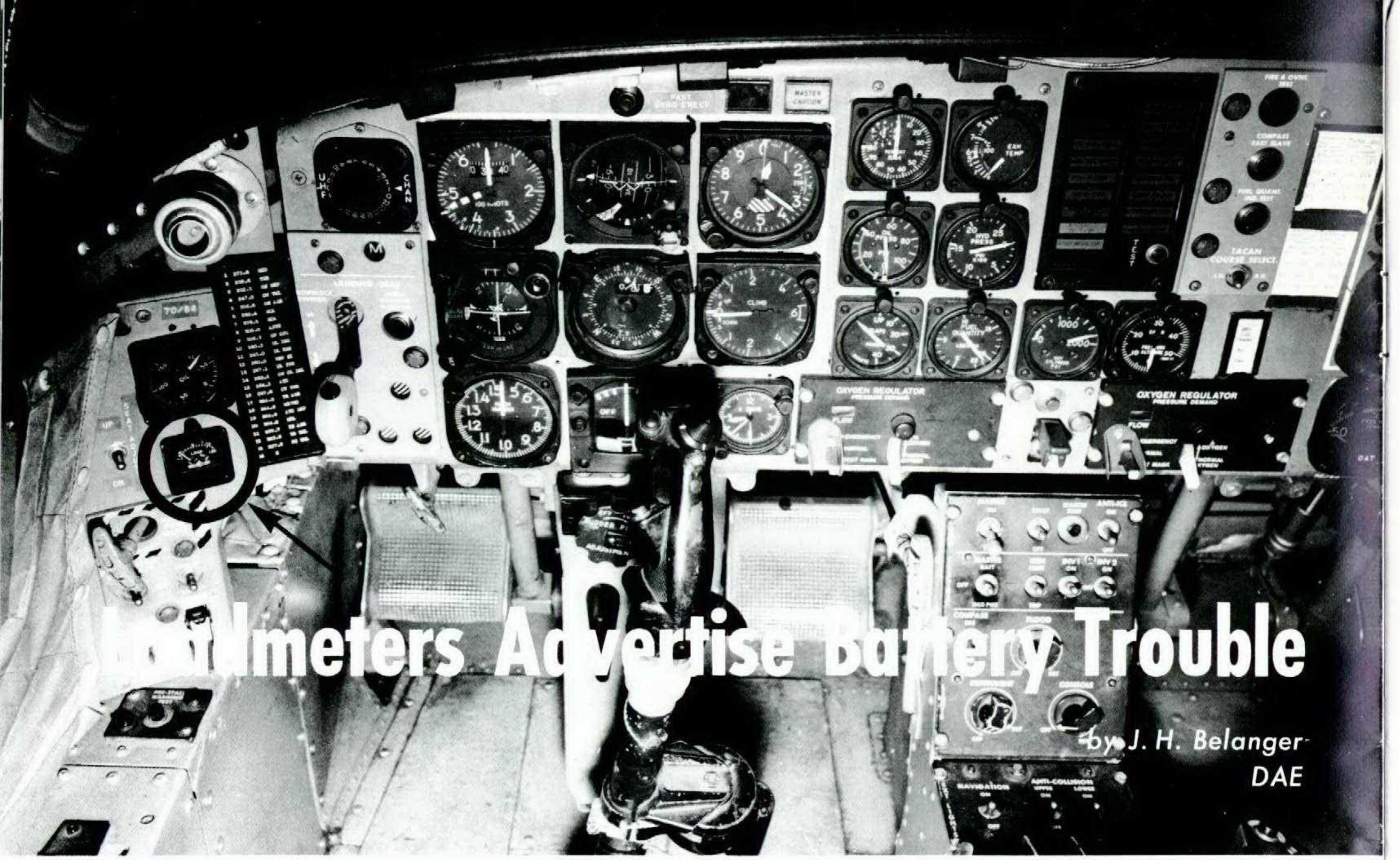
There is not much doubt that for creating maximum frustration in pilots' weekend (cross-country) plans, nothing quite beats having an aircraft go u/s, particularly in some out of the way place. However, reacting to such situations by flying damaged or unserviceable aircraft without proper inspection by qualified technicians can lead to embarrassment – or worse, as the record clearly indicates.

Common sense, not pride, should prevail. The home unit should be contacted giving full details to supervisory and technical personnel. They will advise the course of action to be taken.

Last Look-See

The daily pre-flight inspection is the last look-see prior to entering the wild blue yonder. To err is human and you are the last human to look for someone else's error. Your pre-flight may be the deciding factor in simply leaving the ground or leaving the world!

USN CROSSFEED



Loadmeters Advertise Battery Trouble

by J. H. Belanger
DAE

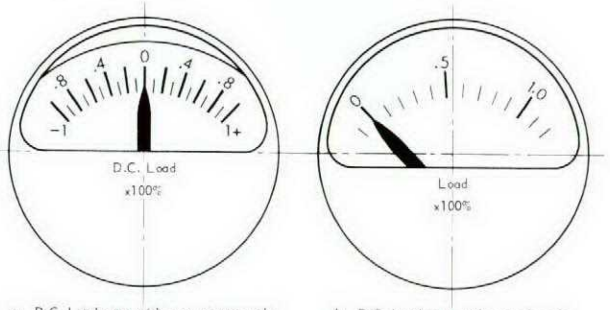
The generator loadmeter is that ubiquitous little instrument found in the majority of aircraft/helicopter electrical system, which tells how much d.c. power is being produced by the electrical power source.

Now remember, a generator, or any power source only puts out what is demanded from it. In other words, the generator output consists of the load drawn from it, including the charging current being accepted by the battery. Thus, in aircraft which use nickel-cadmium batteries, the loadmeter plays a key role in advertising battery trouble. Figures 1 and 2 show two types of loadmeter dials in use, and typical circuit disposition. The face is calibrated to show the percentage of its full capacity that the system is producing.

Your aircraft's generator loadmeter is actually a type of standard ammeter. But what is an amp? Well, you just recall the old hydraulic analogy. The volt is equivalent to pressure (e.g. psi) whereas the amperes is the amount of current flow in coulombs per second, (i.e. the electrical equivalent of gallons per minute).

The d.c. source loadmeter thus indicates, in standardized form, the instantaneous values of current drawn from the d.c. source, as well as the instantaneous electrical loading on the source as a percent of the normal source capacity or rating. It is useful at this point to recollect that the nominal rating of d.c. generators is that which they can supply continuously up to a certain altitude.

The battery loadmeter works like the battery charge/discharge meter on your car. When it reads right of zero,



a. D.C. Loadmeter with zero centre-scale   b. D.C. Loadmeter with normal scale

Figure 1: Two Types of D.C. Loadmeters

it shows that the battery is "charging", and the further to the right the gauge reads, the higher the charging current. Right after you start your car engine, the pointer swings over to the right for a brief time, and it gradually falls back as the battery comes up to charge. When the battery is being charged, it functions as a load, i.e., it takes in power from the generator. Some aircraft, i.e., the Twin Otter, have a Battery loadmeter with a zero-reading center-scale which operates in this way.

The terminology used above is valid for most installations. In the CH113/CH113A installation however, a.c. loadmeters are provided to read alternator phase output, a selector switch being also available to select the phase. The CH113 in addition has a d.c. loadmeter that measures the output of the transformer-rectifiers which power the 28 volt d.c. bus when the alternators are in operation.

Anyway, the small-face dimly-lit loadmeter can tell you

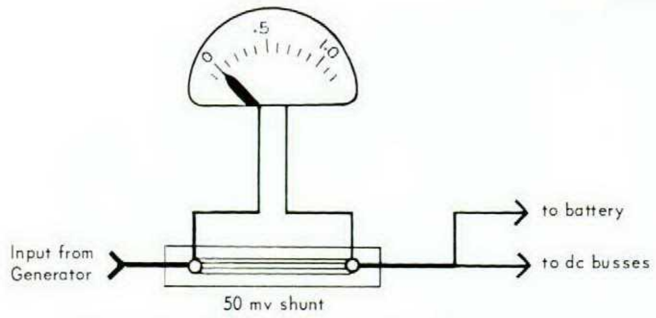


Figure 2a. The Generator Loadmeter circuit.

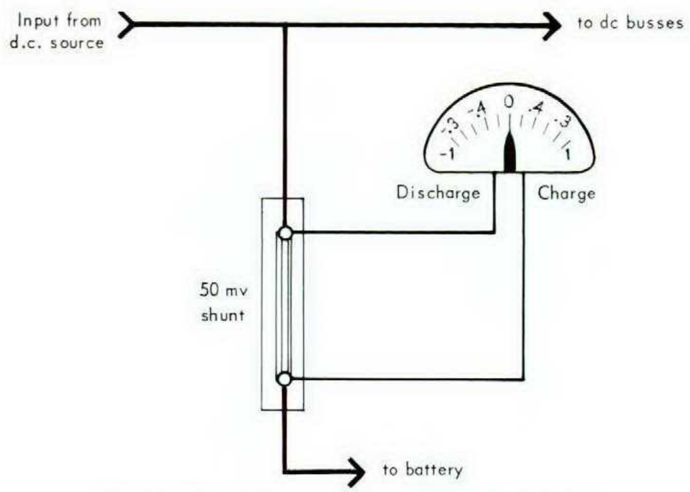


Figure 2b. The Battery Loadmeter circuit

interesting stories, if you understand its language. A very simple language it is too, because its face is calibrated in percent. The 0 to 1 dial markings are multiplied by 100% – meaning no-load to one hundred percent load. One hundred percent refers to the power source continuous rating.

