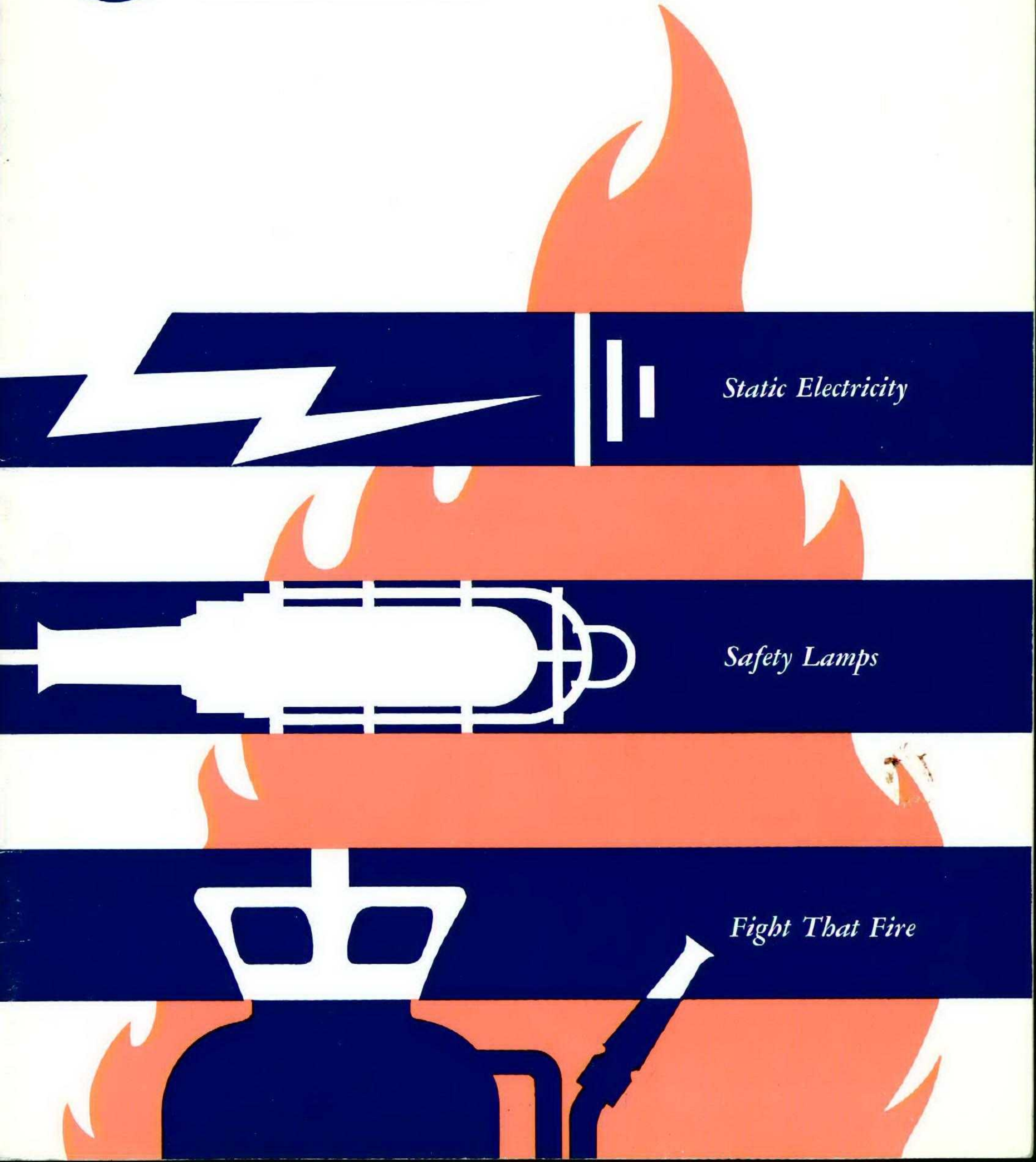
FLIGHT COMMENT

SEPTEMBER • OCTOBER • 1969



Comments

CFANS has flown for 5 air accident-free years - a commendable record. Our congratulations to those who contributed. It's not easy, but it can be done!

More encouraging news. This time, from a base which reports, *"In general the flight safety survey was a success. Particular mention was made to the excellent support offered by all supervisors to the flight safety program"*. Flight safety is built on foundations like that.

It's disturbing to get a report in which a supervisor is faulted for "inattention" when it's clear that he was over-extended at the time. Whenever experience level drops, supervision must be intensified. This often means for the supervisor a too-way stretch - too much spread and too thin coverage.

While we were going to press with the May/Jun Flight Comment, the AMO referred to in the article "A pilot's signature..." was amended. In addition to the Commanding Officer of a squadron or his delegate having authority to impose or remove operational restrictions on the Aircraft Information Record, is the BAMEO or his delegate or the SAMO of a squadron or lesser formation.

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FIRE!!!

During the past eight to nine years we have had 15 reported aircraft ground fires, three of which resulted in aircraft writeoff. Another four aircraft were very substantially damaged and several personnel were injured. These figures do not include any airborne fires because this is another issue and is not directly associated with the current emphasis on reducing the number of ground accidents and incidents. You might say this is not a bad record; I disagree, because examination of these occurrences in detail reveals that in several instances large hangars with many stored aircraft could have been destroyed, possibly with loss of life. At this stage I think two questions should be asked and if you are associated, even remotely, with the operation of aircraft try to answer them honestly;

- do you have a continuing fire prevention programme?
- do you have a fire fighting training programme?

If either or both of these questions prompts a negative answer then you should be asking some searching questions of your own.

To our knowledge most aircraft ground fires result when well established safety measures are ignored. Some obvious examples are: taking unauthorized shortcuts, hurrying, and using improper equipment. You can think of others I am sure!

Even more alarming is the evidence that when a fire occurs, the usual initial reaction is a moment or longer of panic followed by varying degrees of confusion as to who should do what, in what sequence, where is the nearest fire fighting equipment and how does it work?

Some of the information contained in this issue of Flight Comment could increase your knowledge about fires and prevention measures. However, positive results will be achieved only when you make the effort to be prepared for any conceivable eventuality and such preparation must accommodate the specific peculiarities of your operating environment.

COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

FIGHT THAT FIRE!

Maj P. Brown
CFHQ/CFFM

It was pointed out that there was much confusion in a recent hangar fire...

- *Flight Safety Committee minutes*

In this present age of global peace-keeping activities we often overlook the home front war that someone is fighting and losing every day. It's probably the oldest continuous war in the world, if you exclude the battle of the sexes. The enemy? FIRE! Ever since man first discovered its uses, it's been rearing its ugly flaming head and striking back at its would-be tamers.

The citizens of bygone days couldn't overlook this enemy. There were no paid fire departments to call. Everyone had to be ready to drop everything and grab their "leathern bucket" and heave water on the enemy. A trace of this spirit still exists in today's voluntary fire departments.

This philosophy appears to be wearing thin or even fading out in some segments of the Canadian Forces. Many people, including those engaged in potentially hazardous maintenance procedures appear to be adopting the attitude of "let the fire fighters do it". In fact, they're not even bothering to find out how the fire extinguishers operate that are located in their places of work.

Let's have a brief look at this problem. First, it takes time to call a fire department. Not a long time, granted, with alarm systems and the telephone. Let's suppose you transmit the alarm in 30 seconds. Now the next delay occurs; it takes time for the fire truck and crew to mount the truck and drive to the scene. Again, not long, but let's say a minute and a half. That's two minutes. This only puts them on the scene; it will take another half minute at least to start the pump and apply water or fire extinguishing chemicals. In that two and one half minutes, a small fire could become a raging inferno. If you had known how to operate the extinguisher protecting your place of work, the inferno would either have been extinguished at the start, or would still have been kept to a small, partially controlled and easily extinguished fire.

Let's also look briefly at the Fire Department. Canadian Forces policy is to establish a small, well-trained group of fire fighters to fight incipient fires and to form a nucleus to organize and direct all base personnel in fighting large fires - that's YOU! Yes, for those of you who didn't know this, *you* are being depended upon to help (under direction) at the scene of a fire. This should be readily understandable to military personnel. If your base were attacked by an enemy, everyone is expected to be capable of helping in its defence. What's so different about an attack by fire? It can cripple your operation as quickly as any other enemy attack.

Weapons for defence

What is a fire extinguisher? It's merely a container of fire extinguishing water or chemical capable of propelling the contents to the fire as directed by a hose and nozzle. Is it difficult or a complicated procedure to activate one? No! But you will have to be familiar with the types. Excluding water extinguishers that you won't normally find in maintenance areas, there are really only three different methods of activating hand portable units:

- Invert the extinguisher - and if it has a knob on the cap, bump it on the ground as well
- Remove a locking pin and push firmly down on a well marked plunger or lever; or
- Remove a locking pin and squeeze a double armed handle or trigger.

You must in all cases take hold of the nozzle first. Now, it's simply a case of directing the stream of chemical at the base of the fire.

You may also have large wheeled extinguishers in your area. These are usually the wheeled 40 gallon foam type. This unit is moved to within 40-50 feet of the fire, the hose laid out, the valve on the top of the extinguisher opened fully (anti-clockwise) and the whole unit then tipped so that it rotates on the wheels and the handle rests on the ground. This action mixes the two ingredients in the chamber and makes foam. The increase in pressure, caused by this creation of foam, forces it through the hose to the nozzle. Now the operator can pick up the nozzle and by opening the nozzle valve can direct the stream at the base of the fire. The best advice is to read the operating instructions on the extinguisher located in your place of work NOW - not during the excitement of the moment. If you're still in doubt, drop by the Fire Hall and any fire fighter will be glad to give you a demonstration.

A word of caution would be in order at this time. Portable hand fire extinguishers (some call them "first aid" extinguishers) are designed to control incipient fires. Webster defines incipient as "beginning to be"; that means, literally, that these units are designed to extinguish small fires, or fires just starting. Don't think that a fire extinguisher in your hands makes you a one-man fire department capable of extinguishing any and all size fires. These portable units have limitations just the same as the tools in your tool box. Always send someone to call the fire department.

Your fire department is constantly keeping abreast of the great proliferation of combustible and flammable materials used in aircraft and hangars. At one time the only weapon was water; today, new extinguishing mediums are in your fire department's arsenal.

Quick knock-down of a flammable liquid fire is obtained by dry chemical. This fine powder, expelled by inert nitrogen gas, reacts upon contact with fire and heat to break the chain reaction of combustion thus knocking down the fire. The latest type of this dry chemical is Purple K (potassium bicarbonate). These powders are contained in portable fire extinguishers as well as in major fire vehicles.

Foam is the second major extinguishing medium in use in aircraft fire fighting vehicles. This light, bubbly material floats on the top of flammable liquids and seals the air from the liquid, preventing vaporization. This action smothers the fire. The G19 Sicard major foam vehicle (MFV) will generate enough foam to fill your living room and kitchen to the ceiling. That's about 13,000 gallons.

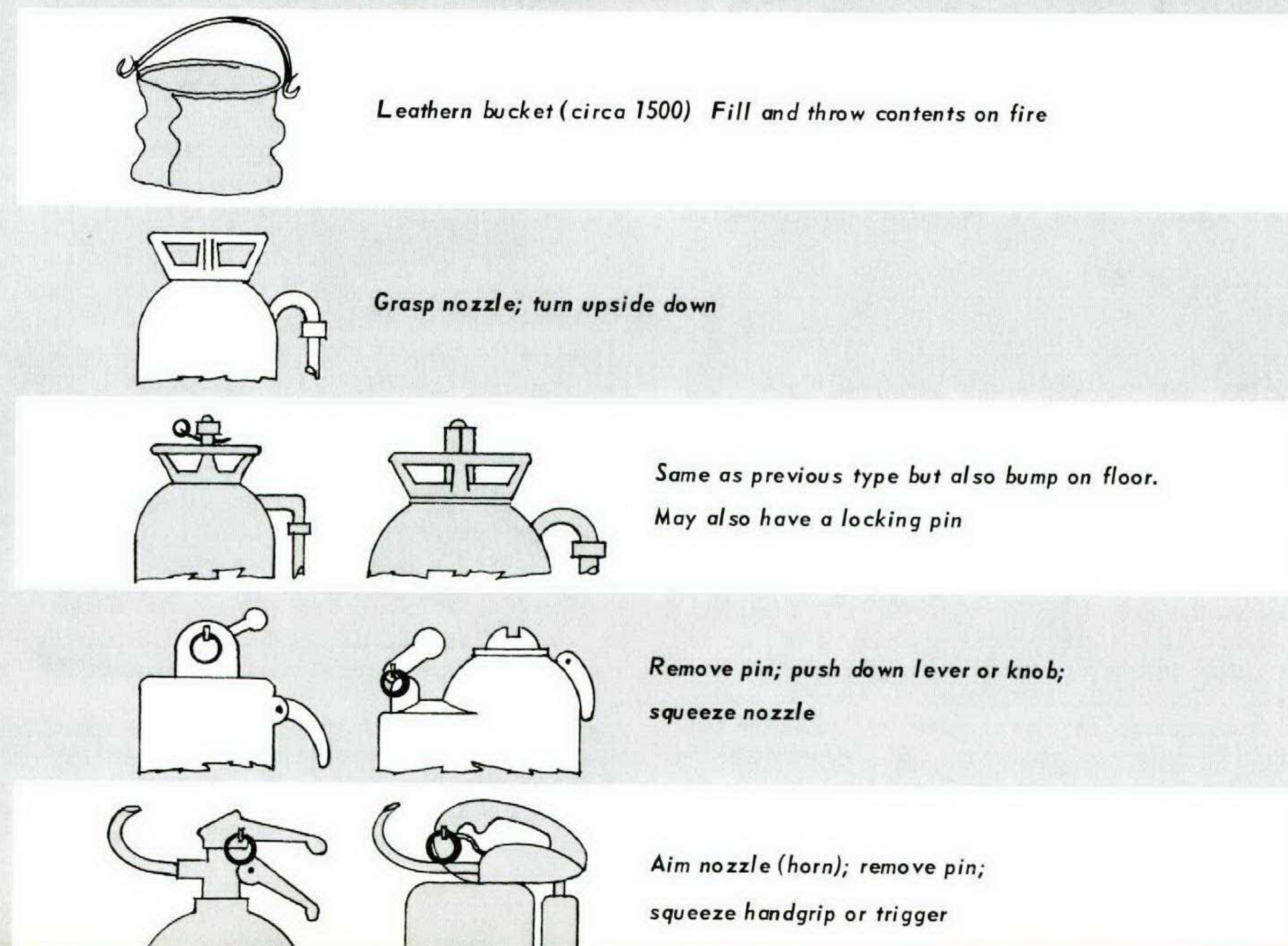
A new extinguishing agent is being tested and introduced. This is an amazing material called "light water". Generated by foam-making vehicles its reaction upon contact with fire is much different to the standard foam. A thin layer will snuff out the fire very rapidly but the reaction however does not stop there. The chemicals combine with the flammable liquid making it almost impossible to re-ignite.

