FLIGHT COMMENT

MARCH • APRIL • 1970

Runway coefficient-of-friction measuring equipment

Life perserver automatic inflation valves

In-line miniaturized O_2 regulators

Barostatic seat pack deployment

Two-piece transport flying suit

Double bladder life preserver

Double break-link chinstraps

Ballistic inertia reel (BIR)

Gun-deployed parachute

Aircraft UHF homers

Dual visor helmets

Aircrew clipboards

x873 Rescue Net

Insulated dinghy floors

Personal locator beacons

Life support equipment projects page 10

Comments

During preparation of the article on life support equipment for this issue, many of the queries from users were found to reflect misunderstanding, stemming largely from their not knowing the status of design and procurement of new equipment.

We are watching with interest the results of a Training Command scheme to recognize units that provide and maintain a high standard of service to transient aircraft. The Transient Servicing Recognition (TSR) Program, initiated in January, received over one hundred submissions during its first month of operation.

During the investigation of a recent incident in which an aircraft was landed short following a VASIS-assisted approach, it was discovered that information as to touchdown points from a VASIS glide slope was not general knowledge to many pilots on the squadron.

The education and analysis branch of DFS are pleased with the excellent response to its recent MAID Questionnaire. So far, over one third of the 1600 forms have been returned.

CANADIAN FORCES HEADQUARTERS — DIRECTORATE OF FLIGHT SAFETY

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NOT ME?

There are many who, when confronted with a set of unpleasant facts concerning someone else's mistakes, automatically react with an "it couldn't happen to me".

If this reaction stems from a justifiable confidence in your ability there is nothing to worry about - maybe. However, my concern is that it is more likely a recognized negative human response to disagreeable facts which could affect you the individual; or even worse, a complete lack of awareness resulting in a false sense of security. Whatever the reason there is ample proof that too many of us really don't want to admit our fallibility and take precautions accordingly.

DFS is continuously advertising the reasons for aircraft accidents and incidents to show how easily and how often the same or similar circumstances can trap the unwary. You are expected to examine the causes of these occurrences in relation to your own environment and with a completely open mind use this information to anticipate problems and institute preventive action.

This is one positive way you can reduce the odds of being caught in a situation involving well-known hazards, and might to some degree justify a "Not Me" attitude.

COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

visors and chinstraps

Capt R. E. Noble CFIEM

THE CONVERSATION PIECE

"...Tighten my chinstrap! Lower my visor! Are you kidding? If I eject, the strap will break my neck - not to mention the visor breaking up and cutting my face. Besides, if I tighten my chinstrap I can't hear the engine too well and I like to be able to hear as well as see when I fly."

Sound familiar? Of course it does. Would you like to hear about Captain Whammo? He punched out at MACH .45 - lost his helmet; he was lucky because all he lost in addition was a bit of his pride and a two-inch by three-inch strip of hair when the chute dragged him over that immoveable rock. Chances are he wouldn't have had that headache problem if he had kept his helmet on. The Board of Inquiry established that his chinstrap was done up tight to the extent that he could insert two fingers underneath it - comfort you know! But let us return to basic principles, in the hope that a better understanding of helmets might lead to greater efficiency in all aspects.

For years homo-sapiens have worn helmets, be it half a coconut, a casque, a basinet or even an iron pot decorated with feathers. The types of helmets all had something in common - to protect the head against injuries. In aircraft, the helmet has to do a lot more than protect aircrew heads; it is a platform for the oxygen mask assembly, it contains the communications equipment, and provides other functions. To ensure its effectiveness under all conditions a chinstrap is provided.

The chinstrap on a protective helmet has the following advantages:

- Enhances stability of the helmet on the head if the pilot is exposed to severe buffeting in the cockpit.
- Holds the side flaps around the face thus ensuring adequate sound attenuation.
- Contributes to retention of the helmet during an ejection thereby protecting the head in the event of seat-man collision as well as during the landing phase.
- Aids in retention of the helmet during the severe decelerations that might occur during a survivable crash landing.

Still not convinced? The chinstrap might break your neck, you say? Years ago, the standard issue H-4 helmet consisted of a hard outer shell and a fabric inner. One of the known facts about the H-4 was that in the event of a high-speed, high altitude ejection, the helmet assembly, complete with oxygen mask, could be torn off the head. To solve the problem two spring-loaded break-link assemblies were incorporated into the chinstrap. If the strap was subjected to a force of fifty pounds deadweight the break-links would separate. Therefore, during an ejection, the outer would come off but the inner with its important oxygen mask assembly would be retained. Unfortunately, an unsubstantiated rumour circulated among aircrew to the effect that if the break-link chinstrap assembly did not work, the result could be a broken neck caused by the hard shell. Attempts to squelch the rumour were never too successful.