Now, we have mentioned that there is good reason for a pilot to be interested in his loadmeter readings, particularly in aircraft types equipped with nickel-cadmium batteries, and especially when used as an on-board starting capability for turbine engines. The reason for this is that since the battery charging current passes through the loadmeter, the loadmeter reading will reflect excess currents which a failing nickel-cadmium battery will draw, when it overheats or goes into thermal runaway.

An exact loadmeter reading is not usefully predicted since it is dependent on phase of flight, and loads in use. However, for each aircraft type, the loadmeter readings are always the same at the equivalent phase of different flights, having regard to the utilization of equipment, e.g., starting, the loadmeter will read higher and will take a little longer to drop back. However, a pilot soon gets a good feel of what his "normal" loadmeter reading should be at a particular time. Hence an "abnormal" loadmeter reading has a message. It says "watch me". If the loadmeter reading keeps rising unaccountably without any loads being switched on, the chances are good that the nickel-cadmium battery is overheating, and that thermal runaway is developing. Unless AOI's preclude it, the pilot should turn the battery switch off at such time. If the battery is indeed in the process of failing, the generator loadmeter reading will immediately fall back to normal. It is therefore advisable that the pilot leave the the battery switch off for the remainder of the flight, unless an electrical emergency arises. The incident is of course to be reported for maintenance action prior to the next flight.

So here we are.

The loadmeter is there, and tells a story, and the wise pilot understands its message.

HSI T33 Tacan Tips

Given the right set of circumstances, a peculiarity in HSI-equipped T33s is practically guaranteed to get the adrenalin going in any pilot. Failure of the TACAN AC fuse or inverter in these birds, also results in loss of the ADF if the TACAN is selected to "T/R" or "REC". The TACAN must then be selected "OFF" in order to obtain ADF. Furthermore, for the measure to be effective, the ADF/TACAN switch must be selected to the "TACAN" position prior to turning off the TACAN. The T33 AOIs did not spell this out clearly, and a couple of pilots who have encountered the problem naturally believed they had lost both of their nav aids.

The AOIs will be amended. Further, a modleaflet (6A581) which replaces the 2 amp fuse for the HSI itself with a 5 amp circuit breaker in the cockpit is also in the mill.

How To Cook Your Battery

(The preceding article described how to recognize a failing aircraft battery. Here the author points out how to avoid battery failures.)

by Maj G. G. Kemp
CFHQ/DAE

"Hey Captain, the loadmeter's reading high and it's been rising; we've probably got a failing battery!"

"Lovely, just . . lovely! You know I was thinking that it's just like those ground pounders– telling us when we've got a problem instead of doing something about it".

Did you ever stop to think that it might have been you who unwittingly caused this battery to fail?

In addition to the straightforward approach of sticking it in a hot location, there are two good ways to cook a nickel-cadmium battery: drawing too much current from it, or overcharging it.

Just what is this process of cooking the battery? What is it about the nickel-cadmium battery that is so sensitive to heat?

The nickel-cadmium battery consists of 19 individual removable cells connected in series to form a 24-volt battery. Inside each of the cells is a stack of thin, flat rectangular plates which are alternately negative and positive. The positive plates are joined together by tabs on the top right-hand corner and the negative plates by a tab on the left-hand corner (unless of course you view it from the other side) and these are brought out to the terminals on the top of the cells. The plates are emersed in an alkaline electrolyte.

To separate the positive and negative plates a continuous strip of separator material is folded back and forth between the plates. This is the weakest part of the battery as it is sensitive to heat and tends to break down under extremes, leading to the phenomenon we know as "thermal runaway".

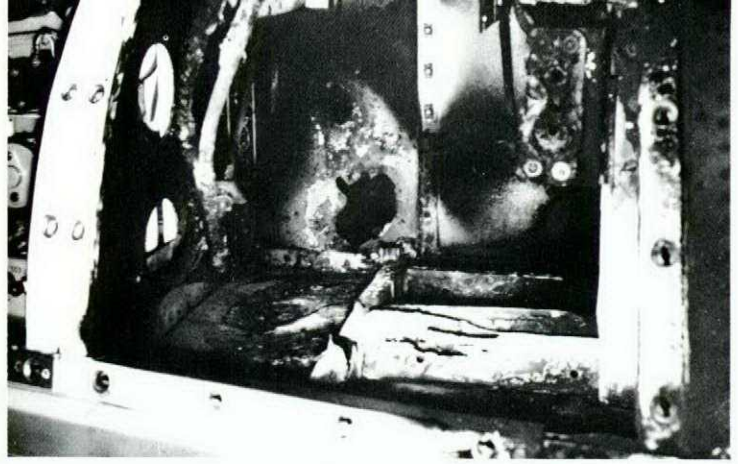
The present state-of-the-art separator material is a special cellophane very similar to that found on the outside of cigarette packages. It allows the passage of ions but not the gasses which are formed on overcharging. The cellophane is very thin and at temperatures above 125°F it softens and can eventually break down and cause a direct short between the positive and negative plates. The insidious thing about the deterioration of this inner cell separator is that it doesn't necessarily fail immediately; the effects are cumulative. Exposures to high temperature weaken the material and the final breakdown puncture can occur at some later date. Neither is the critical temperature sharply defined; short exposures to high temperatures or long exposures to moderately high temperatures (above 100 degrees) have the same effect. At the present time there is no known method of detecting incipient total breakdown of the separator material.

Starting turbine engines by battery is the quickest way to overheat a battery. Why is turbine starting so much harder than starting the big V8 in your car? The reason is that the turbine has a much larger moment of inertia and during the complete 15- to 30-second start cycle the starter is fighting to get it up to speed. An internal combustion engine comes up to speed almost instantly. While the turbine engine is at low RPM the starter motor is relatively inefficient and draws several hundred amperes. This starting current usually does not show on the loadmeter but is the culprit which can overheat and damage the battery, particularly since the duration of the starting cycle is longer than that of the average car. The following table compares the starting energy requirements for some aircraft with that of a typical car:

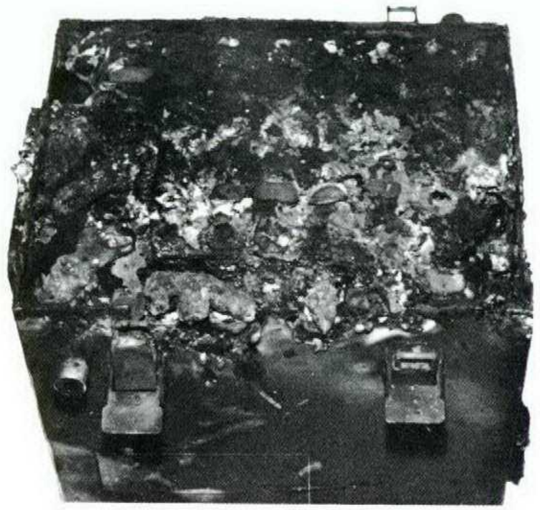
Automobile (100 amps X 10 volts X 5 seconds)	5,000 watt-seconds
Tutor	258,000 watt-seconds
Falcon (each engine)	147,000 watt-seconds
CUH-1H	131,000 watt-seconds
COH-58A	39,600 watt-seconds

One way of reducing the temperature rise for a given engine start is to increase the size of the battery. However one soon runs into weight limitations for the battery required to start some of the larger turbines. The result is that some aircraft must have self start limitations. The Tutor and Sea King for example, are limited to emergency internal starts.

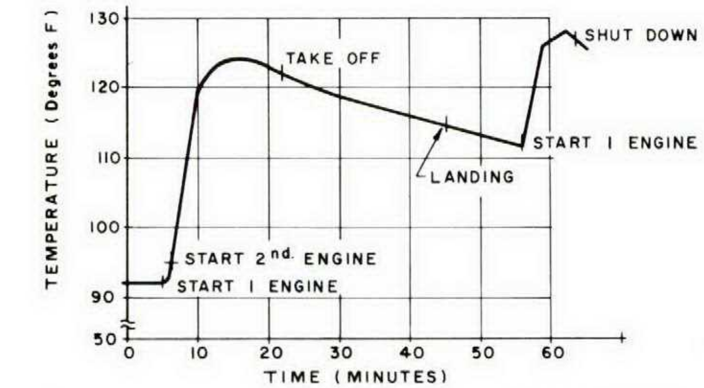
An aircraft battery may be well able to handle one start, or a second start fairly soon afterwards, but because the nickel-cadmium battery has a low heat disipation rate, it might not handle a third start attempt without incurring exposure to overheat. This is particularly so in hot weather, when the battery compartment can easily be at 90 degrees. As can be seen from figure 1, the Falcon battery temperature rises approximately 30 degrees during a start which when added to an ambient temperature of 90 degrees puts it well into the damaging temperature range. For this reason the Falcon and CUH-1H helicopter may be self-started only when no ground power is available and this should not be allowed to happen frequently.



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.



FALCON BATTERY START - INTERNAL TEMPERATURES

Fig. 1

The Twin Otter aircraft, CUH-1N and COH-58A helicopters are less critical but ground power should be used where possible. In particular the frequency of battery starts should be limited to avoid exposing the battery to durations of moderately high temperatures.