All these items are fine, but remember they are in the hands of the fire department and you must call them if you want their help to fight your fire. What you can do from the time the fire starts and the arrival of the fire fighters may be summed up by "Be prepared". How?

- Know the location of the fire alarms and fire extinguishers in your building.
- Learn the instructions on the alarm box and extinguishers. Don't wait until the fire starts. DO IT NOW. Refresh your memory every month or so by looking again.
- Speak to the Fire Chief and make your men available for a short lecture and demonstration. Don't wait for Fire Prevention Week. That comes only once a year. Is that often enough for you? Fire reports wouldn't indicate so.

That's about all there is to the project. Oh yes, one final important ingredient - common sense - should also be unsparingly added. We can't absolutely guarantee the results, but your chances of saving lives, valuable equipment and buildings will be much greater if you're all set to FIGHT THAT FIRE!

EXTINGUISHER OPERATION



an interim report on

SAFETY LAMPS

(Last year a Flight Comment article "A Roar and a Yellow Flash" called attention to a near catastrophic fire in which the smoking hulk of a CF100 was towed out of the hangar before it brought the building down. It happened because of a loose connection in a safety lamp - or should it be extension lamp? The enquiries we made then are producing a complete examination of this problem that has so long been ignored.)

It's the most commonplace articles which inevitably are the most dangerous. The screwdriver is just about the most dangerous tool in a tool kit. And so it is with extension lamps. It's not only a question of the types of lamp we use but of how we treat them and maintain them in a safe condition. With virtually no policy or instructions on the use and care of these dangerous devices, it means that an inspection of your lamps might produce some disturbing findings.

Let's face it, for most of us an extension lamp is just that. It may be called a vapour-proof lamp, an explosion-proof lamp, or a safety lamp, but with no specific indication of their limitations and much erroneous information floating about - little wonder that we average a fire a year from these devices.

The sub-title of this article says that it's an "interim" report and it should be construed only in this light. Nevertheless, there's some things you should know about these lamps - now. Whether you are a user or a supervisor it's about time that you checked off your understanding and knowledge of these lamps and their uses against the information presented here.

If you're interested in looking up the ungarbled on lamps you'll have to turn to EO 00-80-4/12, Electrical Equipment. It's in the process of being re-written so this article will supersede the information the EO now presents. This unorthodox approach is taken to enable you to immediately examine the state of your lamps and their applications. Vapour-proof or Explosion-proof?

Do you really know the difference? Chances are you don't; in fact, the correct answer to this question was hard to find.

- **Vapour-proof** "Extension lights for use in or around aircraft are to be of the vapour-proof type..." states EO 00-40-4/12.5. However, the Canadian Standards Association states that "the term vapour-proof is not officially recognized by CSA as it has become somewhat misleading in recent years because many people felt that this category of equipment had some application in hazardous locations." They prefer the term "enclosed and gasketted" for the category of lamps commonly known as vapour-proof. So, it's a lamp with a glass globe gasketted to the base containing a standard incandescent element bulb. The significance of the bulb is, of course, that the filament temperature is well in excess of flash points for most gases and liquids. The handles and base mounting of this lamp is carefully designed and made to preclude possible ignition of vapours by arcing from terminals or switches.
- **Explosion-proof** These lamps rely on their safety not by excluding hazardous gases but rather by making the lamp durable enough to contain an explosion generated within itself, or having it function at temperatures below the flammability level of liquids and gases. Hence, it is designed to prevent an explosion by making an explosion within the lamp harmless.

Now that that has been cleared up, let's take a look at the environment these two lamps are designed for. The Canadian Electrical Code definition for Class 1 hazardous locations describes the environment commonly found within the services. The definition reads "The Class 1 locations are those in which flammable gases or vapours are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures". That certainly defines the hangar/aircraft environment.

The most hazardous sub-division of this Class I again seems to best describe the hangar/aircraft environment:

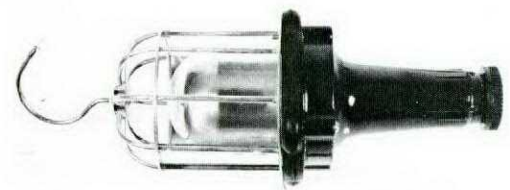
"Locations (1) in which hazardous concentrations of flammable gases or vapours exist continuously, intermittently, or periodically under normal operating conditions, (2) in which hazardous concentrations of such gases or vapours may exist frequently because of repair or maintenance operations or because of leakage, or (3) in which breakdown or faulty operation of equipment or processes which might release hazardous concentrations of flammable gases or vapour, might also cause simultaneous failure of electrical equipment".

There's little doubt, then, that the CSA's contention "...vapour-proof lamps have no particular status in hazardous locations" tend to invalidate the EO and our practice of using vapour-proof lamps around aircraft. This situation is currently under review.

Meanwhile, let's review the lamps that are being used at present. Below is a description of lamps available.

6230-21-812-3006 This lamp is listed erroneously as an explosion-proof lamp in EO 00-80-4/12. Units are to delete this item from the EO.

6230-21-806-7136 (McGill 3006R) This is a *vapour-proof* and watertight 60 watt lamp. The guard is made of zinc-plated steel, which is attached to the handle on a silicone rubber gasket. The cord is secured with a screw-tightening nut on a rubber bushing. The light is equipped with a reflector. ▽

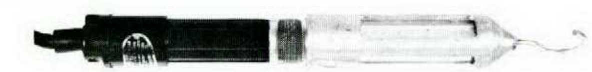


6230-21-801-6971 (Day Ray Products DRV 8P-GK3) This is a portable, fluorescent, *vapour-proof* and moisture-tight lamp. It uses an 8 watt fluorescent lamp, and has a plastic enclosure, and wax-filled starter. The cord comes with an encapsulated ballast case. The light can be easily relamped by unscrewing the cap assemblies. 6230-21-812-3029 (Day-Ray Products DRV 15P-GK3) This lamp is similar to item 6230-21-801-6971, but is larger and takes a 15 watt fluorescent lamp. ▽

6230-21-805-7640 (Crouse-Hinds VS30) This is a 100 watt, *vapour-proof* light with a screw-on globe, and a cast aluminum guard which clamps on with one screw. The bushing comes in three sizes, depending on the size of cord used.

6230-21-797-5173 (Crouse-Hinds EVH106) The globe of this 100 watt, *explosion-proof* and weather-tight lamp is heat and impact resistant. The globe is clamped firmly between the guard and globe holder, making a flame-tight joint. The cast aluminum guard and globe holder assembly is threaded on the handle assembly, and locked to prevent accidental loosening. The terminal housing, provided with a water-tight rubber bushing, encloses three pressure connector terminals. The cord can be wired to the terminals without the use of soldering iron or blowtorch. Relamping is done by removing the guard and globe holder assembly as one unit and installing a new lamp. Globe replacement, however, must be carried out by the manufacturer. ▽

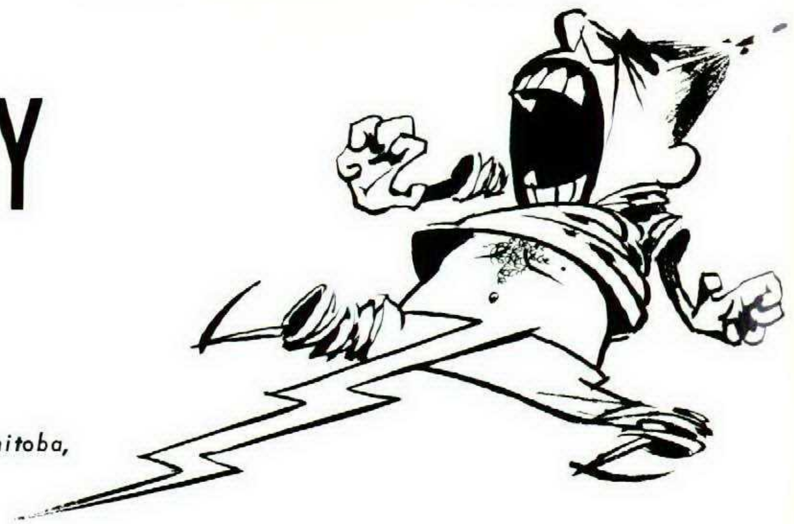
6230-21-812-3010 (SR Browne XP-25) This is a 25 watt, tubular type, *explosion-proof* portable light, consisting of a globe and guard assembly with hook, handle assembly, cord bushing and cord connection assembly. This item can be furnished with a handle for inspecting barrels and drums. This modified version is referenced as NSN 6230-00-266-8646. Globe replacement must be carried out by the manufacturer. ▽



There's a recent arrival which has not been officially certified (although it carries the Underwriter's Laboratories approval), and is currently used during fuel tank inspections in the Hercules. Its portability and ease of handling are obvious: ▽

Looks like a healthy clean-up is proceeding in an area long overlooked. The adoption of explosion-proof lighting may finally put an end to another hazard in the hangar.

STATIC ELECTRICITY



"... Personnel from a CFB in Manitoba expressed concern about the static electricity developed in some items of clothing. Because of this concern, and because of the usually cold dry environment during winter in Manitoba, it seemed very desirable to investigate these causes for concern..."

Well, two scientists went to the scene of all this "static" and made some observations. One scientist was from the University of Guelph, the other from CFHQ's Directorate of Clothing and General Engineering. The outcome injects an element of scientific objectivity in a subject which has long been in the realm of speculation and prejudice.

The experts commenced their observations on a snowy day last February. The relative humidity of 85% was considered unusually high by the technicians involved in the tests; actually, meteorological records show that in winter high humidities outdoors are normal. During three outdoor operations static charge measurements were made:

- arming a T33 with a 2.25" rocket (which is electrically fired)
- fuelling a T33 with JP4 using separately, primary and secondary grounding
- filling a bowser with JP4.

In none of these operations was it possible to detect more than a small potential on or around the technicians' clothing - even when a man slid off the wing of a T33.

Of the indoor operations, only the packing of parachutes was claimed to present a static electricity problem. Here, the characteristic very low humidity (22%) of the heated indoors was conducive to the generation of charges. Nevertheless, no evidence of a problem was found in any phase of a complete packing operation. Halfway through the packing operation the electrostatic energy released by the man was less than ¼ of the strength required for a shock or spark. At the end of the operation, a charge of similar strength was recorded. The same conditions were found in a parachute packing section at a nearby base.

To test the relative propensities for different fabrics to generate static electricity, four men donned, exchanged, and wore garments made with standard and experimental fabrics. The room for the experiment had a relative humidity of 21-24%. The clothing was rotated among individuals to reduce the effects of man-to-man variation. Each man dressed, walked slowly for two minutes, then placed a hand on the electrometer terminal to determine the electrostatic energy. Also measured, were static charges occurring when the garment was removed; in this case, the man's charge as well as the garment's charge was measured.

The scientists found that with the standard combat shirt/coat and summer trousers the subjects developed little electrostatic charge on their bodies.

The experimental aspect of the project was the comparison of standard cloth to fabrics containing stainless steel fibres about 3 ten-thousandths in diameter. These comparative tests of standard vs the metal fibre fabric as well as fabrics of different percentages of metal fibres yielded some interesting results. The report reads, "...after doffing the shirt/coat, a substantially greater energy was measured on wearers of the standard clothing than was the case for wearers of the clothing which contained stainless steel fibres". The difference was, in fact, quite striking; the standard cloth garment contained nearly seven times the static charge of the cloth containing metal fibre. A comparison between 1% and 3% metal fibre content revealed little difference although this comparison was not fully investigated.

For a final test, a man wearing the standard and later the clothing with metal fibre was rubbed across the back with three light but firm strokes of various material - 80/20 wool/nylon sock, 80/20 wool/nylon toque, and a sheet of vinyl material. The sock and toque gave different surface coarseness comparisons, whereas the vinyl was to simulate contact with vehicle upholstery. In every case greater charges developed on the man wearing the standard clothing but the charges were similar for both the 1% and 3% stainless steel fibre blends.

From the tests the researchers drew these conclusions:

- That in neither western base visited was there any operation which creates an electrostatic hazard problem.
- The material in the *Jacket and Trousers, Safety*, for spring, summer and fall wear is "unfortunate" as this outfit showed a marked propensity for generation of static electricity. Recommendations have been made for the use of alternative clothing.
- Small proportions of stainless steel fibres significantly reduces electrostatic propensity.

The researchers placed particular emphasis on ensuring that "...personnel employed on operations liable to present electrostatic problems should be made more positively aware of the danger involved as a result of *removing* a garment and, if necessary, regulations prohibiting the act should be enforced."

All clothing materials generate static electricity; whether they constitute a hazard under the special conditions of use is the problem which the scientists are aiming to solve.

That's about it - not a complete report but a significant advance in our knowledge of this vexing problem.

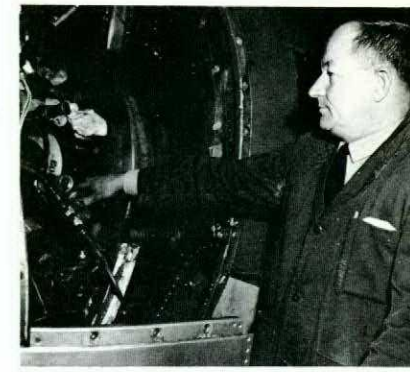
Good Show

Sgt J.M. MacPherson

Pte J.M. Ferris

Lt J.P.L. Leblanc and Lt R.C. Lanning

Capt J.C. Brohman



Sgt S.H. Pugh

CAPT J.C. BROHMAN

After takeoff at about 75 feet above the ground the Chipmunk's engine began extreme rough running accompanied by a partial power loss. Capt Brohman took control from the student and elected to do a non-standard circuit to avoid flying over a built-up area. Throughout the remainder of the flight Capt Brohman struggled with an increasingly rough running engine which delivered less and less power. During the flight he was able to climb only to 140 feet above ground. Capt Brohman flew to a safe landing on the runway.

Faced with a serious in-flight emergency in which the engine could have failed without warning, Capt Brohman flew his aircraft to a safe landing, exemplifying a high degree of flying skill and judgement.

LT J.P.L. LEBLANC AND LT R.C. LANNING

While on a mutual training exercise in an Expeditor, Lts Leblanc and Lanning heard an unusual noise followed by severe vibrations coming from the starboard engine. Lt Leblanc shut down the engine and carried out a successful single-engine landing. The engine was found to have sustained severe internal damage.

The prompt response and correct handling of this in-flight emergency averted the serious consequences had the engine been allowed to run. These two pilots demonstrated that a knowledge of the aircraft and emergency procedures is a basic ingredient of the safe operation.

SGT S.H. PUGH

After the Albatross had returned from a flight the aircraft was signed in with several minor defects, none of which concerned the engines. Later, while maintenance technicians were ground running the engines to check the operation of deicer boots, Sgt Pugh who was on duty in Servicing, noticed what appeared to be after-firing from one of the engines. He then went to the aircraft to check the engines with the ignition analyzer and found a cylinder showing some pressure firing. The engine was shut down and an exhaust valve was found stuck open.

Sgt Pugh's alertness and initiative brought to light a potentially hazardous condition as well as averting further damage to the engine.