An analysis of fifty ejections shows that except for a mild abrasion or contusion, *NO INJURIES WERE INCURRED FROM A FASTENED CHINSTRAP.* However, to allay the fear of the skeptics a stitched safety break-link is provided in the present chinstrap. The link is designed to break at 150 plus or minus 25 pounds. The RAF helmet has a break-link system designed to separate at 250 pounds. It is difficult but not impossible to assess the strain or force the human neck will withstand. There is recorded evidence from two scientists who observed three executions (by hanging), in which two of the unfortunates died by strangulation instead of broken necks. An approximation of the hanging force based on energy relationship was made and they concluded that the adult human neck is capable of withstanding an applied hanging force of 2000 pounds.

Aircrew have been apprehensive that during ejection the initial windblast force may be on the side of the chinstrap which does not have the break-link. Help is on the way. A chinstrap with double break-links - one near each end of the strap - will shortly replace the single break-link strap.

Finally, how tight should you wear the chinstrap? The word 'tight' has a variety of meanings, not all of them complimentary. The chinstrap should be tightened around your chin almost to the point of being uncomfortable. The oxygen mask (Pate) suspension straps should be similarly tightened. A word of warning: don't get into the habit of wearing a tight chinstrap while flying at high altitude, then loosening it when you drop to a lower altitude. The same reasoning applies to the oxygen mask assembly which also contributes to the stability of the helmet.

Okay, you say, what about the visor? You've heard that during the ejection sequence the visor will break and your face will be injured by the pieces. Also you have the tinted visor which is not very good during dull weather so most of the time you leave it in the 'up' position. In addition you know that some of your buddies prefer a clear visor with sun glasses and feel maybe we should have a three visor system (clear, tinted and gold) with sun glasses to satisfy all aircrew. There is no doubt these points are of interest to all aircrew. Let us get back to the drawing board.

The incorporation of a visor on the helmet provides:

- Protection from sun glare
- Limited protection against spray from small pieces of perspex resulting from birdstrikes
- A bonus. The visor when worn in the 'down' position streamlines the complete helmet assembly, resulting in better helmet retention during ejection.

In an analysis of fifty ejections we discovered that *NOT ONE PILOT WAS INJURED AS A DIRECT RESULT OF THE VISOR BREAKING FROM WINDBLAST FORCES.* Similarly, during the current visor development programme a standard issue tinted visor was pulse-windblast tested from MACH .5 to MACH 1.0 forty-one times before it broke. There is evidence of man/seat collision where the visor albeit in the 'up' position has been scraped, but not broken by the seat.

We recognize that the tinted visor worn in the 'down' position in dull, overcast weather is a hindrance to many aircrew. Temporary solutions such as changing the tinted for a clear or vice-versa by means of snap fasteners is cumbersome, awkward and generally not acceptable to many pilots. The clear visor and sun glasses may be the solution. However, the present sun glasses are not satisfactory as they were not designed to be compatible with the present helmet assembly. A new design is being tested.

A triple-visor system is not available but a dual-system is being developed and shows promise. However, the dual-visor helmet will only be presented to aircrew after exhaustive laboratory testing to meet specific requirements, and satisfactory field trials.

The reasons why the helmets are lost during ejection are as numerous as they are varied. If the helmet is lost during the ejection but found later on, the cause of the loss can be determined with a very good degree of accuracy. On the other hand, if the helmet is not found one can only assess the complete ejection sequence and speculate. Here are a few examples:

- During 18 ejections in the range of MACH .3 to MACH .4 five pilots lost their helmets as a result of unfastened chinstraps while 12 with fastened chinstraps retained theirs. There is one case where the pilot had his chinstrap unfastened and still retained his helmet.
- The chinstrap broke. If the stress was in excess of 150 plus or minus 25 pounds, the equipment worked as advertised. If, on the other hand, the stress was less, the cause may be due to the difficult-to-measure quality - ageing.
- Ageing is an excellent process for the winemaker, but a problem for fabric manufacturers. The process for ageing can be supported by words like bio-degradation or bio-deterioration, but lets keep it simple. Generally, fabric material has a tendency to weaken over a period of time; the problem is - how long? An investigation is already in progress, but if aircrew have any doubt about the condition of their helmet equipment, they should have it checked as soon as possible.
- Wear and tear - several of the helmets I've seen are in a questionable condition, particularly the inners; the material has deteriorated as a result of handling, perspiration, hair conditioners and other unknown agents. The argument that it fits well and therefore should not be turned in for a new one even though it might be worn out, is potentially dangerous.
- Loose fitting chinstrap - the combination of windblast and snatch force may move the helmet upwards and break the strap, the strap may slide up - over the chin or the helmet may slide from back to front, up - over the head.