The other method of overheating a battery is by overcharging it. The electrochemical process of charging a nickel-cadmium battery absorbs heat. However this benefit is offset by the resistance heating effect of the current passing through the battery. When the battery becomes charged it starts to emit hydrogen and oxygen. Oxidation of the plates and separator material causes some heating and when the separator is soft (at high temperatures) the gas emission itself can be physically damaging to the separator. As the temperature rises the battery voltage drops. This means that if the charging voltage (aircraft bus voltage) is left constant, more current will flow into the battery generating more heat. Thus the process can become self-perpetuating. Eventually the temperature can become high enough to damage the separator.

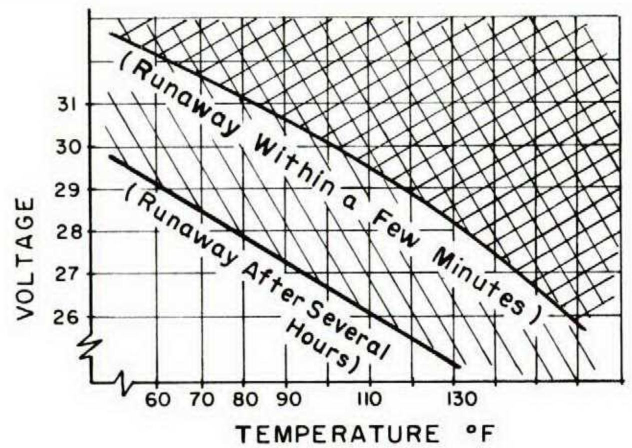


Fig. 2

Figure 2 gives an indication of the time required to put a battery into overcharge at various voltages and temperatures. This can only be used to indicate the trend because the actual time depends on ambient temperature, internal temperature rise due to the discharge, electrolyte condition and level, the state of charge of the battery and the condition of the inner cell separator. Because of the variation of battery voltage with temperature, the aircraft bus voltage is set lower during hot weather.

If the separator fails, causing a short circuit in one of the 19 cells, the battery voltage is proportionately reduced and the runaway can get into high gear.

Nickel-cadmium batteries can last almost indefinitely if they are properly maintained and not overheated. In view of their high cost and good emergency performance, all efforts should be made to preserve them.

The failure may come as a surprise but it is possible that it was due to undetectable abuse through overheating the battery earlier. Did you contribute to a needless battery failure lately by doing an internal start when it was avoidable? ■

FORMATION:

facts, figures and failures

Lead: "OK, Red Two, move it out and relax."
Red Two: "But I am relaxed."
Lead (after a long pause): "Well, move out and let me relax."

This is the time of year when a lot of pilots will be reminded of that old joke as they engage in one of the most challenging aspects of flying – formation. We have all admired professional teams like the RCAF Golden Hawks and the Centennaires. We know it looks easy, but we also know it requires all the best attributes of flying – team work, discipline and good common sense – to achieve the polished performances of those teams.

Most of us know our limitations and the summer "formation" season often provides the confirmation of this as we find ourselves filling a spot in a formation, for which we have had little opportunity to work up.

Few flying activities bring together all those intangible sensory experiences which enthrall pilots as does formation flying – the sense of accomplishment, the intense hard work and sweat, the colour and the beauty, the feeling of having truly "slipped the bonds". But for the unwary, the pitfalls are there. The record of the past few years makes this abundantly plain. Hang in there for a bit while we review it.

Takeoff

Two CF104s took off in formation in IFR conditions. The experienced wingman was chase pilot for the mission, while the formation leader was inexperienced and undergoing combat phase training. Instead of establishing the required instrument climb, the leader became concerned with the position of his wingman and allowed the flight to descend until collision with the ground was imminent. The lead managed to pull up, but the wingman ejected just before his aircraft struck the ground.

Result: One aircraft lost and a close call for the pilot.

On two occasions T33s collided on the roll. The wingmen let themselves get sucked in way too close and there was nothing they could do because their aircraft were not yet ready to fly.

Result: Bent T-birds but fortunately no serious injuries.

Join-up

Number four in a four-plane CF101 formation flew underneath and ahead of the lead on the join-up, losing sight of him. Instead of breaking away, the pilot decided to wait for the rest of the formation to overtake him and inadvertently flew his aircraft up into the lead.

Result: Two aircraft lost and two aircrew killed.

A three-plane CF104 formation took off with lead and two as a section and number three trailing. Number two reported a hung gear, so three decided to take a look, after which he moved laterally to his wing position. In joining he overshot and pulled up in front of his lead, breaking off the nose cone of the lead aircraft with his tail section. The pilot of the lead aircraft was forced to eject.

Result: One CF104 lost, one damaged.

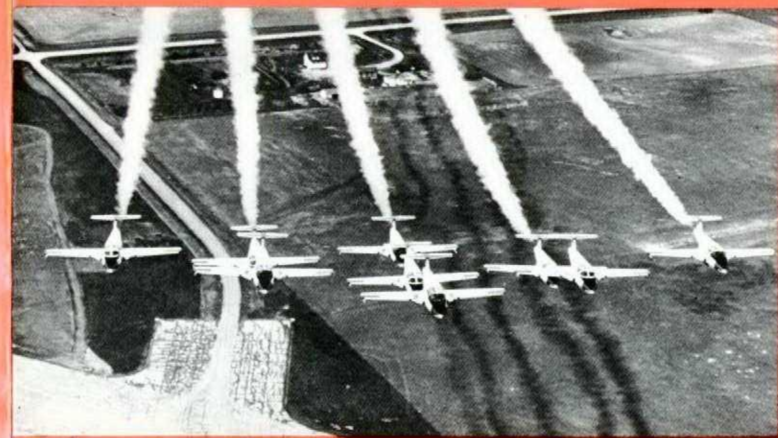
In-flight

Two CF5s were engaged in formation/tactics. Lead and number two were the attackers and number three was the target. During a turn, lead directed number two in to attack. Shortly after, the target reversed his turn and a collision occurred between lead and two as they were reversing.

Result: Two aircraft lost and one pilot killed.

Two CF104s engaged in unscheduled formation practice. After break-off, one pilot apparently made a simulated attack on the other without warning and collided with him.

Result: Two aircraft lost, one pilot killed.



A formation of CF101s was preparing for a display. The leader was late calling the formation into position for the run-in and in the ensuing rush two of the aircraft tangled wing tips.

Result: Two aircraft damaged.

Two helicopters were putting on a "fly-by". Everyone agreed that they were low and "tucked in" close. After landing it was discovered that both sets of blades were damaged, the result of having "overlapped" them at some point. How close can you get?

Result: Two helicopters damaged.

Approach

A CF104 four-plane was recovering. Because of the weather, the leader elected to have three and four approach first. On entering dense cloud three and four became separated and recovered independently. Lead and two then commenced a letdown. On the inside of a turn in cloud number two lost sight of his leader, levelled his wings and a few seconds later a collision occurred. Both pilots ejected.

Result: Two aircraft lost.

Landing

A formation leader briefed for a return flight to home plate in formation – even though it would be dark by the time they arrived. On the way, one of the members didn't like this situation and broke off, carrying on independently. The other three "hung in there" until nearing base when individual approaches were carried out. Two of the T33s ran into each other on the runway. The cause of the collision was attributed to a controlling problem.

Result: Two damaged T33s.

Four CF5s were landing after a practice display. The runway was very wet and all aircraft had considerable difficulty on the roll-out. On top of this, the drag-chute failed to deploy in one of the aircraft and the aircraft sped off into the toolies.

Result: One aircraft badly damaged.

If you've been "keeping score", these brief accounts add up to ten aircraft destroyed and four people killed. At the risk of over-simplification we can identify these areas which demand special attention:

Leaders:

- Briefings must be thorough and leaders must be aware of the capabilities of all formation members and stay within them
- Avoid indecision and plan ahead. Allow plenty of time for your formation to join-up, manoeuvre and so on
- On approach and landing, carefully consider all factors to provide adequate spacing. Leave your formation an out.

Formation Members:

- Don't forget the basic fundamentals! Know exactly what to do if you lose sight of the lead – and do it. A standard "lost wingman" procedure is now policy. Do you know what it is?
- One of the best descriptions of good formation is "sm - o - o - th". This doesn't mean zorching in to join-up and over-shooting.
- NEVER move around without getting the OK from your lead. For some reason, some individual members seem to think they can wander all over the sky – "same way, same day" style.

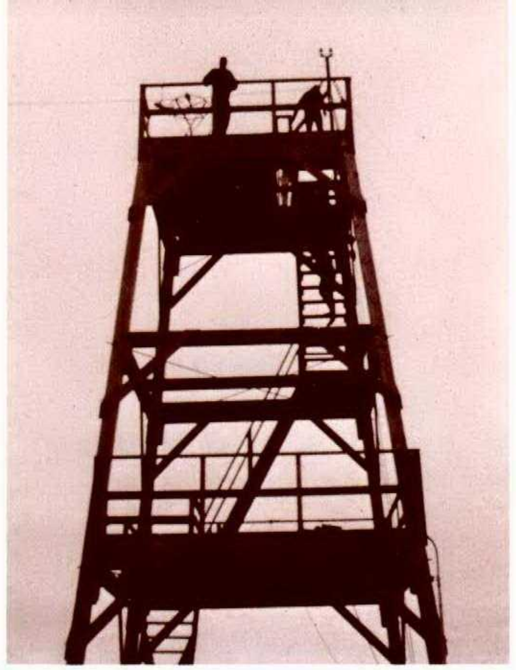
■

water survival training...