SGT J.M. MACPHERSON

While on a pre-flight inspection of a Hercules, Sgt MacPherson heard a slight noise when performing a flight control check. Not content that the control system appeared to function normally, Sgt MacPherson investigated further and found a control cable rubbing on a fibre fairlead. This explained the slight noise but he still decided to investigate further. He established that personnel climbing the step to the flight deck could easily step on control cables running near the top of the steps. This, in fact, had actually occurred on the aircraft.

Sgt MacPherson's decision to conduct a full investigation into an apparently minor problem demonstrates his professional attitude and is in the best tradition of good maintenance practice.

PTE J.M. FERRIS

A curious sequence of coincidences has enabled Pte Ferris to make a commendable contribution to flight safety. During the 18 months Pte Ferris has been employed in the Safety Systems section of CFB Cold Lake he has personally packed the parachutes used in six successful emergency ejections.

In a trade where the quality of workmanship is best revealed by the "real thing" Pte Ferris has demonstrated a high level of competence. This is most encouraging for those whose lives depend on men like Pte Ferris. Such continuing attention to detail can - and does - save lives.

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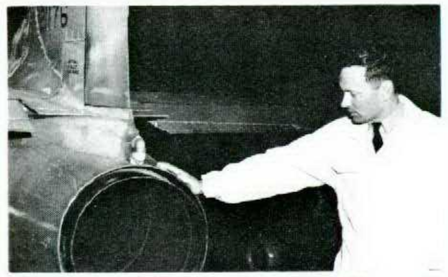
Good Show

Cpl W.J. Fogarty



Cpl J.C. Bigeault

Cpl J.J. St-Pierre

Cpl F. Greene

Cpl D.D. Ferguson

Cpl J.H.G. Bedard

CPL W.J. FOGARTY

Cpl Fogarty was performing an inspection on a CH113 helicopter when he noted that a hydraulic line appeared to be crimped. Persisting in his investigation he removed a manufacturer's tag and found a permanent crimp in the line. He then checked the other similar line and found several inches of black tape covering another crimp. The lines, which had been installed at another unit with straight fittings instead of 90° elbow fittings, had been overstressed.

Cpl Fogarty's alertness and persistence in investigating this faulty installation possibly averted a very serious in-flight emergency.

CPL J.C. BIGEAULT

After experiencing a "wet" start in a T33 the aircrew shut off the engine and quickly evacuated the cockpit. Cpl Bigeault had noticed flames coming out of the tailpipe but after his attempt to put out the fire with the extinguisher failed, he climbed into the cockpit and carried out a successful ground crank to blow out the flames and excess fuel.

Despite the hazard, Cpl Bigeault's initiative and disregard for his own safety averted a major fire that could have resulted in the loss of the aircraft.

CPL F. GREENE

Cpl Greene was checking the fuel flow divider on a CH113 helicopter engine as part of a daily inspection when he noticed a crack in the combustion chamber. The chamber is located behind the flow divider making the crack barely discernible.

Cpl Greene's alertness and keen observation led him to observe component damage which could have readily gone unnoticed. His finding averted a condition which could have caused an in-flight engine failure.

CPL J.J. ST-PIERRE

As a passenger on a scheduled Yukon flight, Cpl St-Pierre was seated at the rear of the aircraft, when he noticed smoke coming from the starboard rear washroom. He immediately grabbed a fire extinguisher and put out a fire, in which the panelling and insulation adjacent to a water heater were badly scorched. Intense overheating could have caused the fire to spread.

Cpl St-Pierre's initiative and quick action prevented what could have developed into a very serious in-flight emergency.

CPL D.D. FERGUSON

During a deployment exercise Cpl Ferguson was performing an inspection check on an Argus when he discovered a fuel leak. This leak, at the junction of a fuel nozzle and its flexible feedline was far beyond the limits of a normal check. Furthermore, Cpl Ferguson discovered this condition during the hours of darkness.

Cpl Ferguson demonstrated a commendable alertness and integrity in uncovering a serious hazard which could have resulted in a major engine fire.

CPL J.H.G. BEDARD

While carrying out corrosion preventive measures and Rust Lick procedures on a CH113 helicopter, Cpl Bedard noticed that the head was missing off the retaining screw of the starboard starter cover. This cover has only one retaining screw and is located inside the intake screen making it very difficult to see.

The measure of Cpl Bedard's integrity was his finding an obscure flaw while on an unrelated job. By bringing this condition to light he averted a potentially serious flight safety hazard.

Winter clothing - NOW!

With the approach of winter all aircrew should ensure they have adequate winter flying clothing. Some items are stocked only in small quantities but can be ordered...

- Flight Safety Committee

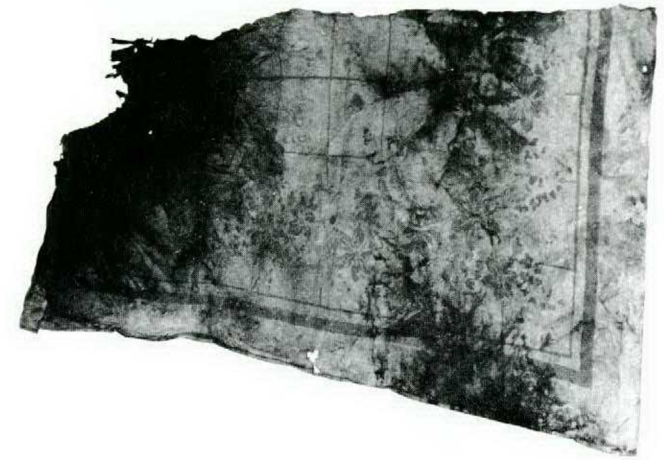
...and out it came!

The Dak had oil pressure fluctuations in the starboard engine twice in one week; this prompted an in-depth investigation of the whole system. It drew a blank. However, on the second hour-long run-up the boys got what they were looking for - a momentary pressure fluctuation. Now that both sides of the fence had witnessed the fluctuations, an even closer look was made.

Suspicious of the trickle of oil which flowed from the oil tank when the outlet line was removed, a technician examined the 90-degree elbow by the "finger probe" method. Sure enough, there was an obstruction. A portion of tablecloth 4 feet by 2 feet was removed from the oil tank!

How long had it been there? We looked back and found that there was quite a history of problems with the starboard engine in this aircraft between 1950 and 1964. There were six single-engine landings - half of these involving oil pressure fluctuations, one of which was attributed to oil starvation.

However, in 1963 the oil tank was overhauled by -6A mod on the oil standpipe - at which time surely, someone could have spotted the rag. Also, there's the assurance by the base that since 1960 at least, the 14 x 16 reusable rag has replaced tablecloths!



...and out came a 4' x 2' piece of tablecloth (after cleaning).

The last engine removed was time-expired at 1375 hours with no reports of oil pressure problems. So the riddle of when and how the rag got into the oil tank will (unless someone volunteers an explanation) remain unsolved.

Canopy focuses sunlight - Fire!

As the canopy was raised on the tarmac before a flight, smoke was seen coming from behind the rear seat. A burning flying jacket was quickly extracted and extinguished.

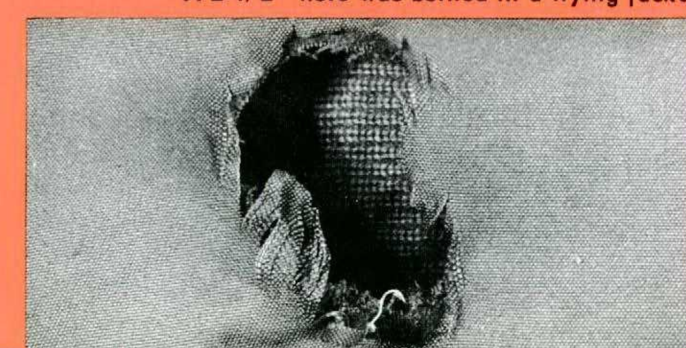
To confirm the suspicion that the canopy had focused the sun's rays, a glove was placed in the same position - it took six seconds to catch fire. (The outside air temperature was 20°F.) The same day in another T33 an officer did a slow burn when he found his hat with a 1-1/2" charred hole.

This isn't new. The Canadian Forces share the experience of other services whose personnel use exposed areas for the storage of inflammables such as clothing.

This condition is an ingredient for a major accident; both fuel and oxygen are present.

Maybe we should all go further than the usual bulletin aimed at making "aircrew aware of the hazard"; if memory serves, that's what we did the last time this happened.

A 2-1/2" hole was burned in a flying jacket.



a message for managers

Don't get your curves crossed!

Capt. D.W. Rumbold
DFS

(Capt Rumbold is currently employed on accident prevention and investigation duties at DFS. He developed this article from an idea presented by Mr Bob Morrison, an engineering lecturer at the Aerospace Safety and Management Division of the University of Southern California.)

If we were to measure the height of everyone in the Canadian Forces we would notice (not surprisingly) that everyone is not the same height. Most personnel are between 5'6" and 5'11" tall, with more of them being 5'8½" tall than any other height. However, some are shorter or taller than these limits. By plotting on a graph the numbers of people in each height range, we would come up with a bell-shaped curve that looks something like this:

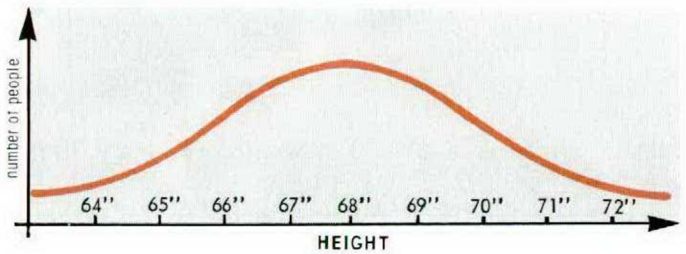


Figure 1

If we were to make a thousand 1/2" bolts we would find (if measured accurately) that they would not all be *exactly* 1/2" in diameter. Some would be one or more thousandths of an inch bigger than the nominal 1/2" and some smaller by similar amounts. Again, if we were to plot our measurements on a graph, we would end up with a bell-shaped curve.

This shape of curve is common to the distribution of any natural phenomenon or man-made object; it is known as the CURVE OF NORMAL DISTRIBUTION. Its general theoretical characteristics are:

- It is symmetrical - ie, "mirror image" on each side of the nominal value or "top of the bell";
- It is "asymtotic at infinity" - ie, the "rim of the bell" never completely reaches the baseline.

The normal distribution curve applies to many aspects of aircraft design, construction, and operation. For instance, an aircraft is designed to withstand a certain usage during its life. For a variety of practical reasons, some parts come out a little stronger and others a little weaker. Similarly, some mechanisms are a bit more reliable than necessary, and some less. If it were possible to measure the capability of each aircraft of a certain type, we would have a curve that essentially looks like this:

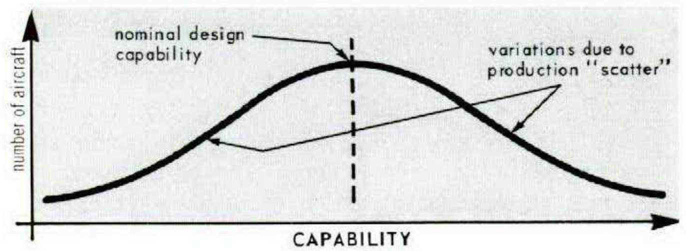


Figure 2

Of course, due to the multiplicity of components and variables involved it is impossible to compile the data to plot such a curve. Nevertheless, it does illustrate what actually occurs.

We could also apply this analogy to the *people* in our "man/machine system" - the aircrew, supervisors, managers, and technicians. We would find that a normal distribution curve would also describe the variations that exist about the *nominal capability level* of our personnel.

Now, if we were to look at our utilization of man/machine resources, what would we find? You're absolutely right! There's another normal distribution curve:

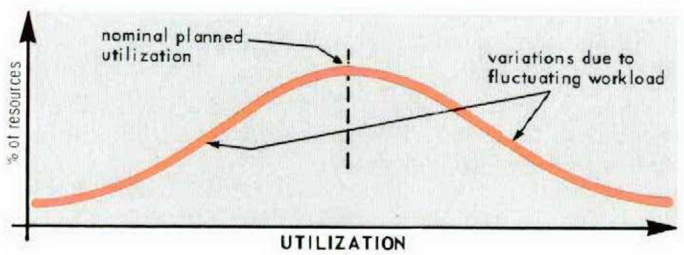


Figure 3

Some aircraft or people are worked or stressed harder or longer than the planned amount, and some less.

Let's examine what happens when we plot on the same graph, the curves of capability and utilization (or man/machine) for a specific activity. We would probably end up with a graph that looks like this (remember that this is an abstract representation):

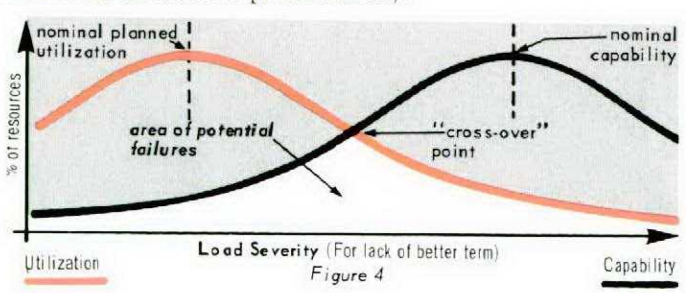


Figure 4

Because neither curve reaches the baseline they must cross. This is most significant because the area enclosed below the crossover point is the area in which *utilization can exceed capability* - the area of potential failures in our man/machine system.

Fortunately, we have several means to control this situation. First, it is possible to modify the characteristics of a normal distribution curve. Let's go back to the height of everyone in the Canadian Forces for a moment. In theory, our curve would show that some personnel were less than 4' in height, a few were less than 3', and one or two were less than 2' - and so on! But this is not the case because we have controlled the curve by setting a minimum height for service personnel. We could take a similar approach with our 1/2" bolts; by reducing tolerances, we could throw out all bolts which were, say, 0.001-inch greater or smaller in diameter than the nominal 1/2". We may well end up with fewer of them, or it may cost more to produce the asked-for 1000. It is therefore possible to reduce the spread of the curve. By so doing, the original curve will now look something like this:

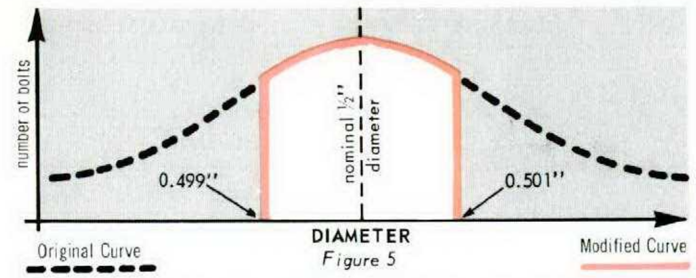


Figure 5

Also, we could cut portions off either the left or right-hand side of the personnel curve by recruiting only those within a height range. Similarly, we can hack away the unwanted areas within the man/machine curves.