WATER LANDINGS MADE GOOD

There is a well-known reluctance among aircrew to really come to grips with what we feel are unpleasant chores, like periodic simulator trips, dinghy drill, ticket rides and so on. Perhaps this accounts for the fact that when the critical moment of decision to abandon an aircraft comes, aircrew are often not adequately prepared. If for example, that crucial moment occurs over water (as it has for seven CF pilots since 1960), are we really prepared to handle the threat of water survival? Have we got the most out of our survival drills or has our presence been physical only? For a refresher, here's a chance to follow the Survival Training School's five-and-a-half day Sea Survival Course at CFB Comox. In addition, we take a look at how the positive approach towards a pre-planned action sequence developed at the Survival School is reinforced by regular drills at the local level.

Day three . . . Tower exercise



The 50-foot tower from which the simulated para-water entries are made.

The parachute harness is attached to the cable car ring at the top platform of the tower.

A descent of approximately 20 feet comes first at which point the brake is applied allowing time to go through the post-ejection procedure.

Ready for final descent. Floating parachute canopy, one- and ten-man life rafts can be seen in the water.

Into the water with the safety boat standing by.

After splash down candidates are required to swim under the parachute canopy from one side to the other by following a seam.

Life raft entry is practised next, followed by simulation of a helicopter hoist and entry into the helicopter. Then comes a repeat of the first drop, this time using black-out goggles to simulate night para-water entry.

Day four . . . Dragging and One Man Life Raft Living

At sea on a diving Tender. Hooked to the towing yoke and listening to last minute instructions.

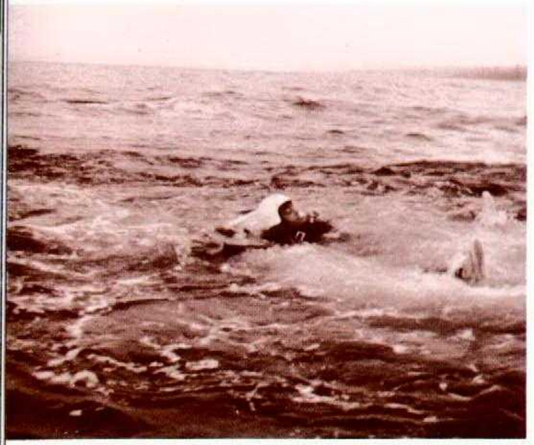
Ready to be moved out to the end of the boom.

Time for running through the post ejection procedure.

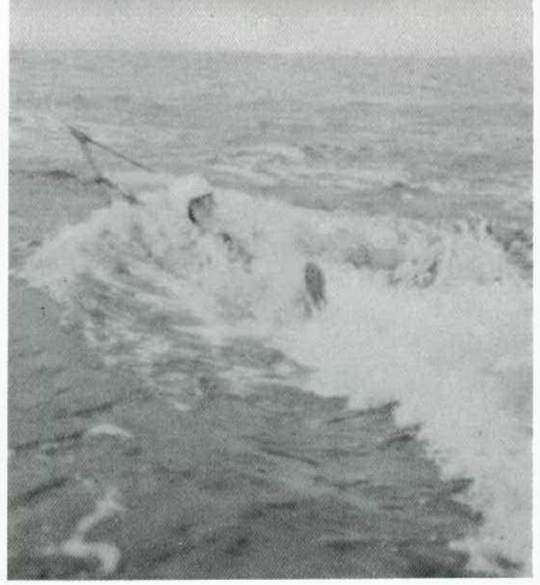
Into the water from 15 feet up.

cont'd next page

Day five . . .



At the end of a 30-foot rope, the candidate practises the drag position – onto his back, legs well apart, head down looking at his toes and seat well down in the water.

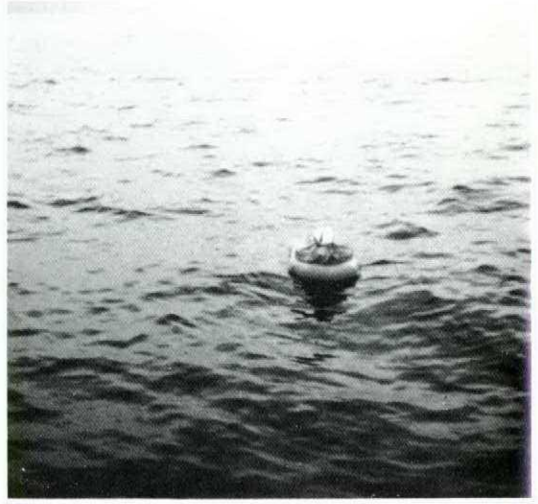


Proper drag position at 6 knots. When the controller in the safety boat is satisfied with the drag position, he gives the signal to release from the parachute harness.

Second run. Note that the life raft (attached to the Mae West) is in tow on this run. On the second drop the candidate releases the QRB as his feet hit the water. Experience at the school has shown that the safest procedure is to ensure the leg straps are released to prevent them from becoming entangled and causing the individual to be dragged feet first after rolling out of the harness.

Stable two!

With the wear and tear beginning to show on our hero's wet suit, he climbs aboard his raft . . .



. . . and begins practising boredom.

WATER LANDINGS MADE GOOD

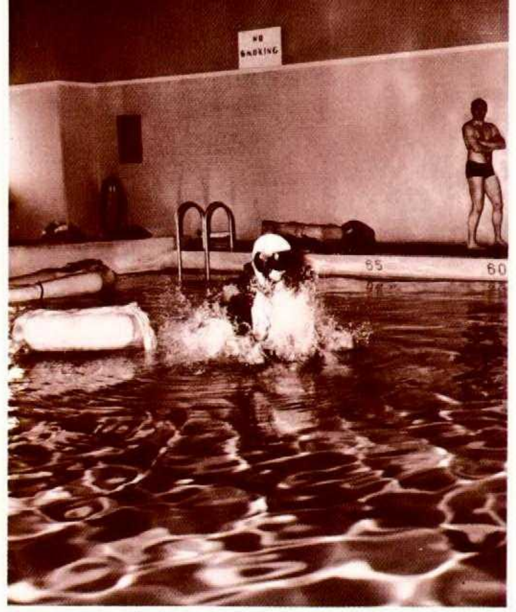
Multi-place life raft practice, using six-man and ten-man rafts. This exercise, simulating an aircraft ditching, takes place at sea, preferably out of sight of land.

The crews are put over the side at half mile intervals. As they go into the water, two men simulate various injuries and are instructed not to help themselves.

The crew have uprighted the life raft and the injured are being pulled towards it.

CFB Chatham . . .

At Chatham CF101 crews go through a dinghy drill annually (an ADC requirement). Here a CF101 seat pack is deployed with the pilot giving the contents the "once over" from his peculiar vantage point.



And into the water. Note that the pilot is obeying the NO SMOKING sign in the background.

CF101 pilot, Capt B.C. Dixon, buttoning up after house-keeping chores. The sea anchor has been deployed, dinghy bailed out and checked for proper inflation. Survival equipment should be stowed inside the dinghy under the splash shield.

CFB Cold Lake . . .

WATER ENTRY PROCEDURES FOR TRAINING COMMAND T33 AIRCREW

High Altitude – Maximum Preparation

CHECK THE PARACHUTE CANOPY for proper deployment. Cut any lines over the canopy.

DISCONNECT THE BAILOUT BOTTLE HOSE FROM THE MASK OXYGEN HOSE AND UNDO THE OXYGEN HOSE DOT FASTENER FROM THE SHOULDER STRAP OF THE PARACHUTE HARNESS.

IDEALLY THE OXYGEN MASK should be removed from the face and discarded.

INFLATE THE LIFE PRESERVER USING ACTIVATING TOGGLE. If the vest is over inflated bleed off excess air by use of the oral inflation valve. The locking ring should be screwed to the "out" locked position to prevent further loss of air.

VISOR DOWN prior to water entry if helmet is retained.

ROTATE QUICK RELEASE BOX TO RELEASE POSITION.

IMMEDIATELY ON CONTACT WITH THE WATER, RELEASE THE SEAT PACK *(Most other types of aircraft are equipped with a different seat pack and consequently the procedure varies.)* THEN SQUEEZE THE QRB VERY HARD WITH BOTH HANDS. There will be a short period of time when the parachute lines are slack and the QRB will be easiest to open. If one hand is injured the QRB should be released by reaching across the QRB with other hand and hooking three or four fingers behind the release mechanism and pressing down on the face plate with the palm/heel of the hand. The QRB should not be released until contact is made with the water.

WHEN IN THE WATER, if entangled in shroud lines do not move rapidly or struggle. Carefully remove any shroud lines that may be wrapped around the body. If trapped under the parachute move out from under the canopy by slowly pulling the canopy forward from behind the head and following a gore line until clear of the canopy.

IF DRAGGED ON WATER ENTRY, assume the stable drag position – back to the parachute, arms and legs spread. When stabilized squeeze the QRB and get out of the parachute harness.

RETAIN HELMET

Low Altitude – Minimum Action Only

INFLATE LIFE PRESERVER USING ACTIVATING TOGGLE.

ROTATE QRB TO RELEASE POSITION.