What does all this mean to our aircraft operation? Well, to eliminate overlap (Fig 4), we would obviously want to limit the right-hand area within the Utilization curve and the left-hand area within the Capability curve. Or, in practical terms, reduce the random extremes inherent in *excessively high* utilization and *excessively low* capability. The technique to achieve this is the same as for recruits and bolts, viz, rigidly enforced limits. In practical terms this, of course, boils down to GOOD MANAGEMENT AND SUPERVISION. Good management and supervision can achieve better operational limits and better operational standardization to cut away the right-hand portions of our Utilization curve. Also, we can cut the left-hand spread of our man/machine Capability curve by better quality control, tighter specifications and better and/or more frequent inspection (assessment) of our resources - remembering of course that resources include *personnel* as well as aircraft and equipment.

To accomplish all this, supervision alone is not sufficient, for we could still be faced with an overlap, albeit reduced by our earlier efforts. In such a case, our curves could look like this:

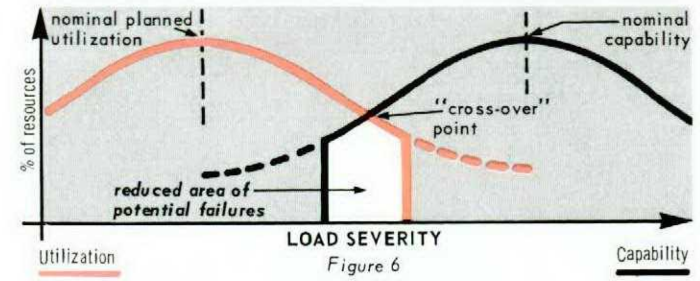


Figure 6

Any overlap is not healthy, therefore good supervision must be complemented by efficient management of operations and resources by proper *matching techniques*. By careful planning, our resources (Capability) can be matched to the operational requirements (Utilization). This means our best resources (men/machines) will be identified and assigned to the peak operational requirements. Provided this matching is realistic enough that our utilization never exceeds our capability, we can cope with the limitations imposed by our resources.

But what happens in the final resort when, despite all these efforts, it appears that utilization is about to over-reach capability?

- Do we shrug our shoulders and ignore the consequences, accepting a rapid rise in resource losses and "down time"?
- Can we afford the expense of specifying *higher* nominal capability for men and machines to meet the "operational requirements"?
- Or, will we *reduce* nominal utilization by cutting our operational "coat" to suit our resource "cloth"?

Whatever happens, the normal distribution curves handily illustrate the potential consequences of our actions and the approaches which can be adopted to reduce the so-called "unexpected failures". They show also why such failures should *not* be unexpected to the discerning manager.

Let's hope you are that discerning manager - and that you never let your curves cross! ■

Smoking hazard!

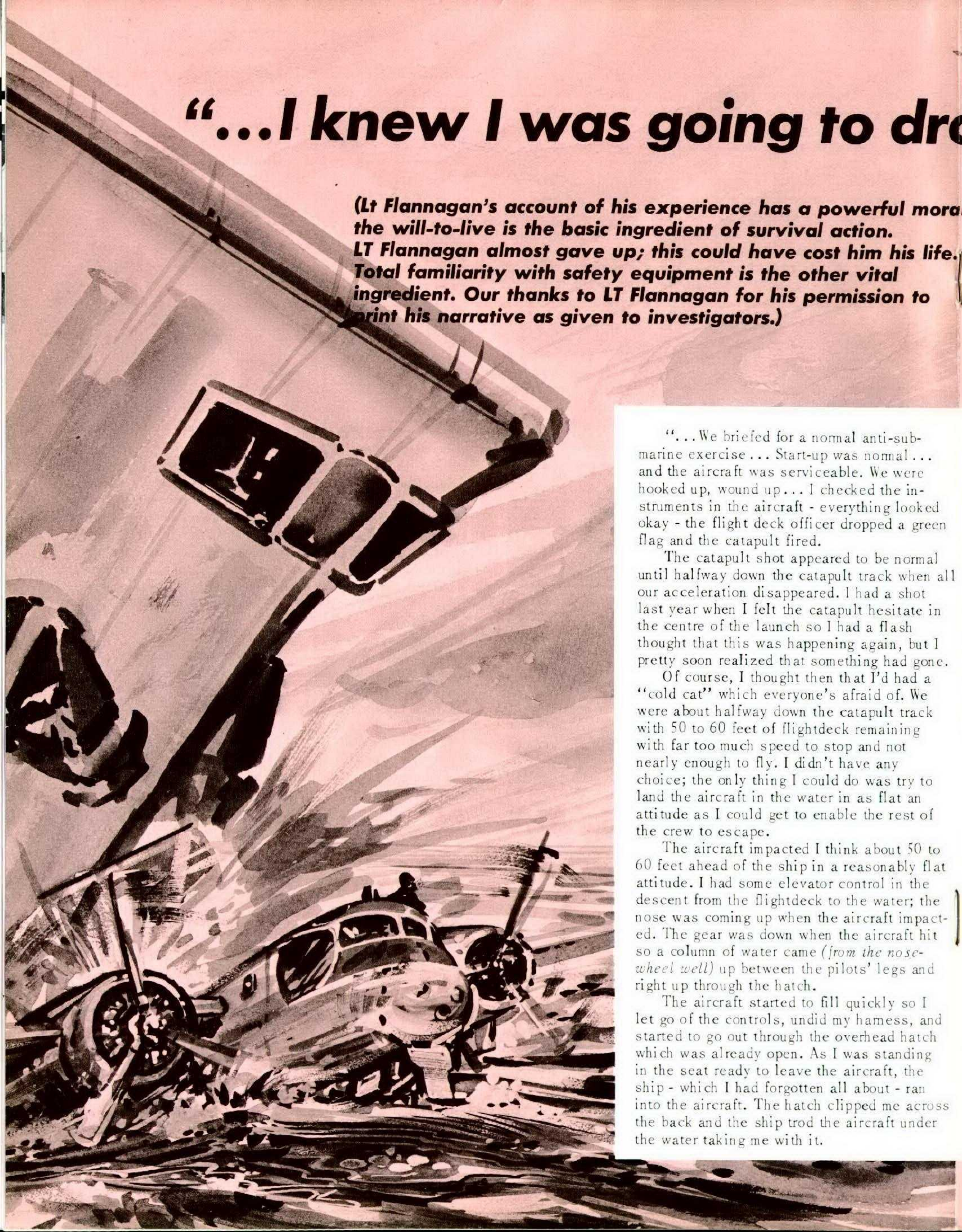
During a recent inspection of a passenger aircraft, a handle for the overwing exit hatch could not be pulled. After working with tools for approximately ten minutes and pulling with considerable effort, the handle and related mechanism released. A considerable accumulation of nicotine and tar was found on the mechanism and linkage. Operation of the other three emergency handles was difficult but the exits were found to be operable. There was no information available as to when the exits in this aircraft were last checked and operated.

- FAA bulletin

Land vs press on

The FSO reminded all aircrew of the seriousness of flying in aircraft that have symptoms of malfunction. Better to land than press on . . .

- Flight Safety Committee



"...I knew I was going to drown"!

Lt(N) J.H. Flannagan

(Lt Flannagan's account of his experience has a powerful moral: the will-to-live is the basic ingredient of survival action. LT Flannagan almost gave up; this could have cost him his life. Total familiarity with safety equipment is the other vital ingredient. Our thanks to LT Flannagan for his permission to print his narrative as given to investigators.)

"...We briefed for a normal anti-submarine exercise ... Start-up was normal ... and the aircraft was serviceable. We were hooked up, wound up ... I checked the instruments in the aircraft - everything looked okay - the flight deck officer dropped a green flag and the catapult fired.

The catapult shot appeared to be normal until halfway down the catapult track when all our acceleration disappeared. I had a shot last year when I felt the catapult hesitate in the centre of the launch so I had a flash thought that this was happening again, but I pretty soon realized that something had gone.

Of course, I thought then that I'd had a "cold cat" which everyone's afraid of. We were about halfway down the catapult track with 50 to 60 feet of flightdeck remaining with far too much speed to stop and not nearly enough to fly. I didn't have any choice; the only thing I could do was try to land the aircraft in the water in as flat an attitude as I could get to enable the rest of the crew to escape.

The aircraft impacted I think about 50 to 60 feet ahead of the ship in a reasonably flat attitude. I had some elevator control in the descent from the flightdeck to the water; the nose was coming up when the aircraft impacted. The gear was down when the aircraft hit so a column of water came *(from the nose-wheel well)* up between the pilots' legs and right up through the hatch.

The aircraft started to fill quickly so I let go of the controls, undid my harness, and started to go out through the overhead hatch which was already open. As I was standing in the seat ready to leave the aircraft, the ship - which I had forgotten all about - ran into the aircraft. The hatch clipped me across the back and the ship trod the aircraft under the water taking me with it.

I came out of the aircraft and I pulled the right-hand side of my mae west which I don't think inflated.* Then I began bumping down the underside of the ship. There was a lot of turbulence and I was turned over and pushed around. I almost drowned. I had reached the point where my chest was working and circulating salt water. I reached the stage when I knew I was going to drown.

Then I saw the white water which was the cavitation of the screws and I realized a fraction of a second before it happened that I was about to go through the ship's propellers! I could see the individual prop blades, I saw the propeller blade which hit me come from the 12 o'clock position down to the 9 o'clock position. This was an indication that the props were almost stopped. The blade passed in front of my face and struck me on the leg and I think the shock of my leg being amputated *(below the knee)* woke me up enough to continue with some survival efforts because it was after this that I pulled the other side of my mae west and I felt a definite inflation of the mae west. Then I floated to the surface in the wake of the ship.

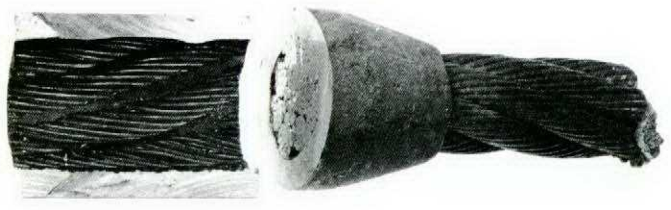
When I surfaced I was looking toward the rescue helicopter; he was less than 400 yards away from me and was coming straight towards me with his horse collar skipping across the waves. I'm sure that the helicopter crewman in order to put me in the sling must have jumped 30 or 40 feet into the water. I was in the water with large pink blood areas spreading around me; I know that I wasn't in any condition to put myself in the collar. I feel that if the helicopter captain hadn't made the decision to pick me up right away and that if his crew hadn't worked so fast and so efficiently in getting me out of the water it might have made the difference between survival and death.

The helicopter picked me up and took me back on board the carrier. I was taken down to the sick bay where they started pumping blood into me and stopping the bleeding in my leg. I was given morphine to stop the pain and decrease the shock effects and started generally to build up my strength so that when I got ashore they could operate on me.

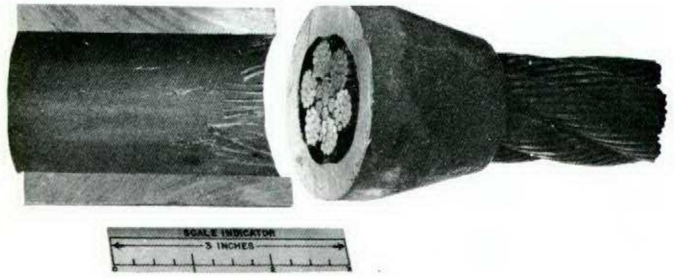
I was back on the ship about 8 minutes after the accident. Two hours later, I was loaded into a Sea King helicopter and flown to an army hospital in San Juan, Puerto Rico. When I arrived, there was a surgeon with a neurosurgeon standing by. They took me straight into the operating room. Because of the condition of my lungs they didn't dare give me a general anaesthetic so they gave me a spinal anaesthetic; consequently I was conscious throughout the operation which took about 2½ hours.

The other three crewmembers got out of the aircraft, I think, before the ship struck the aircraft. One crewmember managed to swim clear of the ship; he was never in the turbulence of the ship's passing through the water. The other two crewmembers I wasn't sure about, but I think they just followed down the side of the ship and into the wake. When the helicopter crew saw the first head appear in the wake they went over and picked him up immediately. While they were doing this the other three crewmembers came to the surface in the ship's wake. The helicopter captain was faced with a decision of who to pick up first. He took a quick look and decided that I was the one that looked to be in the worst shape. As it turned out, the other two crewmembers were not injured so his decision was an extremely good one!"

* *It was subsequently checked and found serviceable. Due to the turbulence he would be unaware that it had inflated.*



Note how properly swaged join has cable wire embedded into sleeve.



Improperly swaged, the cable slid loose on launch; the smooth sleeve interior and gaps between cable sleeve (end view) show why the loop couldn't take the strain.

The accident was caused by catapult bridle failure. Examination of the failed bridle showed that the bridle loop had pulled free from the swage sleeve during the launch. This item was gripping only approximately 1" to 1½" of the splice whereas the sound bridle showed complete interlaced splice fully swage gripped over 6" of splice (see photo). Specifications require that each pendant assembly be proof-loaded to 100,000 lbs. This bridle apparently failed at less than 90% of this value on its second launch. The cause factors assigned to this accident are:

- Materiel - Related Facilities. Failure of catapult bridle.
- Personnel - Other Personnel/Civilian Contractor. Non-compliance with orders. Failure to ensure that each bridle is serial numbered to facilitate control of proof testing.
- Personnel - Other Personnel/Quality Assurance - Inattention. Did not ensure bridle met specifications.

CLOSE CALL · OPERATIONAL HAZARD · SAFETY SUGGESTION

SAFETY COMMENT

This pilot's last "rush job"

(We're grateful to this pilot for taking the time to pass along a lesson of prime importance...)

For two weeks I'd been waiting for the weather to clear sufficiently to carry out this flight. At last the forecast looked good so the aircraft was scheduled for an 0800 line time. If all went well, we would be airborne by 0830 and on the ground again for 1130 so that one other crew member could keep an important engagement.

As forecast, the dawn broke crystal clear. I arrived at work a half hour early and thought I'd just check to confirm that the aircraft would be ready on time. When I asked about the aircraft state, the sergeant told me that the aircraft wouldn't be ready on time due to a radio snag. I told him how important the mission was and advised him that the priority was sufficiently high to warrant going even if only one radio was serviceable. He assured me he'd do the best he could.

It was at this point that I noticed that the DI on the aircraft had not been started, probably because the aircraft was u/s and the crew assumed the flight would be delayed or cancelled. The time - 0730. The maintenance crew then went to work while I checked weather, flight planned and rounded up the rest of the crew.

My regular crew would not be with me on this trip as they had important duties elsewhere but the replacements were familiar with the mission and my regular crew were to brief them on the special equipment prior to takeoff. Since we were to operate above 10,000 feet and we had oxygen outlets only for the special crew and pilots, the crewman was going to have to stay behind. This was no problem; I'd flown without a crewman several times.

Everything looked good if only the aircraft were ready on time. The time was now 0745. My replacement nav had not arrived but he was usually very punctual so I wasn't worried. 0800 and still no sign of my nav. No sweat, the aircraft still wasn't ready. Finally at 0815 the nav arrived and a hurried briefing was held. At 0820 a call came from maintenance to say that the aircraft was ready on the line and the snag had been cleared.

As I signed out and headed for the aircraft, I was thinking, "Well done; the boys must have really put their shoulder to the wheel to get the bird serviceable so quickly". I made a mental note to compliment the telecom boys. Then I stepped out of the hangar and saw the Buffalo. Any thought of praising the troops soon vanished. The aircraft was signed out serviceable but it was still tied down as it had been overnight; the dust covers, ground locks and pitot covers were still firmly in place and the props were still tied to prevent windmilling.

I asked my crew to take the replacements inside and brief them on the equipment and procedures while I did the external. I then set to work removing all the pins, plugs, covers, etc. When I got to the nose, I was unable to remove the pitot covers as they were firmly tied and a little too high for me to reach. I made a mental note to remove them as soon as I got into the cockpit. About the time I got to the starboard wheelwell, I realized I wasn't doing an external at all, I was merely removing the plugs, etc.

I finished my external with a little more thoroughness and boarded the aircraft.

As I entered and stowed all the plugs I noticed my crew still busy briefing on the special equipment. However, by the time I'd finished my internal check and was ready to enter the cockpit, they were finished and heading for the exit.

The time was 0840 and I was beginning to wonder if we would make it back on time. We would have to hustle. We went straight into our checks and within a minute the APU was on and we had power. Then I noticed the door-unlocked light was on and the nav said the crew were having trouble with the door. I waited impatiently for the problem to be cleared. Finally the nav reported that the handle was locked with the door open and the key would have to be obtained to unlock it.

Another delay! Our chances of making that appointment now seemed to be nearly impossible. Finally the door was secured and we were given the all-clear to start. Then like a well-oiled machine, my co-pilot and I went rapidly through the start, post-start and pre-taxi checks. Checklists complete, I waved the chocks and was given a thumbs-up from the start crew. At last we were underway. Brakes OFF - time 0850, we'll be airborne by 0900.

Then out of the corner of my eye, I caught sight of my regular nav entering the hangar. He glanced back to see if we were underway and then he stopped. The next thing I knew he was giving the brakes-on signal and pointing to the nose. Then it struck me - the pitot covers. Those covers I'd made a mental note of. Sheepishly, I opened my window and removed the cover while my copilot did the same.

As I taxiied out, I wondered, would I have thought of the covers during the engine check when it came time to turn on the pitot heat? Would the tower have noticed as I taxied by? Would I have seen the streamers when I checked reverse and they fluttered forward? I couldn't help but feel that the answer to all these questions might have been NO. Yes, I came very close to being an accident/incident statistic. Close enough that I paused to reflect on what I had done wrong:

- I'd expected a rush job by the maintenance boys to be done to the same high standard as they usually maintain;
- I tried to do the crewman's job as well as my own in less time than I usually take for my own;
- I had not allowed sufficient briefing time for my crew;
- I allowed myself to be distracted by minor delays and became impatient to be underway;
- I had accepted an aircraft that was not properly prepared for flight.

Ironically we carried out the mission exactly as planned and still finished a half hour earlier than expected, so all my impatience had really been for naught. Yes, I learned about flying from that. In future, I'll allow more time so that I can be more relaxed and more thorough.

Mental block OR Acute transient cerebro-cortical retardation

If there's one noteworthy characteristic of the safe driver, it's his habit of continually assessing the nature and likelihood of an accident for each situation he's exposed to. The outcome of this mental process is the high probability that he will know what to do when the actuality confronts him. Living in expectation of the worst is basic to defensive driving.

How does one learn to fly defensively? The most effective way is exposing the pilot to simulated hazards. That way, he can not only experience the personal "clutch factor" involved, but can learn the complex reactions required of him, when conditions are downright unfavourable to precision and rapidity of thought!

In fact, on occasion an *acute transient cerebro-cortical retardation* sets in - and nothing moves. And inasmuch as in-flight emergencies tend not to correct themselves unassisted, an absence of thought can be suicidal.

Here's what one of our doctors recently wrote: "The usual cause of mental block is an unresolving doubt present in an individual's mind as to the reality of his present situation. This usually stems from incomplete knowledge and results in a form of negativism in which no action is taken..." The doctor went on to comment on the makeup of some persons in whom "...fast deductive thinking followed by appropriate action is just not possible". We support the doctor's further observation that more emphasis on simulated emergencies is the only way to overcome mental block during an emergency.

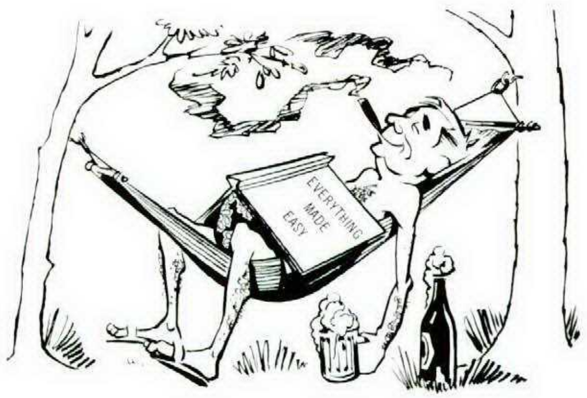
There's convincing evidence that the simulator - far from being the perennial drag - may just equip you for that moment when immediate detailed action is needed but all that's forthcoming is an acute case of transient cerebro-cortical retardation.

Forty - and fit?

A Canadian Forces survey of "aerobic work capacity" is underway. Aerobic work capacity is a good indicator of physical fitness.

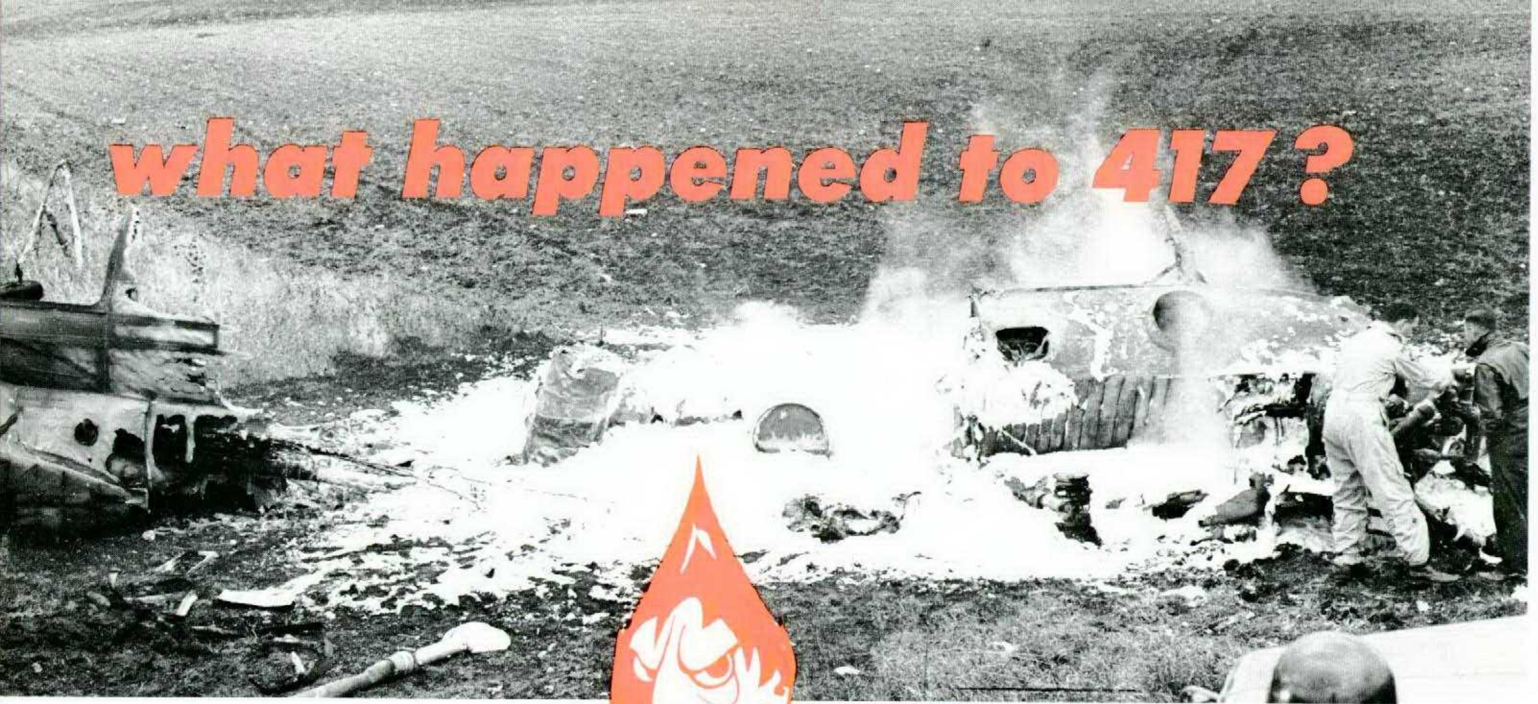
Surveys at CFB Borden and CFB Toronto have been completed and the preliminary results released. Several points came out:

- The oxygen uptake and age distribution are remarkably similar for Toronto and Borden.
- Both these groups are significantly different from the 1st Bn Canadian Guards who were tested earlier.
- As expected, the Guard's physical activity left them more fit.
- There's a dramatic decline in aerobic capacity up to about age 40 at which point the rate of decline is much less. (Small solace for the aging!)
- Using a USAF standard, practically all the Guards personnel would "pass" vs only half of the Toronto and Borden groups.



- Only 10 to 15% of personnel make an effort to improve their fitness.

From recent stock market maneuvers it's apparent that the smart money is on the move; tobacco profits are being ploughed back into breweries. This being the case, the fight for fitness is going to get tougher...



what happened to 417?

"Mike" FOD strikes again...

Maj G.M. Henderson
DFS

(Four years is a long time to look back to an accident but with "Mike" FOD now in the public eye, the story of 417 should convince anyone that micro-FOD must go...)

Up on a training flight with an instructor, a student and crewman, the time came for a demonstration of flight without the stability augmentation system (SAS). A pilot must know how to fly the aircraft without this SAS in case it fails in flight.

Without the SAS the aircraft tends to wander around the yawing axis. The expected happened; in fact, the instructor twice had to assume control but the second time, a left yaw and roll continued setting up severe control difficulties. The nose dropped and the aircraft went into a steep spiral dive to the left. After turning through 270 degrees the instructor seemed to gain some control and the aircraft was pulled out of the dive at about 300 feet above the ground. The aircraft, however, continued to sink in a slightly nose-high attitude.

The sinking continued with little forward speed, the rotors heavily thumping and vibrating, when at about 75 feet the aircraft rolled 60 degrees to the left and descended sideways into the ground.

The forward blades hit while the nose of the aircraft was still in the air. When the nose section struck, it did so with such violence - probably due to reaction from the blade strikes - that the instructor who was a big man was thrown out through the nose of the aircraft still in his seat. The student unstrapped himself and together with the crewman dragged the instructor clear of the wreckage.

The investigation was hampered because the student had not been at the controls during the emergency and the instructor could not be interrogated before his death. It was fairly clear that the instructor had lost, or had been deprived of, the control of the aircraft, and on these two aspects the investigation was focused.

The centre section of the fuselage was gutted in the fire but enough remained to establish that all control linkages were intact and secure. Incidentally, no unwanted tools were discovered.

The control systems in this aircraft are extremely complex and there was much work to be done by the crash investigators. A computer study of the controlability of the aircraft in the attitudes described established them to be extreme but controllable in the yaw/roll manoeuvre which initiated the emergency.

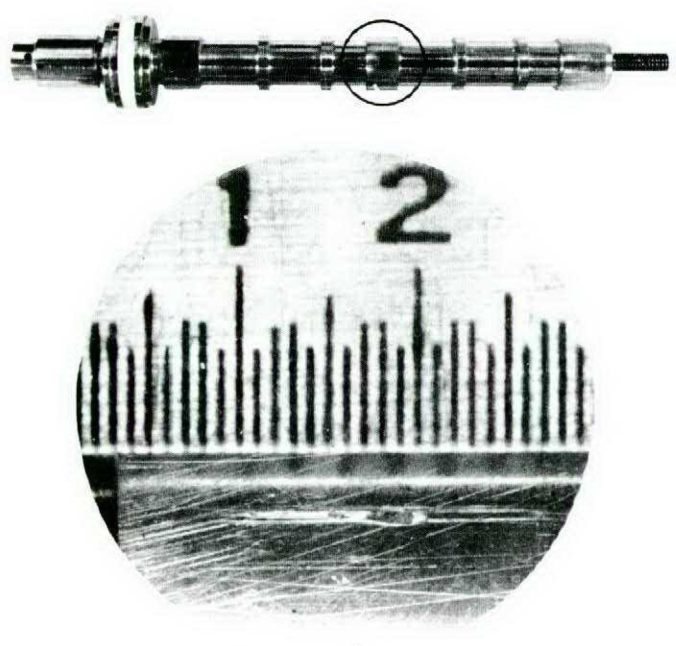


Fig 1 The enlarged photo shows that scoring of spool surface

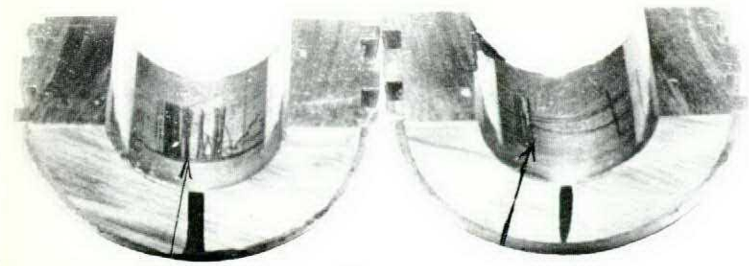


Fig 2 Control valve sleeve cut open to show extensive scoring

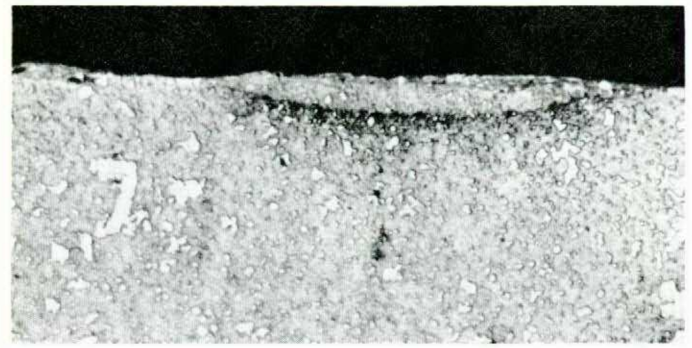


Fig 3 Cross-section of controller galled area. This micro-photograph shows depth of damage.

Why the nose dropped is a mystery; under the circumstances it should have gone up rather than down. During the pull-out from the dive it was clear that the flight envelope of the blades was exceeded even though the engines were delivering full power. This was confirmed by evidence of coning of the blades.

The control system components were removed from the wreckage and shipped to various overhaul contractors for stripping down. The only component which caused concern was the forward upper collective dual boost actuator valve which was score marked (Fig 1, 2) and possibly galled (Fig 3).