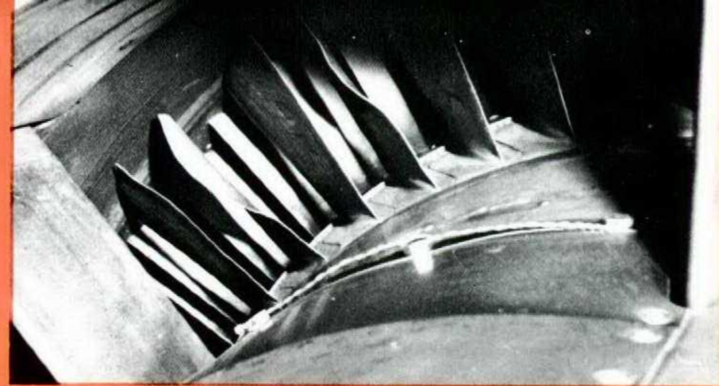
RELEASE THE SEAT PACK ON CONTACT WITH THE WATER, THEN SQUEEZE QUICK RELEASE BOX.

CARRY OUT STEPS AS IN PROCEDURE ONE to clear the parachute and harness and enter the dinghy.

NOTES:

1. *Some of the steps outlined in procedure one may be difficult to carry out. In step 3 the present method of attaching the oxygen mask to the helmet by pull the dot fasteners may make it impossible to remove the oxygen mask and discard it.*
2. *If step 2 is not completed, the aircrew member may be trapped in the harness by the emergency oxygen hose which is connected to the oxygen hose attached to the helmet.*
3. *Aircrew should be instructed to retain their hard hats, if possible. They provide protection from the elements and are excellent "bailers".*
4. *Aircrew should also be advised to leave their dinghy during helicopter rescue and keep the visor of the hard hat down. The helicopter downwash will blow a dinghy out of reach of the helicopter sling and the spray from the rotor downwash will impair vision if the visor is not down.*

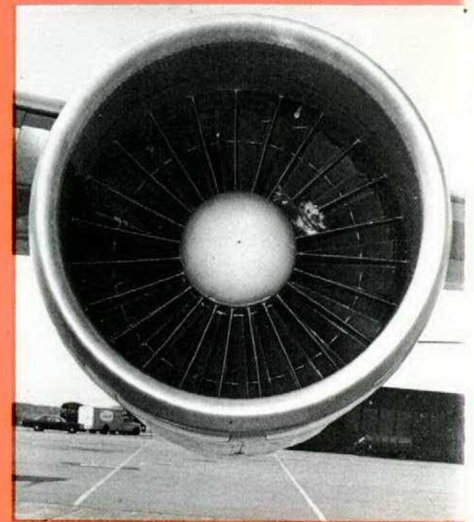
Birds continue to represent a serious hazard to flight even though a great deal has been learned about the problem. Our records indicate that there has been no definite decrease in the Canadian Forces birdstrike rate; however, an increased awareness of the problem and the application of common sense practices seems to have resulted in a decrease in the extent of damage resulting from birdstrikes. We would like to see this trend continue, or better, be improved. Now that we are into another bird season, it's appropriate to review bird control and avoidance measures which are available.



One of the latest strikes, during a touch-and-go at Trenton, damaged the fan on a Falcon engine. Total repair bill: $10,000.

Coping With Birds

by Capt C.E. Hansen



Striking a great black-backed gull (larus marinus) at Shearwater caused severe damage to the inlet guide vanes and the first stage compressor blades of this 707 engine. The cost of parts alone came to $40,000.

For convenience, the birdstrike hazard is divided into two areas of concern: those that occur in the vicinity of an airport and those that occur enroute. The problems in each area are generally different and require different solutions.

AROUND AIRPORTS

Approximately 60% of all birdstrikes occur within the traffic pattern area of an airport and two thirds of these occur during landing or takeoff. Since aircraft speeds are low in this region of flight, airframe damage is not likely to cause serious problems. However, the engines which may be required to operate at high power at critical flight stages are still vulnerable and a birdstrike could be catastrophic – and this hazard exists for transport type aircraft as well as for fighters.

The solution is to make the airport environment as unattractive as possible to birds. This is best accomplished by adopting simple good grounds maintenance practices which include keeping the grass cut, draining water ponds, clearing underbush and grading ditches. In addition it is highly recommended to locate and use a garbage dump that is at least five miles from the airport and not situated so that birds must overfly the airport on their journey between the dump and their resting area, which is usually a large body of water. In this regard, a revised Construction Engineering Technical Order, which will give a complete outline of the problem, should soon be available to Base Construction Engineering Officers. Meanwhile, if your Base has a problem, your flight safety officer can arrange for a specialist from the Canadian Wildlife Service to investigate and provide specific recommendations.

When all this has been done, transient birds will still visit your airport and make a nuisance of themselves; these birds must be frightened away. The most effective method is to use a standard 12-gauge shot gun and approved shell crackers (an exploding projectile which frightens birds). Birds such as pheasants or partridges that adopt the airport as a home may have to be caught by live trapping or hunting. Experience has shown that an active bird scaring program is a necessary requirement to make airports a safer place for aeroplanes. Your flight safety officer has been given the necessary details to order shell crackers and shotgun ammunition for this purpose.

ENROUTE

The enroute problem has been more serious, especially for low-level jet operations. The CF104 is especially vulnerable; however, CF5s have also been severely damaged. The basic solution to this problem is to avoid flying through airspace known to be used by large numbers of birds. With this in mind, the following flight planning considerations are suggested:

- On low-level operations, airspeed should be kept down during bird migratory season. The force exerted by a four pound bird struck at 600K can be as high as 57 tons while at 300 kts this force would be reduced to about 14 tons – a ruinous blow at either speed;
- During periods of high migratory activity, decrease airspeeds and increase rates of climb or descent during terminal flying. While enroute, fly as much of the trip as possible above 10,000 feet MSL;
- Since bird migratory activity increases at night, local night flying should be restricted during the migration season. (Bird migration forecasting can provide valuable information in this area);
- Dual visor helmets will be available soon; use them in accordance with command instructions;
- There are indications that increasing aircraft conspicuity caused by using lights may result in fewer birdstrikes. As a result, the use of landing lights is recommended whenever practical for all flights below 10,000 feet ASL;
- If AOIs permit, keep your windscreen defrosters on. Tests have shown that a warm windscreen is more flexible and is therefore better able to withstand a bird impact;
- Have a look at bird warning NOTAMS, they can be very useful in flight planning;
- Report all birdstrikes on a form CF218. Birdstrike statistics are still required in order to pinpoint problem areas.

U.S. Wx . . .

What's the Secret?

Mr. D. Webster
CFHQ/DMETOC

Have you ever noticed how busy a weather office becomes when a request for a seldom used forecast comes up during a briefing? The increase in activity is probably a result of a well kept secret – the crew had neglected to notify MET in advance of their requirement for this forecast. Such forecasts are available in the weather office by means of one particular feature of the meteorological teletype network called "request/reply".

To obtain additional forecasts, it was necessary in the past to send a message through a teletype relay network. This involved frequent delays at relay points and resulted in frustration to both weather office staff and waiting aircrew. This picture was altered in 1969 with the introduction of the automated teletype system by the Atmospheric Environment Service (AES), formerly the Canadian Meteorological Service.

The heart of the new system is a Collins C-8500 computer which is located in Toronto. This computer has a high speed interface circuit with a United States Weather Bureau computer located in Maryland, which in turn links with other systems in the U.S. and abroad. In Canada, each group of stations (called a circuit) is connected directly to the computer, thus eliminating the manual relay points and speeding up transmissions.

One of the features of this system is the ability of the computer to store forecast information and make it available to any station on request. Here is how this feature, the "request/reply" system, works: Let us suppose you are departing for a destination from which forecasts are not normally received in the weather office. To obtain this forecast, the weather office makes a request to Sub System Control (SSC), Toronto, who control the computer. SSC polls the computer for the information and the forecast is automatically transmitted on the appropriate circuit. The time involved is usually only a few minutes, but should the circuit be heavily loaded, it will take longer – so advance notice is recommended.

Only forecast data is available via the "request/reply" system as the computer does not store items such as Hourly Weather Reports. This minimizes stored material and keeps circuit loading down during critical periods when more pertinent information is required.

The computer of course, won't solve all problems, but it is a step in the right direction. Even with this improved capability please bear in mind that the "request/reply" system takes time. Just as servicing requires time to properly prepare a briefing, especially if the information is not readily available. So the next time you plan a trip, when you notify servicing – let MET know too. Don't keep it a secret!

Fuel Gauge Fact

The only completely reliable information that can be obtained from a fuel gauge is the fact that there is or there is not one installed in the aircraft.

USAAAVS Weekly Summary

Good Show

Cpl R.G. Brownie

CPL R.G. BROWNIE

Cpl Brownie noticed abnormal pump fluctuations while he was unloading JP4 from the supplier's railway tank cars into the bulk fuel storage tanks. A thorough examination of the unloading equipment revealed flakes of an unknown substance lodged in the suction arm screens, and he immediately quarantined this load of fuel. He then checked his records and found that three weeks previously the same tank cars had delivered fuel which was now being dispensed to aircraft. Suspecting that the previous load may have also been contaminated, Cpl Brownie stopped supply of the fuel and informed the appropriate base personnel.

Investigation revealed that the fuel was indeed contaminated and that the filters in the dispensing system, although doing their job, were virtually clogged and might later have broken down allowing contaminated fuel into the aircraft.

The supplier subsequently cleaned the tank cars and gave assurance that there would be no further problem. However, Cpl Brownie continued to make extra checks of incoming fuel shipments and two weeks later detected a recurrence of the same problem.

Cpl Brownie's excellent advice and thoroughness enabled timely action to be taken to avoid what might otherwise have developed into a dangerous situation.