Investigators then asked for a metallurgical analysis of this fault and an appraisal of its effect on component functions. Extracts from the Quality Assurance Laboratories report tell the story:

"... the friction existing in this particular area of the actuator was much higher prior to the accident and was therefore much more sluggish in operation or seized... The material build-up on the controller centre land of this actuator is considered to have been of sufficient dimension prior to aircraft impact so as to have caused a very sluggish and insensitive actuator or seized controller."

From this investigation it is concluded that the controller valve of the forward upper collective actuator stiffened or seized to the point where the pressure exerted by the stick boost actuator could not move it, or could only move it sluggishly. This would have deprived the pilot of full control of collective pitch on the forward head.

Cause of this scoring and interference: HYDRAULIC CONTAMINATION - "MICRO FOD".

Is this likely to happen again? Since this occurrence the hydraulic cleanliness in the CH113/113A fleet has been greatly improved. With 3-micron filtration for all our aircraft systems soon to be made available, there's every expectation that accidents of this sort will never happen again - that is, if everyone associated with hydraulic fluid and maintaining aircraft keeps on the look-out for that arch-fiend, "Mike".

Major Henderson joined the army (artillery) in 1940 and saw service as a troop commander in Italy 1943-44 before taking his flying training in the UK 1944-45. He served as an AOP pilot until 1946 in Holland and Germany. In several flying posts, he became CO 1 AOP Flight, RCA, Petawawa. Major Henderson came to DFS in 1964 - the first flight safety appointment from the army aviation element. He retired recently from his work as a DFS investigator.

Bad management?

While staggering, dazed and dome-weary in the daily trek through jargon-infested prose jungles (!) we came across a pleasant little clearing the other day...

The late Sir Harold Nicholson in his Peacemaking 1919, *said "Nothing could be more fatal than the habit of personal contact..." The apparent passion in aviation and of senior people generally to get to know each other is a dangerous practice. Personal contact breeds personal acquaintance and that leads to friendliness - and there is nothing more damaging to precision in decision-making than friendliness. Aerospace decision-making is a process of negotiating documents in a ratifiable and dependable form and it does not include the art of conversation. The affability inseparable from any conversation between aerospace people who know each other produces allusiveness, compromises and high intentions. In contrast, an aerospace decision - if it is to be productive - should be a disagreeable business with which the participants should be dissatisfied. How can it be made disagreeable if people use every opportunity to generate a phony conviviality? You don't invite your income tax assessor to a nightclub for drinks; it is a serious business handled by mail in documentary form.*

It is the falseness that is so morally bad. If a man loses his position he suddenly finds all his "friends" have evaporated too - just when he needs them. People pretend; they think they have friends but these are not friends at all.

"Safety through friendship" may be suspect after all!

. . . a good job on

T33 prevention

Cpl McPherson of CFB Bagotville's Maintenance Research section observed recently that while EOs provide good maintenance information they seldom refer to the consequences if these procedures are not followed. He then prepared a table showing the cause-and-effect relationship of maintenance error to the consequences. It's an interesting approach and while it will be of direct value to T33 operators the table is printed here as a sample of good preventive work. Congratulations Cpl McPherson.

	ERROR	RESULT
AIR INCIDENT CAUSES	Main undercarriage uplock and trigger mechanism improperly adjusted	Undercarriage probably dropping in flight.
	Loose rivets on the elevator spring or trim tab hinges	Possible loss of elevator spring or trim tab in flight.
	Failure to set the cabin pressure regulator to the "all on" position following cockpit pressure test	Cockpit probably will over-pressurize, causing the mission to be aborted and usually resulting in the canopy actuator chains being broken when the canopy is unlatched.
	Failure to drain the cockpit water drains	Frozen or stiff controls during flight.
	Seatpack incorrectly stowed during solo flight	Probable jammed controls.
	Armament doors insecurely closed	We sometimes lose an aircraft on this one. The rule is to leave the doors either fully open or securely closed and locked.
	Tiptank caps loose or inboard/leading edge tank caps installed on top of the bonding wire	Fuel venting or a requirement to jettison the tiptanks
GROUND INCIDENT CAUSES	Canopy closed on the seat harness	Ruptured canopy seal - or more serious - ruptured fuselage skin. (Depends on the harness buckle position).
	Using a mop to dry the interior of the fuselage fuel cell	Possible static electricity fire.
	Aircraft towed to the tarmac area and parked with the undercarriage lever in the UP position	Undercarriage retraction on engine start-up. (This actually occurred: the aircraft had undergone a periodic inspection and the retraction happened on start-up prior to air test.)
	Aircraft pushed with shop mules rather than towed	Probably a collapsed nosegear.
	Hydraulic power applied while a rig pin is installed in the aileron boost assembly	Control column inadvertently moved thereby inflicting damage to the aileron boost assembly.

Makes sense . . .

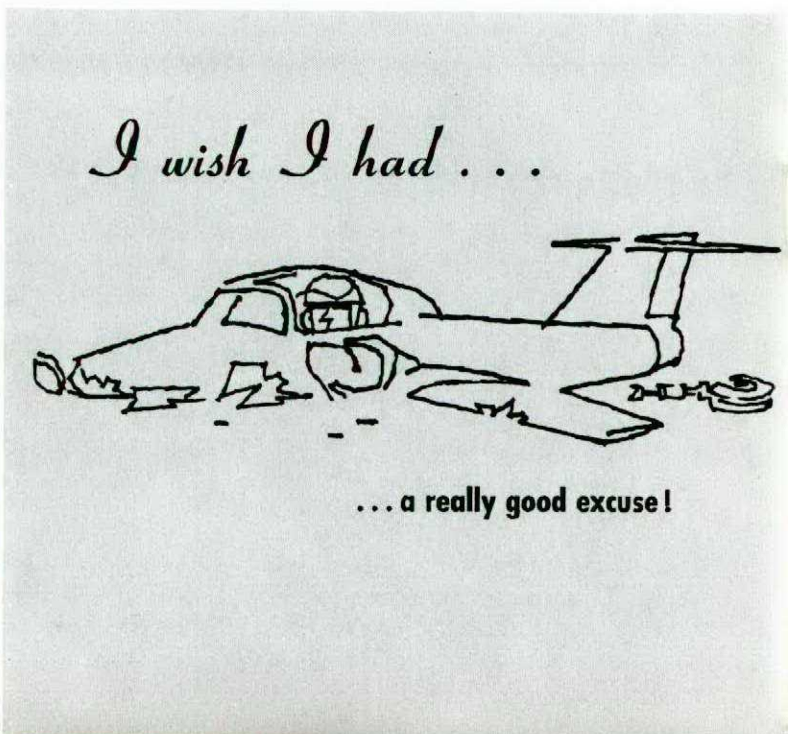
BAMEO observed that it would be easier for one man from the hospital staff to go down to the flightline to fit earplugs rather than have 500 men go up to the hospital . . .

- Flight Safety Committee

Fire up the fighters!

The Fire Chief asked about the possibility of injecting more realism into crash drills. He stated that a situation should be set up to provide the Fire Fighter with more practical experience than just being required to arrive on the scene in the minimum time. It was agreed that simulated conditions could be generated and that much more could be achieved than at present.

- Flight Safety Committee



On the Dials

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

MEA/MOCA during climb

Current regulations covering minimum enroute altitudes (MEA) and minimum obstruction clearance altitudes (MOCA) are specific about cruising flight, but do not really legislate for the climb portion of a departure.

Take the case of a departing aircraft which is climbing to its assigned altitude of 9,000 feet. It will shortly pass the first enroute fix and enter a Victor airway.

The pilot is suddenly aware that, upon entry, he will be below the MEA of 8,000 feet for that segment, even though he will be above the MOCA of 2,500. He now wonders:

- proceed into the airway below MEA and continue to climb to assigned altitude?
- request clearance for a shuttle climb, or get vectors short of the fix until at, or above, MEA?

This situation has been discussed with DND and DOT Air Traffic Control, Air Regulations and Air Operations personnel, and here's a majority opinion:

- ▸ Terrain clearance (MOCA) is the prime consideration.
- ▸ The variation between the altitude for the MEA and MOCA probably results from the navigational signal coverage aspect of the MEA which is based upon reception midway between the designated aids. This would not be a problem in this case, since the aircraft is in the immediate vicinity of one aid.
- ▸ The pilot must receive clearance for any delaying procedure which would enable him to cross the fix at, or above, MEA. The sole exception would be during a communication failure.

DOT precision radar

Some pilots apparently do not fully understand the minima to be used when working with any of the DOT precision radar installations.

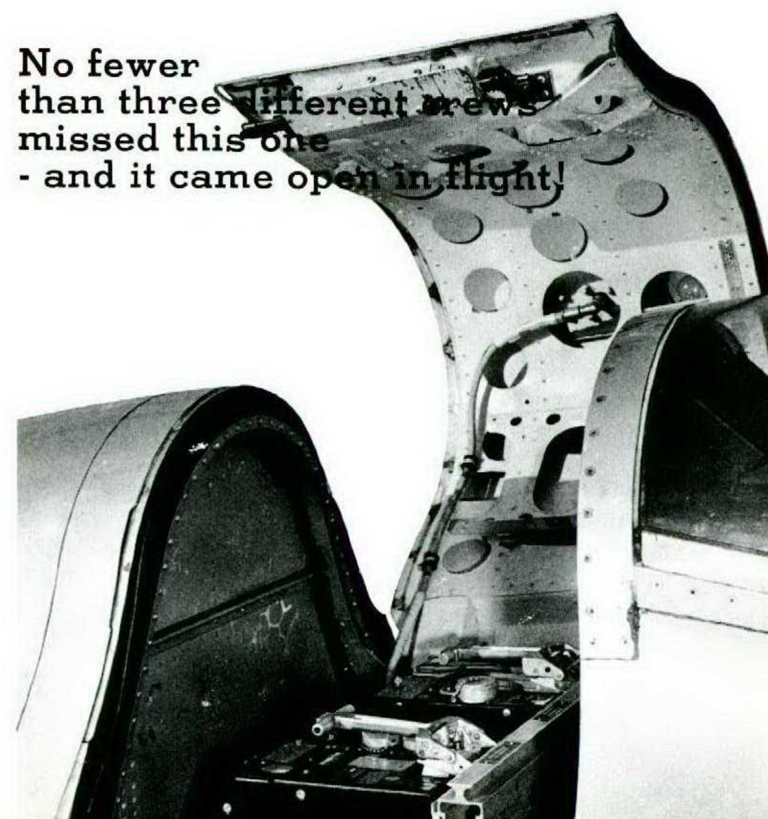
In a nutshell, here's the story. The Canadian military work to PAR limits of 200-½ while Canadian civil generally run to 300-1. A comparison of the information found in two different publications may help to clarify the whole situation.

Let's look at the DOT precision radar in Winnipeg. The civil manual, Canada Air Pilot, shows PAR to be available on five runways: 18, 25 and 31 have limits of 300-1, while 13 and 31 are published as 300-¾ with a note stating that this becomes 300-1 when the approach lighting is inoperative. The PAR/ASR pages in the back of GPH 205, meanwhile, show that all five Winnipeg runways are authorized for 200-½.

An identical situation exists for the military PAR units. The GPH 205 listing for Greenwood shows four runways with PAR limits of 200-½, while the Canada Air Pilot publishes them with civil minima of 300-1.

Pilots operating with DOT PAR must, therefore, remember that they still have about 100 feet to descend when the controller calls them thru minima. After the controller has stated that the aircraft is passing through his published limits, he will continue to issue guidance instructions.

. . . and another one



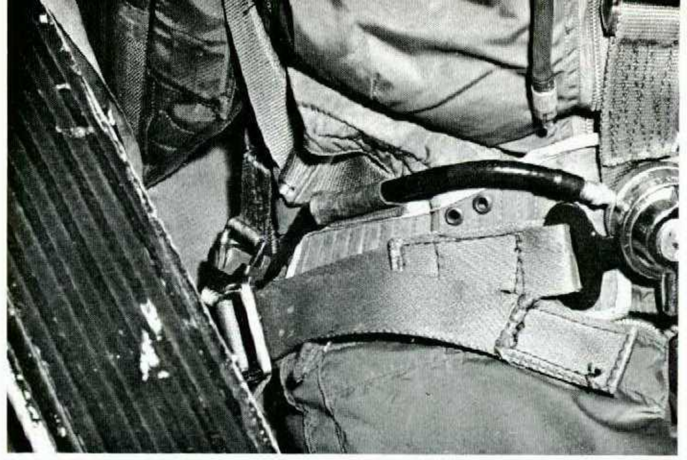
SAFETY COMMENT

T33 strap-in hazard

A potential hazard exists in the proximity of the T33 seatpack straps and the lap strap. These straps can be incorrectly set up before the pilot enters the cockpit in such a way that when he has completed his strap-in, the lap strap is actually next to his body and the seatpack strap is over it. Unless he specifically checks for it, this incorrect positioning of the straps may not be noticed by the pilot. On ejection the pilot might be unable to get out of the seat because the wide part of the lap strap would not slip through between the seatpack strap and the pilot's thigh.

One occurrence of the improper setting up of these straps has been noted.

Our thanks for a report on this perennial problem in the T33.



A possible configuration involving the right lap strap. Note that the seatpack strap is hooked over the gas line to the seat buckle. In the event of ejection, seat separation could only be effected after the survival pack buckle connection had been undone. At low level this could easily be a fatal mistake.

The survival pack strap overlapping the seat belt below the wider padded portion (described above).

Buffalo bends

After having flown at 33,000 feet for an hour, the Buffalo descended to 25,000 feet. Twenty minutes later a crewmember developed a sudden pain in the left knee and was unable to lift this leg. By 18,000 feet the pain had cleared but after landing he began to experience a dull pain in his left shoulder. He then sought medical attention.

A year before, this man on a similar flight had experienced shoulder and knee pains - although it was his right knee that was affected. (This occurrence went unreported.)

During the flight he was required to move about the fuselage interior performing checks; this undoubtedly aggravated the symptoms.

From this occurrence came several observations and recommendations:

- His was a moderate case of decompression sickness at altitude.
- Pre-breathing 100% oxygen will reduce the likelihood of decompression problems. In this case, pre-breathing of oxygen should have been performed.
- Keeping cabin temperature high and reducing muscular activity will reduce the symptoms.
- Bends or decompression sickness should be promptly treated. Reporting the symptoms enables the flight surgeon to diagnose the nature and severity of the sickness; with this knowledge he can advise on restrictions and limitations.

Certainly this is not a common occurrence and the flight profile was quite non-standard. Nevertheless, there's a continuing trickle of similar occurrences - each of which constitutes a possible hazard to the individual and the aircraft.