CAPT W.J. MARFLEET

While flying a T33 night training mission from Cold Lake, Capt Marfleet and his student pilot observed smoke coming from behind the instrument panel in the front cockpit. He declared an emergency and took appropriate action to clear the smoke from the cockpit. However, while still 20 miles from base, flames erupted from behind the panel. Electrical services were then switched off one by one, but the flames continued until both battery and generator were switched off. With all his electrical equipment switched off Capt Marfleet was forced to continue the approach without cockpit lighting or radio communications. There was another brief outburst of flames as he selected the generator momentarily on final for landing clearance, however, the landing was successful.

Capt Marfleet's calm response and sound judgement earned him a good show. The villain in this occurrence was the auxiliary defroster.

Capt W.J. Marfleet

Capt N. Mulikow
Capt H.G. Merritt
Cpl J.C. Tremblay
Cpl B.C. Parrott

CAPT N. MULIKOW CPL J.C. TREMBLAY CAPT H.G. MERRITT CPL B.C. PARROTT

Capt Mulikow and his crew were scrambled from CFB Petawawa to search for a lost commercial light aircraft. The weather at the time was marginal both at Base and in the search area due to extensive low cloud and heavy snow. After searching for approximately two hours without success and with darkness coming on, the crew finally detected a faint radio crackle. Disregarding the approaching darkness they extended their search and finally established radio contact with the downed aircraft. Neither the aircraft nor its occupants could be seen from the air, however the radio signals and a distress pattern in a small clearing eventually led the rescue crew to the crash site from where the aircraft occupants were safely rescued.

In completing the rescue mission successfully,Capt Mulikow, Capt Merritt, Cpl Parrott and Cpl Tremblay displayed professional capability under adverse conditions.

WO J.G. MACDONALD SGT R.C. BURDEN SGT E.W. SAVOY SGT M.D. WOOD

During an Argus start-up flames appeared from under the cowl flaps on number four engine and fuel began flowing from the engine onto the ground. At almost the same time, burning particles fell into the accumulated pool of fuel igniting it. The subsequent eruption of flame enveloped the entire engine and surrounding wing area.

Sgt Wood rushed to the scene from nearby and was joined by Sgt Burden and two flight engineers from the aircraft, WO MacDonald and Sgt Savoy. The four NCOs contained the fire with all available fire extinguishers until the Base Fire Fighters arrived and quickly extinguished the blaze.

Sgt M.D. Wood WO J.G. MacDonald
Sgt R.C. Burden Sgt E.W. Savoy

Lt H.R. Hovey

Mr. F. Willard
Cpl D.A. McDiarmid

With other Argus aircraft parked on either side of the burning aircraft, the quick response of these men to the crisis situation prevented what could have developed into a costly accident.

LT H.R. HOVEY

Following a pitch for a VFR circuit, Lt Hovey experienced a split flap on his CF101. He initiated an overshoot from downwind and selected the gear and flaps up. The flaps however, remained in the split condition with the left flap full down and the right flap full up. A number of flap selections failed to rectify the situation.

Lt Hovey then determined that 200K was the minimum acceptable approach speed and set the aircraft up for a landing. In the final stages of the approach and flare all available aileron was required to keep the aircraft in a normal attitude.

Despite limited experience on the CF101, Lt Hovey displayed outstanding airmanship in his calm handling of a hazardous situation.

MCPL J.R.G. PERRY

MCpl Perry was performing a "B" check on a Cosmopolitan when he noticed a hole in the left elevator flight tab, near the outboard hinge. Closer inspection revealed cracks in the skin and a small piece of metal missing. To find out why this damage had occurred, he removed the tab and found two loose hinges, one with one retaining rivet missing and the other with two of the four retaining rivets missing, and the remaining two on the verge of failing. In addition, the ribs and skin in both hinge areas showed cracks. The tab was not locally repairable and had to be replaced.

MCpl Perry demonstrated that he is a highly capable

MCpl J.R.G. Perry

Cpl A.R. Ford

technician. His alertness and quick evaluation of the problem probably averted the development of a flight hazard.

CPL D.A. MCDIARMID MR. F. WILLARD

Cpl McDiarmid and Mr. Willard were the drivers of two refuelling tenders which were positioned to refuel a 707 at CFB Uplands. Mr. Willard assisted in connecting the nozzle from his vehicle to one side of the aircraft, then returned to his tender. While he was waiting to commence refuelling, he noticed smoke coming from the towing tractor which was being used as a stand to reach the underwing refuelling point. He immediately grabbed a fire extinguisher and ran to the towing tractor where he disconnected the refuelling nozzle and proceeded to fight the fire. Cpl McDiarmid also noticed the fire from his side of the aircraft. He took an extinguisher and assisted in fighting the fire.

Mr. Willard and Cpl McDiarmid displayed a high degree of competence in their reaction to this emergency. Their immediate response averted the possibility of a costly fire.

CPL A.R. FORD

Cpl Ford was the crewman on a T33 which was severely damaged during an emergency landing where he and the pilot had to use the break-out knives to escape through the canopy. On subsequent flights as crewman in T33 aircraft, Cpl Ford observed that break-out knives were not located in the same place in all aircraft. Extending his check, he found the same to be true on other types of aircraft as well. Recognizing the safety implications of an improperly positioned break-out knife, Cpl Ford reported his findings to his Flight Safety Officer.

As a result of his observation and follow-up action, a local SI was issued to correct this discrepancy in unit aircraft and headquarters were advised so that other aircraft users could be alerted to the hazard.

CPL R.N. CAMERON

Cpl Cameron was performing a routine daily inspection on a CF104 when he noticed two hairline cracks on a hydraulic line fitting. The particular area where the cracks

Cpl R.N. Cameron

Cpl W.E. Knaap

Pte G.A. Johnston

Pte J.P. Desnoyers

Cpl J.P. Goyer

were located is barely accessible, and only his thorough inspection brought these cracks to light.

The fitting, located in the right main landing gear well, is part of the No. 2 hydraulic system on the pressure side. If the unserviceability had not been discovered by Cpl Cameron, the fitting could possibly have broken with the resulting loss of the system – and a possible serious in-flight problem.

CPL W.E. KNAAP

While performing an "A" check on a CF104D, Cpl Knaap noted that only two strands were left holding on the throttle cable at a point where it passed through a fair-lead.

Corporal Knaap's attention to details not specifically mentioned in Engineering Orders and the thoroughness of his investigation averted the possibility of a complete break in the throttle cable. His action demonstrated a high degree of professionalism.

PTE G.A. JOHNSTON

Pte Johnston was conducting an inspection on a Buffalo which had landed following a suspected bird-strike. No evidence of birdstrike could be found, however in the course of his check Pte Johnston crawled up the engine intake to inspect the guide vanes. While doing so he noticed a very fine, barely noticeable crack in the lower front engine mount.

Although he was looking for evidence of birdstrike, Pte Johnston's attention to detail uncovered a materiel breakdown which had it gone undetected could have resulted in a serious engine fire.

PTE J.P. DESNOYERS

Pte Desnoyers was conducting an airframe post flight inspection on a Sea King aboard HMCS Annapolis. As he inspected the engine intakes for FOD he noticed three small nicks on the engine inlet guide vanes and reported the condition to his supervisor. Subsequent investigation revealed considerable engine damage from an unidentified foreign object.

This inspection was carried out under adverse environmental conditions – at night and on the rolling deck of a DDH. In addition, inspecting the engine intakes places the technician in a precarious position because of their location in relation to the work platform.

In spite of the adverse conditions, Pte Desnoyers went beyond the specified requirements of his check and uncovered a serious hazard.

CPL J.P. GOYER

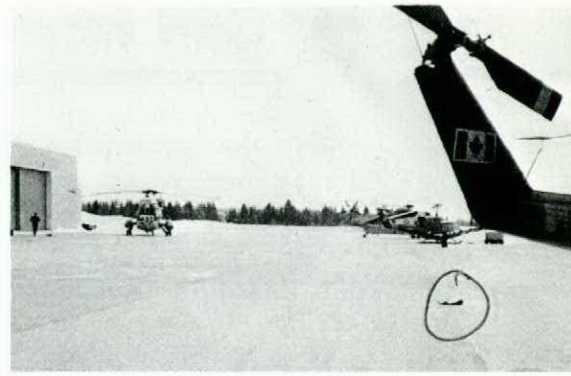
While carrying out a daily inspection on a T33, Cpl Goyer noticed a very slight binding in the rudder control. Investigation revealed that the pin stowage pouch in the front cockpit had been attached with a screw that was too long, and that the left rudder cable was rubbing on this screw. Although there was no damage to the cable, a definite possibility of future malfunction existed.

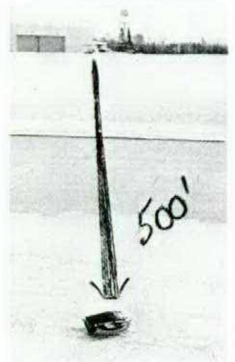
Cpl Goyer's attention to detail and his follow-up of a barely discernible binding in the rudder control system are examples of a professional technician operating at peak efficiency.

Unsolved Puzzle

The crew was thoroughly confused at this point and retired to quarters to wait for a Mobile Repair Party to solve the puzzle.

Extract from a Message





Taxi Tangles

We seem to have encountered more than our share of taxiing accidents in the past few months, involving both helicopters and fixed wing aircraft. In each case the cause was very fundamental. You guessed it – human!

A case in point is a Sea King which was taxied into a confined area without marshalling assistance, with predictable results, as shown in the accompanying photos.

To get to the allocated parking spot where a marshaller was waiting, the pilot had to taxi between a hangar and two parked aircraft, one a Sea King with the rotor engaged. The pilot was aware of the hazard, but was sure that he had adequate clearance. In addition, a crewman on board had positioned himself between the two pilots to check clearances and monitor loading and unloading.

Completing the last act in closing the trap on the pilot was a ground crewman who appeared (quite by chance) outside the hangar door. He was waiting for the helicopter to taxi by so that he could walk across the ramp to one of the parked aircraft, however the pilot assumed he was a marshaller. Thus, when this ground crewman saw that the blades were going to strike the hangar (and just before he alertly dove for cover) his signal to attract the pilots attention was interpreted by the pilot as indicating the parking spot.

Do you have the picture now? One rotating object and a large stationary one – less than an ideal taxi area most will agree. The pilot thinks there is sufficient rotor clearance and assumes the arm signals of the onlooker are directions to the parking spot. By his presence in the cockpit the crewman probably gives added assurance to the pilot's belief that he has clearance. At the instant the pilot becomes aware of the signals of the ground crewman, the rotor blades strike the hangar.

This was the second such episode in recent months, despite a comprehensive preventive campaign after the first. No injuries resulted which is fortunate indeed since shrapnel from the five blades was found almost 1000 feet from the contact point. Needless to say, the cost of replacement items to return this aircraft to operational status was significant.

The message here is to reiterate that the pilot is solely responsible for the safety of his aircraft, and that marshalling signals are informative only. But that does not mean that we can do nothing to prevent recurrence of this type of incident, thereby reducing loss of operational equipment and more important – preventing personnel injury.

Corrective action following this occurrence included:

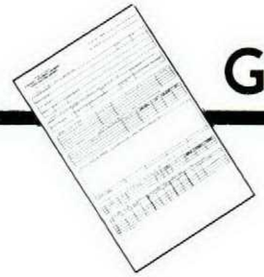
- A CFHQ review of current marshalling orders. An amendment to AMO 00-12-2 will more clearly define areas of responsibility as they pertain to marshalling of aircraft.
- All MARCOM aircrew have been made aware of their responsibilities, the professionalism which should be displayed and is expected of experienced personnel.
- Standard taxi, parking and landing markings have been approved for MOBCOM heliports.

Now, it is up to you!

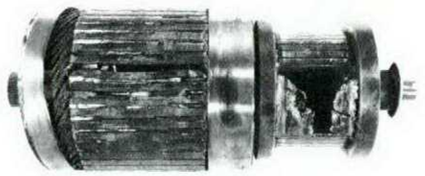
Lights On

The chairman decided that landing lights should be used at all times below 10,000 feet to reduce the chances of birdstrikes.

The Flight Safety Committee



Gen from Two-Ten



T33, FORCED LANDING The aircraft took off from Winnipeg on the second leg of an eastbound cross-country flight. The turnaround had been uneventful as was the start up, taxi out, takeoff and climb to Flight Level 290. Over Sioux Narrows VORTAC the generator fail light illuminated and almost simultaneously a high frequency, low amplitude vibration could be felt. The pilot immediately informed Kenora Radar of the electrical problem and was cleared back to Winnipeg below the block airspace so that he could return VFR.

During the descent the pilot decided to land at Kenora because the vibrations had increased and fluctuations in oil pressure had developed. The main UHF and battery were turned off to see if the electrical fluctuations were affecting the oil pressure readings, but the oil pressure remained at approximately 20 PSI regardless of battery position. The pilot's attempts to contact Kenora Radar on emergency UHF were unsuccessful. However, the controllers in Kenora Radar, using initiative and good judgement, were following his progress using "skin paint" only (no IFF) and concluded that an emergency landing at Kenora instead of Winnipeg could be expected. This information was passed to the airport personnel who immediately assumed their secondary duty, that of manning the volunteer fire truck.

The pilot told the crewman of his intentions to go to Kenora, then the intercom failed. He jettisoned the tip tanks over a nearby lake and arrived at Kenora just after a rain shower had passed. He flew a straight-in flapless approach (flaps and speed brakes not available) but overshot the first attempt because he felt his airspeed was too high for the short runway. He landed off the second approach maintaining correct approach speed for the configuration. However, the brakes were ineffective because of hydroplaning so he raised the gear to prevent overrunning the end of the runway. The aircraft settled to the runway but still had enough momentum to slide over the lip of the gravel overrun, down a steep grade, and through bushes and trees. It finally came to rest with one wing sheared off and the aircraft on fire. A large tree had fallen across the canopy forcing the pilot and his crewman to use the break out knives. The MOT fire truck was quickly on the scene, putting out the fire, and also aiding the crew's egress.

The investigation determined that a large part of the generator commutator was missing, causing electrical failure and a severe mass imbalance. The basic cause was a failed generator bearing. This accident illustrated the importance of knowing how to use the break out knife and it brought to light discrepancies in the location of these knives in aircraft of the same type (see Good Show, page 18). A major factor in the crew's successful escape was the first-class performance demonstrated by the MOT personnel in their reaction to the emergency.

T33, RUNWAY COLLISION The aircraft were Number 3 and Number 2 in Red formation, a 4-plane flight returning from a weekend cross-country. By the time the formation arrived overhead, it was dark, so they split up for individual approaches. Weather at the time was 2500 broken, 8000 overcast with three miles visibility in light rain and fog.

Number 3 was the first aircraft cleared for an approach. The pilot landed following a normal PAR. Number 2 was next and also landed from a precision approach, after which the pilot encountered hydroplaning, but had everything under control with still 4000 feet of runway remaining. He taxied towards the end using the taxi light, but it was ineffective because of the rain on the windscreen. About 1200 feet short of the turn-off the pilot suddenly saw Number 2 on the runway directly in front of him and despite hard braking was unable to avoid a collision.

Reconstructing the events leading to the collision, investigators found that the aircraft had been set up on approach quite close together. When the second aircraft was handed off to radar, it was only two miles behind the first which was also on a radar approach, and the radar controller requested that the pilot reduce his speed as much as possible because of the traffic ahead. The controller's concern over spacing was evident and the pilot offered to do a 360, but was told to continue as everything was now OK.

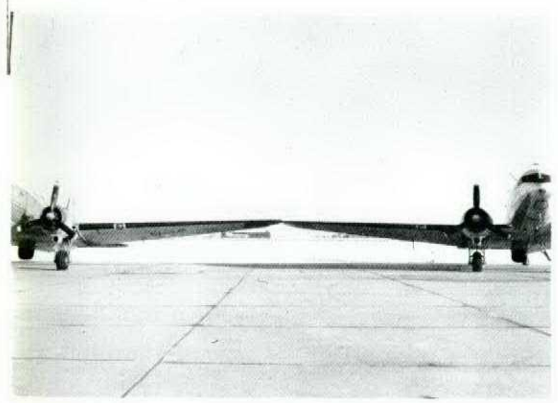
During the final approach the relative position of the two aircraft changed little. Radar obtained clearance for the second aircraft to land when it was at one and a quarter miles and reported to the pilot that the first aircraft was just touching down. The controller handling the first aircraft cleared the pilot over to tower once he was on the runway, but the pilot didn't check in with tower – until after the collision.

The investigation determined that both the Radar Final Controller and the Terminal Controller had conducted parts of this approach contrary to regulations, the Radar Controller by failing to maintain the required minimum spacing between aircraft on final, and the Terminal Controller by authorizing continuation of the approach in spite of the inadequate separation.

OTTER, TOWED INTO HANGAR (DOOR) A private was assigned as NCO in charge of a towing crew moving an aircraft from a hangar to the flight line. He was also the mule driver! Four other airmen made up the crew, one in the cockpit to work the brakes, one at each wing tip and one at the tail.

As they approached the doors, the driver reduced speed and checked with his "wing walkers" who responded with an "all clear". However, when the aircraft came nearer to the door the walker at the right wing suddenly realized that it wasn't going to clear the door after all. Reacting to his first impulse, he put his weight to the door in an effort to open it wider and when this proved futile, he turned his efforts to warning the driver. And he probably would have succeeded had not a Falcon entered the picture, taxiing by just at the right moment, as if on cue, to make voice communications virtually impossible. Result: another wing tip impact with another hangar door.

In spite of the number of times this story has been told – only names and places have been changed – the techniques used in towing aircraft continue to be elusive for some.



DAKOTA, TOWED INTO DAKOTA Here's another one. Five men were assigned to tow this Dak into a hangar, an adequate crew it would appear, yet they managed to ding the wing tip into an adjacent aircraft.

As is invariably the case in this type of incident, the causes turned out to be very basic. The NCO in charge of the crew had been called away to another job but had neglected to appoint someone in his stead. Thus, what developed was a no-one's-in-charge muddle, complicated by the element of haste brought on by extremely cold weather. The aircraft was parked forward of the adjacent aircraft, but the wing tips were overlapped so that the aircraft could only be moved forward. The wing man on that side assumed this was the plan and gave the "all clear" to the towing tractor driver who promptly moved off to the rear pulling the wing tip into the other aircraft.

ARGUS, LANDED SHORT During a VFR approach the aircraft touched down approximately 60 feet short of the threshold, bounced onto the runway and came to rest 4200 feet from the button – minus the nose gear.