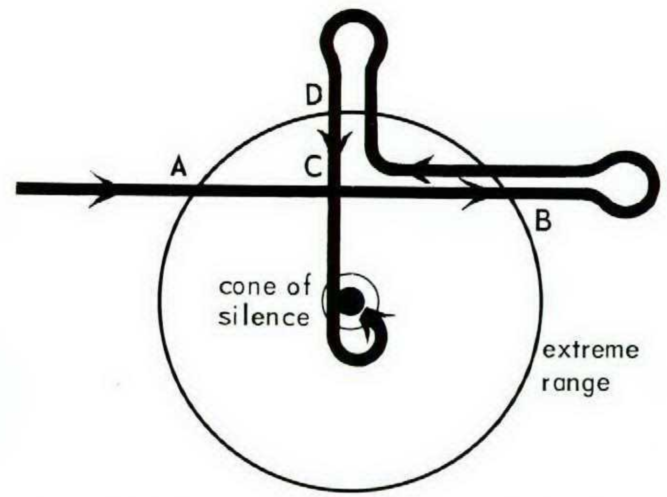
Foot for thought...

When a pilot ejected recently the toe leather of his right boot was cut but his foot was uninjured. This serves to re-emphasize the merits of steel-toe flight boots, the investigating flight surgeon states. - USN "Approach"

URT503 A new survival beacon...

The AN/URT503 Radio Beacon Set is a lightweight miniature beacon for rapidly locating downed aircraft. It was introduced in 1967 into Air Div, Transport, and Maritime Commands to replace the SARAH, URC4 and URC11 beacons, and will entirely replace SARAH later this year.

Designed to meet the latest NATO standard (STANAG 3281), the URT503 transmits a distinctive, continuous undulating tone on the international emergency frequency of 243 mhz. The beacon signal can be detected by any UHF-equipped aircraft - unlike the SARAH beacon which can be detected only by search aircraft equipped with the SARAH airborne receiver. Aircraft equipped with homers such as the ARA25 or ARA50 Automatic Direction Finders may home directly on the beacon, while aircraft without homers may locate the beacon by flying the pattern shown here.



The outer circle represents the extreme range at which the beacon can be heard. The time taken to fly from A to B is measured. The pilot then turns 180° and flies back to the halfway position C and turns through 90° right or left it does not matter which. This course will bring the aircraft to D or to the cone of silence. Point D is characterised by a slow diminution of signal while at the cone of silence the signal falls from strong to weak in a matter of seconds. At point D, another 180° turn will bring the aircraft toward the cone of silence and the beacon.

There's no voice capability in the URT503 because:

- the essential feature of the beacon is the tone transmitter,
- the addition of a voice facility would involve penalties in size, weight, reliability, and battery operating life.

Once a search aircraft has located the downed aircrew by homing on the beacon, it may drop a rescue kit which contains a URC4 radio for voice communication with rescue aircraft.

Like previous beacons, the URT503 is powered by a separate battery. This is necessary because the battery's operating life below 32°F decreases drastically. The beacon itself can operate at temperatures as low as -65°F. The cable permits the battery to be kept warm inside the user's clothing and still permits the beacon antenna to be located clear of the body for an unobstructed field of radiation. The URT503 now comes with a mercury battery which has better voltage regulation, low-temperature performance, and storage life than the zinc-carbon battery first used with the beacon. This mercury battery will operate the beacon for 48 hours at 70°F or 24 hours at 32°F. Under development is a magnesium/silver chloride battery which will perform at temperatures down to -40°F and have a storage life of at least five years. This battery may be in service within two years.

Satisfactory operation of the URT503 is checked periodically by the TS5062/URT503 test set, which tests the power output, frequency accuracy and modulation of the beacon.

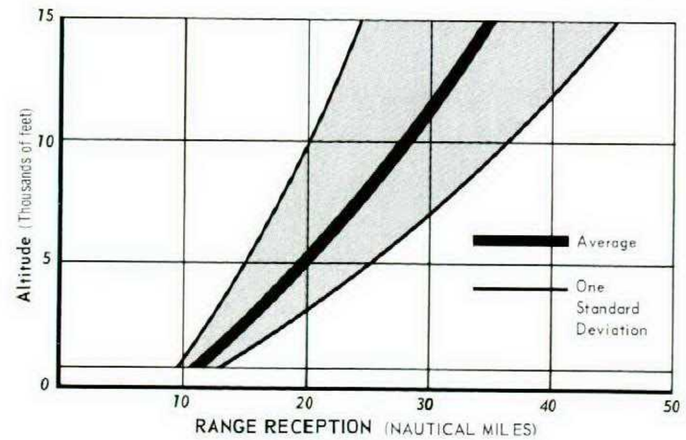
Operating hints

The URT503 is extremely simple to operate. Full instructions are printed on the beacon and battery. Some key points:

- The beacon is turned on by extending the antenna; this closes a switch inside the beacon at the base of the antenna. Be sure to pull the antenna out to its full extent of 11 inches to switch on the beacon.
- Depressing the TEST button causes the TEST lamp to light if the beacon is radiating. Use the TEST button after raising or lowering the antenna to ensure that the beacon has actually been turned on or off. Don't keep the button depressed; this wastes battery power.
- Transmission range can be improved by:
  - keeping the line-of-sight transmission path free of obstruction by terrain or vegetation,
  - raising the beacon a few feet above ground level,
  - placing it over a metal surface,
  - keeping the antenna vertical.

Field trials

User trials of the URT503 were conducted in 1968 by VX10 Sqn to establish its operational suitability; the detection ranges determined for a beacon mounted in a dinghy are shown here: cont'd on next page



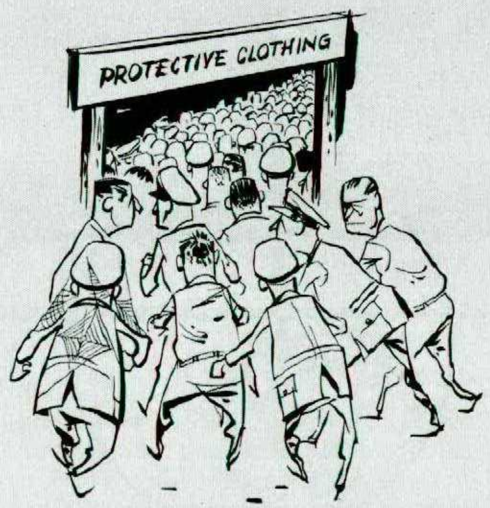
Detection ranges depend mainly on the sensitivity of the airborne receiver installation and the output power of the beacon. The spread in ranges shown in the graph is typical, and results from three aircraft types - the Albatross, Tracker and Sea King - being flown against five different URT503 beacons. The trials proved the beacon to be satisfactory except for the cable/connector assembly, which was not rugged enough. A new, tough, waterproof cable and connector have been incorporated in later production models and will be retrofitted on all beacons with the original cable.

Search facilities for the URT503

Our primary search aircraft - the Albatross, SAR Dakota, Labrador - carry the ARA25 UHF Automatic Direction Finder which gives direct homing information. This equipment is also carried by the Argus, Voodoo, Sea King and Tracker. An improved version - the ARA50 - is carried in the CF5. Test flights with an AM3969 VHF/UHF preamplifier added to a Voodoo ARA25 indicate that this device can almost double the detection range of the ARA25. Another homing system, the Plessey PV141, is being installed in a T33 aircraft for evaluation; it is hoped to develop a fast-search capability using T33s. Results of this evaluation and the AM3969 trials will be analyzed to determine what mixture of equipment can best improve our current search capabilities.

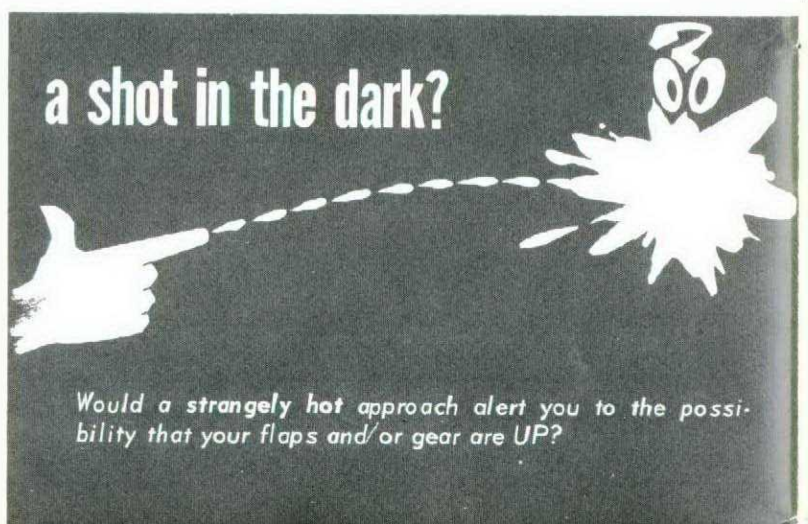
The North winds do blow and we shall have snow,
What will the robin do then, poor thing?
- old nursery rhyme

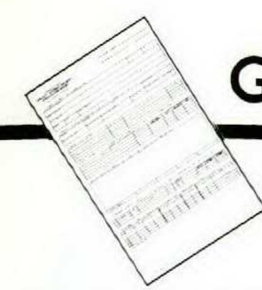
Forget the robin and think of your own winter needs. Every year we read of beefs about clothing stores not having an adequate selection of winter protective clothing, and that such-and-such has been issued out to nil stocks.
Give the clothing stores - and yourself - a treat this year: GET DOWN THERE NOW (YES, NOW) FOR YOUR COLD WEATHER REQUIREMENTS!



Fire!

The report reads *"Maintenance personnel were using methyl-ethyl-ketone with an open motor polisher and a steel bristle brush to remove paint from a concrete floor. There was an explosion followed by fire. The fire department responded to a telephone call and found that one sprinkler had activated and put out the fire, saving $5.4 million in the hangar and shops."* This actuality (from another service) has a real hazard potential. Are you using this lethal combination?





Gen from Two-Ten

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

H21, BUMPED BY MULE The D8 towing tractor was backed up to the rear door to help in loading heavy ballast blocks into the helicopter. When the loading was finished, the driver started up the mule and shifted the combination emergency brake/gear shift lever into neutral. The tractor lurched backward so suddenly the driver was unable to apply the foot brake before the mule struck the aircraft.

The corner of the rear platform on the mule punctured the skin of the helicopter causing a 1½-inch tear in the skin and slightly bending a vertical stiffener aft of the door. The gearshift linkage was found to be out of adjustment caused by transmission hold down bolts being loose. Tightening these rectified the problem. All other towing tractors on the base were found serviceable.

Could it be that DIs on aircraft support equipment are not as thorough as they should be?

T33, OVER-ROTATED When the student taxied out for his first night trip, it was also his first front-seat trip in three weeks. With a full fuel load, his aircraft was approximately 1000 pounds heavier than he had been accustomed to flying.

On takeoff at 70 kts the student rotated the nose higher than normal; the aircraft became airborne at 110 kts in a very nose-high attitude. The instructor recognized they were in "a semi-stalled condition" but was reluctant to take over. However, after no reaction by the student he finally forced the stick forward.

The nosewheel appeared to strike the runway, the aircraft rebounded into the same nose-high attitude and veered off the runway. At this point the instructor told his student he was taking control. Deciding his only course was to keep airborne, he attempted to gain flying speed by lowering the nose. Behind the power curve, the aircraft hit heavily and bounced back into the air very nose-high.

Power and switches were then cut and the aircraft landed straight ahead. After a light initial touchdown, the aircraft swung left through 180° before coming to a halt. A strong smell of fuel prompted jettisoning the canopy. The instructor received a minor back injury and the student was uninjured. The aircraft was a write-off.

At this weight the T33 should have become airborne at approximately 4200 feet; the aircraft ran off the edge of the runway at about the 7000-foot mark. The student stated he had attempted to maintain a nose-high attitude of 3/8" on the attitude indicator on the rotation. Investigators, although stating it is not to be relied on, found the reading should be close to 1/4" for the best attitude. (The 3/8" attitude corresponds with the climbout attitude with which the student was most familiar.)

Flying for the past three weeks from the rear seat, he had not been given control until climbout. As for being 1000 lbs heavier than usual, neither the syllabus nor the briefing brought to the student's attention the difference in performance. (The instructor who had given the briefing had overlooked this point at the time but had later covered it with his own student while taxiing out.)

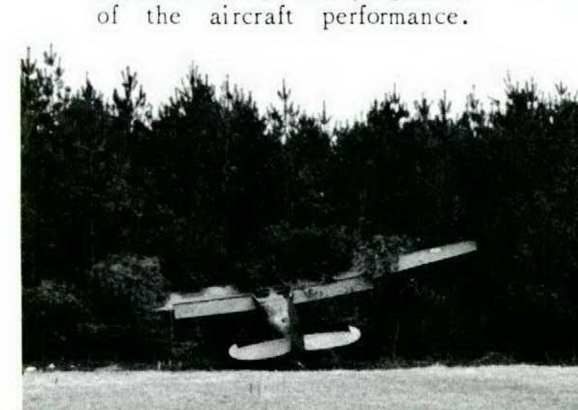
Publications and syllabus were *afterwards* amended to cover all aspects of takeoff performance, complete with charts.

L19, FROST ON WINGS The pilot found frost patches on the upper wing surfaces when doing his preflight for a night training exercise but "considered this to be negligible". The aircraft was operating out of a short turf strip in a pasture bordered at each end with 20-foot trees. The L19 got airborne in about three quarters of the length of the strip, but no sooner was it airborne and in a climbing attitude "when the aircraft appeared to sink". After a quick check that takeoff flap was selected, the pilot decided he could not clear the trees. He closed the throttle, touching down just beyond the end of the strip in the short overrun. An attempted groundloop to avoid going into the trees was unsuccessful.

The pilot who was uninjured stated the impact was slight as he was not thrown forward in the straps. However, the damage required replacing both wings, the engine, propeller, and engine cowling plus repairs to the firewall, windscreen and forward fuselage skin.

The fact that the strip was one-third longer than that required to clear even higher obstacles, and the aircraft being airborne within the expected distance points to:

- frost on the wings or
- in the darkness the wall of trees could have unduly influenced the pilot's judgement of the aircraft performance.



CF104, LATE ABORT The aircraft - number two in a four-plane formation - checked serviceable on run-up. The pilot states "I saw lead rotating and checked back on the control column but did not feel my nose lift off. I checked back further . . . but the nose still did not rotate . . . I checked the control column forward . . . thinking that perhaps the horizontal stabilizer was stalled. I then checked back again and also was using full left aileron and rudder as I was being sucked under lead. The nose still did not rotate and . . . as I was still drifting under lead, I decided to abort." The aircraft came to a halt in gravel and grass off the end of the runway after engaging the barrier. The dragchute lay on the runway 500 feet short of the barrier.

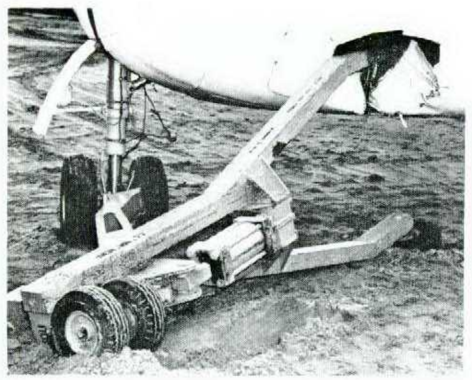
The barrier engagement bent the nosegear lower fork and damaged the dragchute door and assembly.