A broken cloud cover at the time had combined with light blowing snow to produce weather conditions conducive to whiteout. In addition, the airfield was completely covered by snow and ice. The pilot had an indication of the conditions at ground level when he turned final at two miles and had trouble finding the exact location of the runway, but he continued with the VFR approach even though PAR was available.

With depth perception on final made very difficult by the whiteout conditions, it apparently just wasn't a day for VFR approaches and landings.

On the Dials

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

QUESTIONS

In the past few months several questions have been submitted in response to "On the Dials" articles. We welcome these questions and although we do not profess to know all the answers, we will research them and publish the questions and answers as soon as possible.

Question: Prior to enroute descent at a destination terminal, Centre issues the following clearance:

> "CAF 1234 is cleared to the Bravo beacon to maintain 5000, report leaving FL300."

The Bravo beacon is the outer marker for the approach to the current runway in use. Do I begin tracking directly to Bravo or do I continue airways navigation?

Answer: You continue airways centreline navigation. Centre has given you your clearance limit for radio failure procedures. You are not cleared directly to that fix unless they say "cleared direct". Usually you are handed over to Arrival Control when entering the terminal area and Arrival will repeat the clearance prior to giving you radar vectors.

Clearance Interpretation

Often pilots are confronted with doubt when a controller appears to cut his clearance short or the pilot is second guessing. One example is an Arrival controller who gives you a new clearance limit with an altitude change while on radar vectors, but does not tell you to either maintain your present vector or give you a new vector. Of course you must always maintain a radar vector unless you are cleared to a fix "present position direct".

Another area of doubt crops up when a departure clearance places you off-track 15 degrees half way along your first leg and the controller gives you the clearance, "Heading restriction cancelled". Do you proceed direct the next facility or do you establish enroute track as soon as possible prior to the facility? If in doubt; ask. If you are high level, high speed, it is preferable to proceed direct and of course simple if TACAN is your Nav-aid. If low altitude and low speed, regaining flight planned track may be preferable. In either case ask the controller to specify.

Comments to the editor

412 Reunion

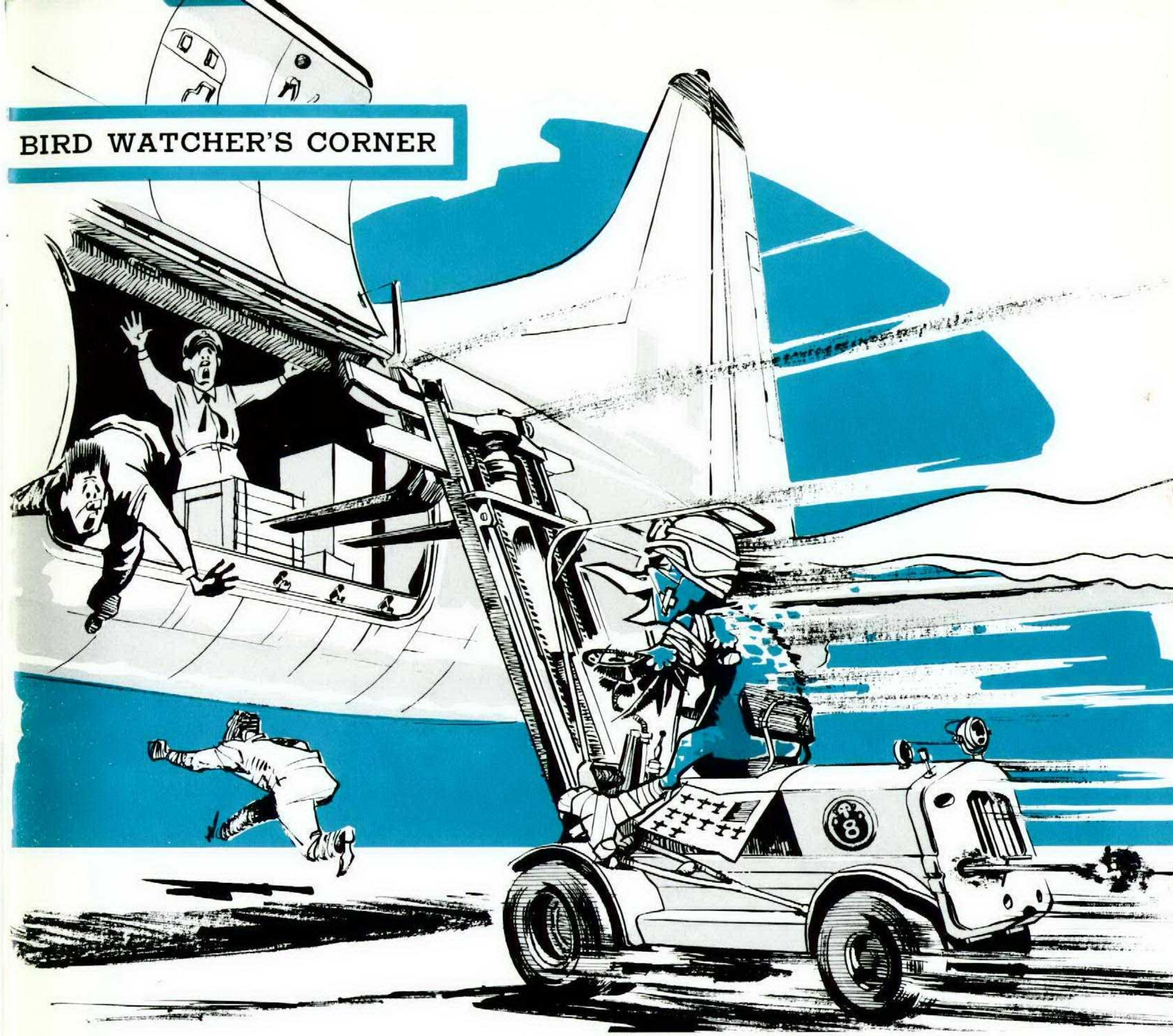
An all ranks 412 Squadron reunion will be held at CFB Uplands, 8 to 10 September 1972 – the first reunion in the Squadron's 33 year history. The Squadron would appreciate receiving names and addresses of former members so that they and their ladies may be extended an invitation. For complete information write to:

Reunion Committee,
412 Sqn.
CFB Uplands, Ottawa
K1A 0K5
Tel. 613 - 995-3412

Lieutenant CS Watts
PAdO 412 Sqn

Are the fire fighters on your base familiar with the crash-rescue procedures for each type of aircraft using your facilities?

BIRD WATCHER'S CORNER

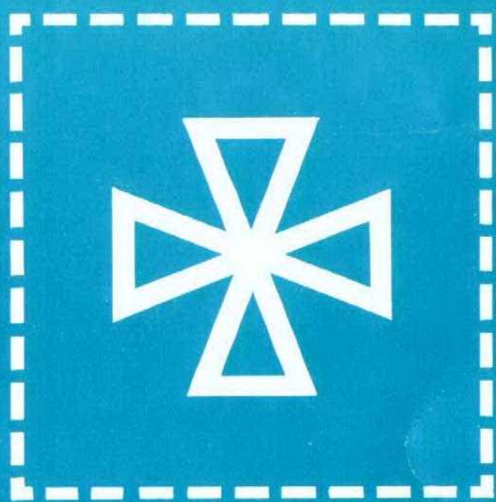


FORKLIFTUS TERRORUS

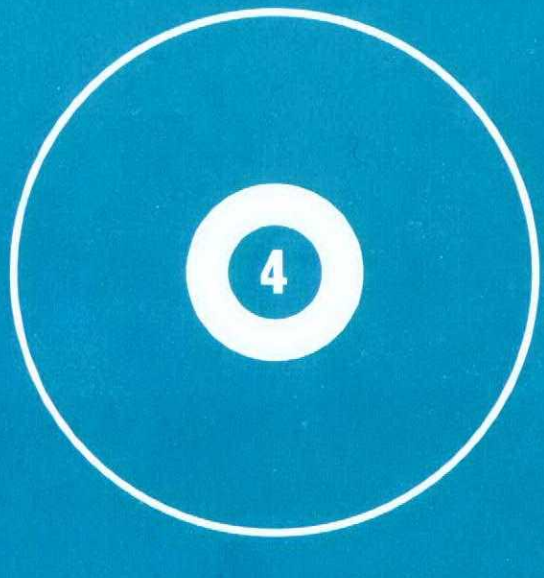
Here is a species that is best observed (and heard) in the nesting area where it is a well-known menace to birds at rest. A relative of the Myopic Woodchopper, this groundling follows the same apparently irresistible compulsion to move in confined areas at high speed. Some birdwatchers attribute the reckless behaviour to pressure to complete tasks on time; some say it stems from the absence of on-the-job supervision. Others hold that poor vision impairs its judgement. Whatever the cause, the result is an endless series of metal-bashing stabs and crunches (the sound of which attracts supervisor birds to the scene at great speed) announcing that old Terrorus has found yet another confined space that wasn't quite big enough. The Terrorus is not a long-lived species, but ornithologists say that it is by no means in danger of extinction. The call is inevitably punctuated by a crunch:

THERE-AWTABEE-ROOMENUF-CRRRUNCH

HELIPORT MARKINGS



Maltese Cross denotes heliports and helipads on airfields.



Helicopter parking area marking. All markings aviation yellow.

Proposed standard layout for helicopter parking areas on heliports. Minimum separation between outside circles — 20 feet. (Note: Positive clearance between aircraft or damage from rotor wash with large transport helicopters is not guaranteed.