The pilot estimated his speed at 230 kts with 3000 feet remaining when he decided to abandon the takeoff and still at 190-200 kts when he engaged the barrier. The dragchute operating mechanism checked serviceable; it could not be determined why it released.

A smooth rotation at not less than 20 kts below computed lift-off speed is most important. It is possible to stall the CF104 stabilizer which will then require a higher rotation speed or even repositioning of the control column to obtain rotation. And the vortex effect when tucked in too close which "sucks in" toward the lead may be extremely difficult to overcome. An abnormal control condition such as excessive cross-controlling should be reason to abort before exceeding liftoff speed.

Flight safety bulletins issued by the command emphasized the above points and also referred 104 pilots to the Lockheed Project SUFE Reports. An AOI amendment on proper takeoff technique is also pending.

CARIBOU, NOSEWHEEL JACK TIPS Supervised by CHQ personnel acting as part of the towing crew, the aircraft was positioned for a trial in a portable canvas hangar. In order that the tail would pass into the hangar, it was necessary to raise the nose with a towing jack. The tractor began to back the aircraft but, after only a few feet, the tail suddenly moved laterally possibly due to a gust of wind. The nose of the aircraft was moved sufficiently to tip over the jack which punctured the side of the aircraft.



A number of components, and fuselage skin plus considerable other sheet metal repairs were required.

The sand surface on which the trial was taking place, while firm enough to support the weight of the aircraft on its own tires, was not able to support the smaller tires of the jack with the weight imposed on it by the aircraft. The track of five feet between main wheels of the jack when compared to the five-foot height of the jacking point does not add up to a secure base on such a surface. Any digging in of a wheel would easily start a swing to that side which inertia would continue until the jack overbalanced completely.

It has been recommended that if use of portable canvas hangars are a necessity for this size of aircraft, then both a modification of the hangar to increase the height of the doorway and/or use of a ramp type device over which the nosewheel would track, might be the solution. Meanwhile the command has directed that this type of jack is not to be used on Caribou aircraft except under closely controlled conditions *on a hard surface.*

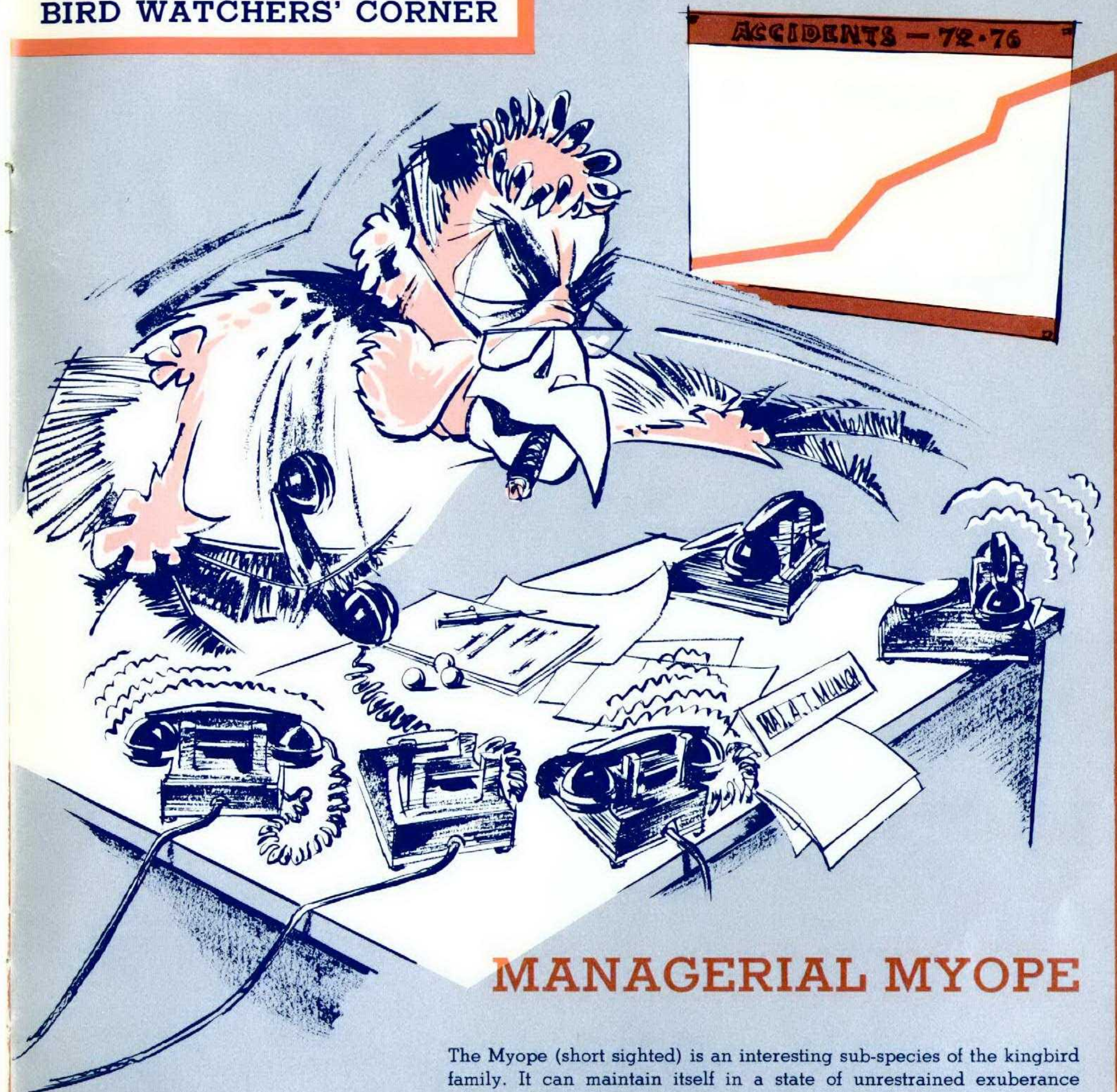
OTTER, FUEL SELECTOR MIS-RIGGED On the first flight after changing of the fuel selector cable assembly, the pilot noticed that the fuel quantity of the rear tank was decreasing although the front tank was selected. On completion of the cable installation the engine had run satisfactorily on all tank selections and pressure had dropped normally when selector was set to OFF.

The fuel selector cable assembly was found to have been incorrectly aligned during the installation. Thus when the selector was rotated through OFF, FRONT, CENTER and REAR - the valve rotated in reverse through OFF, REAR, CENTER and FRONT. The indicating arrow on the valve spindle was partially obliterated - this coupled with an EO which did not clearly show the cable routing, and the cable run itself passing through the fire wall, made it difficult to determine that the assembly was incorrectly rigged. And the lack of clarity in the EO was not previously noticed because the unit had never changed the selector valve cable assembly before.

The unit briefed all their airframe technicians on this occurrence and inserted local amendment pages in the EO until the amendment requested in their UCR has been actioned.

Another Murphy waiting for a victim despite the length of time this aircraft has been in service.

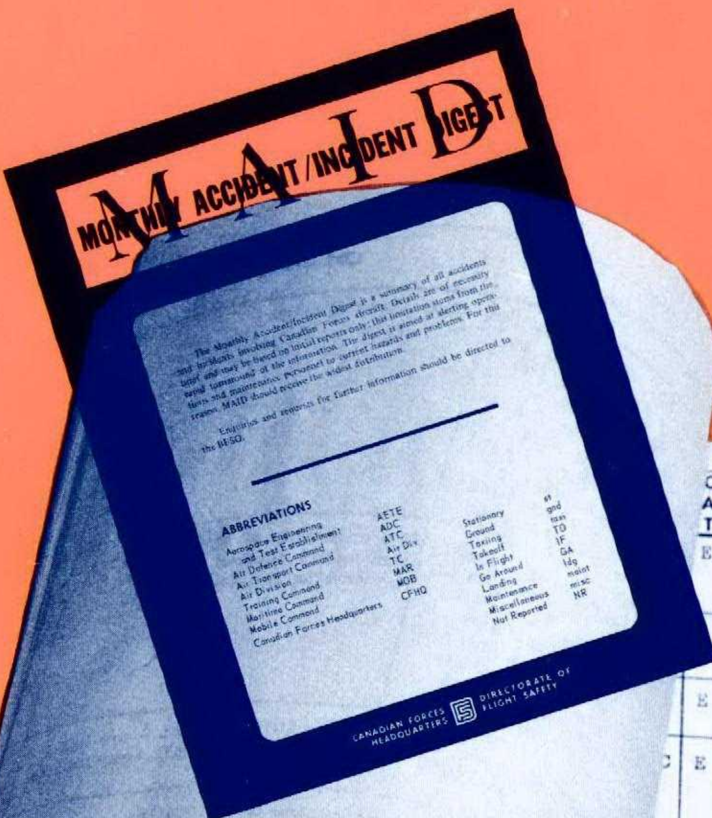
BIRD WATCHERS' CORNER

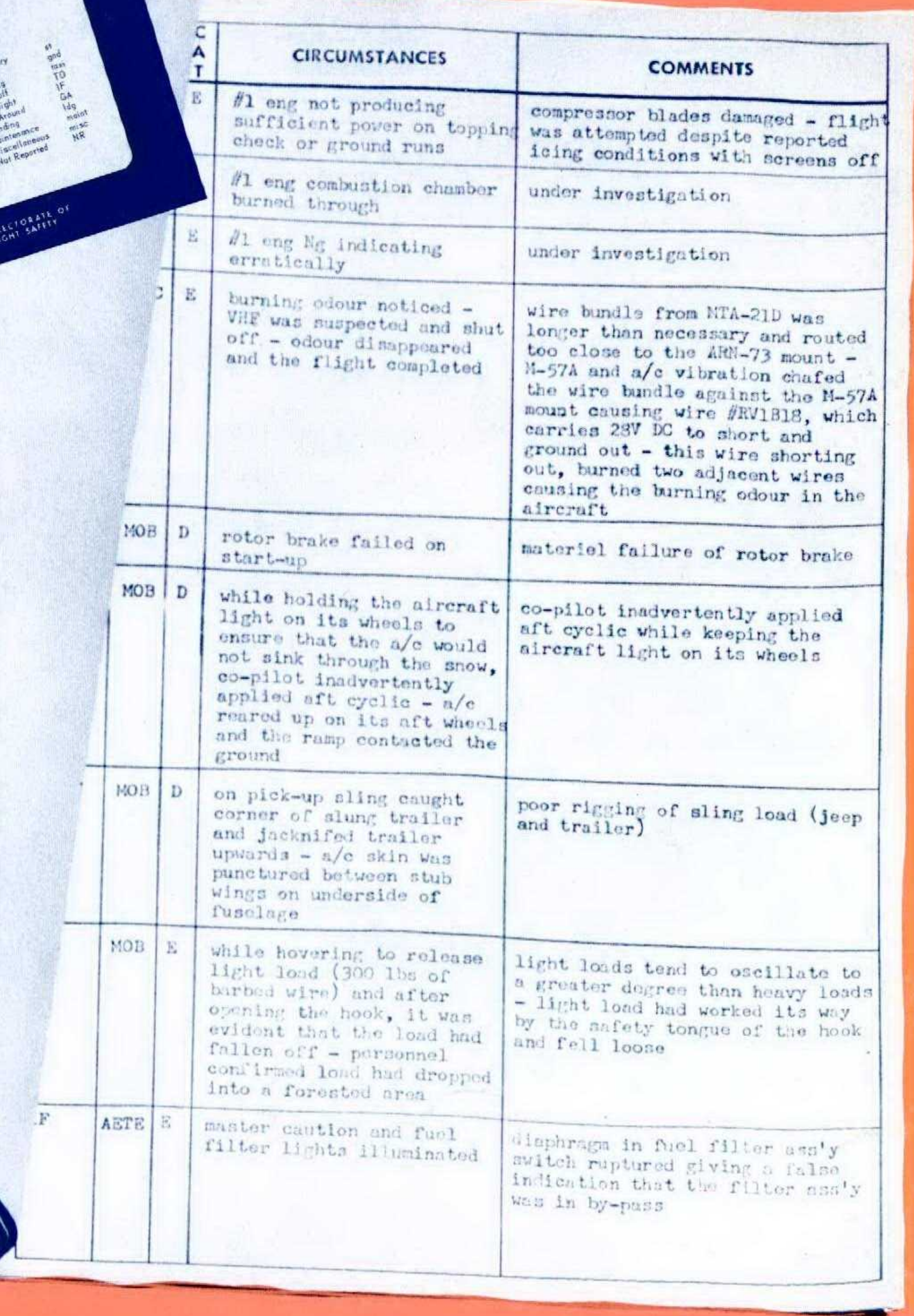


MANAGERIAL MYOPE

The Myope (short sighted) is an interesting sub-species of the kingbird family. It can maintain itself in a state of unrestrained exuberance whenever called upon to pursue impossible goals. As pace-setter for his flock he rallies his resources for the short-term gain at the expense of long-term efficiency and safety. This characteristic flitting-about has a sinister aspect because the Myope's hyperactivity superficially resembles the kingbird's virtues of loyalty, devotion, and so on — which means, of course, he rarely shows his true feathers. As each new commitment comes in, he sits amid the jangling phones and groans:

THEY'VE-GOT-THEIR-NERVE LINKING-ME-WITH-THAT-CURVE





	CAT	CIRCUMSTANCES	COMMENTS
	E	#1 eng not producing sufficient power on topping check or ground runs	compressor blades damaged - flight was attempted despite reported icing conditions with screens off
		#1 eng combustion chamber burned through	under investigation
	E	#1 eng Ng indicating erratically	under investigation
	E	burning odour noticed - VHF was suspected and shut off - odour disappeared and the flight completed	wire bundle from MTA-21D was longer than necessary and routed too close to the ARN-73 mount - M-57A and a/c vibration chafed the wire bundle against the M-57A mount causing wire #RV1B18, which carries 28V DC to short and ground out - this wire shorting out, burned two adjacent wires causing the burning odour in the aircraft
MOB	D	rotor brake failed on start-up	materiel failure of rotor brake
MOB	D	while holding the aircraft light on its wheels to ensure that the a/c would not sink through the snow, co-pilot inadvertently applied aft cyclic - a/c reared up on its aft wheels and the ramp contacted the ground	co-pilot inadvertently applied aft cyclic while keeping the aircraft light on its wheels
MOB	D	on pick-up sling caught corner of slung trailer and jacknifed trailer upwards - a/c skin was punctured between stub wings on underside of fuselage	poor rigging of sling load (jeep and trailer)
MOB	E	while hovering to release light load (300 lbs of barbed wire) and after opening the hook, it was evident that the load had fallen off - personnel confirmed load had dropped into a forested area	light loads tend to oscillate to a greater degree than heavy loads - light load had worked its way by the safety tongue of the hook and fell loose
AETE	E	master caution and fuel filter lights illuminated	diaphragm in fuel filter ass'y switch ruptured giving a false indication that the filter ass'y was in by-pass

This monthly digest is readily available to you - if you ask your Flight Safety Officer. He's anxious to make sure you're on his MAID service because he knows that keeping current is part of keeping safe.

Take a look at this sample page. If that's the kind of information you'd like to have each month on your aircraft type, then make your needs known...