Well, are you convinced? Remember, the possibility of ejecting is extremely remote. However, if the need arises, the helmet with a fastened chinstrap and visor down will provide excellent head protection. If you ever have to eject you will find that your helmet assembly will be sent to CFIEM for analysis as there is always room for improvement. If possible, you may get the helmet back as a souvenir - set it up on your mantle as a conversation piece for a performance well done - if your wife will let you?

The author joined the RCN in 1949. During the following 14 years, working in the Safety Systems trade, he served on two aircraft carriers, several squadrons and spent four years in CFHQ. In 1964 he was commissioned and posted to CFB Shearwater where he worked for three years as Base Safety Systems Officer. Posted to CFIEM in 1968, he has since been involved in numerous projects, one of which is the research and development of all types of helmets for the Canadian Forces.

Good Show

MAJ D.G. COOK

While on a support flight in a T33 at 35 thousand feet, Major Cook experienced explosive decompression when the canopy cracked in half laterally, allowing the rear section to extend into the airstream approximately one-half inch. The cockpit altitude indicated 37,000 feet and as Major Cook was on pressure breathing he was unable to talk to ATC. Speed was reduced and a descent commenced. At 31,000 feet clearance was received for an approach at Saskatoon. As the ADF Sense antenna had sheared when the canopy split, the only navigation aid available was ADF on the Loop position; the Tacan and IFF had failed approximately 10 minutes before the explosive decompression. The aircraft entered cloud at 23,000 feet; destination weather was 1600 feet overcast. As the letdown book had been lost in the cockpit during the explosive decompression (later found behind the left rudder pedal) the Enroute Supplement was utilized to determine bearing and distance of the facility used for the approach to the field with the assistance of ATC. A successful approach and landing was carried out.

Faced with an in-flight emergency under adverse conditions (explosive decompression, cold, IFR, loss of navigation aids) Major Cook displayed a high degree of flying skill and sound judgement in bringing his aircraft to a safe landing.

MAJ J.S. CANTLIE, LT W.J. HOREMANS and MR. D. JOHNSON

Two Tracker aircraft, ten miles apart in cloud, were proceeding inbound to Cape Dyer. Approximately 75 miles from destination the lead aircraft flown by Maj Cantlie lost all navigational and approach equipment. The pilot thus found himself in a night situation, in cloud, over mountainous terrain and unable to accurately navigate or to make an instrument approach at either destination or alternate. At Cape Dyer the weather had unexpectedly begun to deteriorate in snow showers, making instrument approaches mandatory.

Maj Cantlie and Lt Horemans, the captain of number two aircraft, decided to change lead and join up using Cape Dyer radar. Flying at different altitudes number two increased his speed until he was ahead of the lead. At this point the Cape Dyer radar operator Mr Johnson gave the two aircraft radar descents to a partial cloud condition over the sea, and with further vectors enabled Maj Cantlie to join up on the other aircraft.

The Cape Dyer weather meanwhile continued to worsen, however, by following the radar vectors of Mr. Johnson, the aircraft, one at a time, made successful approaches from the seven nautical mile arc, picking up the runway strobe lights at two miles.

Maj D.G. Cook

Maj J.S. Cantlie, Lt W.J. Horemans and Mr. D. Johnson

By demonstrating a high degree of skill in this tense situation Maj Cantlie and Lt Horemans prevented the loss of a Canadian Forces Aircraft.

The successful completion of this mission was made possible by the coolness, experience and skill of Mr. D. Johnson in exploiting radar equipment that was not designed for such a purpose.

CPL W.E. MUNDEN

During a routine preflight inspection, Cpl Munden noticed a small amount of purple fuel residue on the exterior of an Albatross aircraft. As this was an area where fuel should not be present, he decided to investigate further. Removing an interior panel he found a badly corroded and leaking APU fuel line. This leak was located in the passenger compartment; the mere act of lighting a cigarette could have caused a catastrophe.

Cpl Munden displayed a professional approach to his work in eliminating this potential fire hazard.

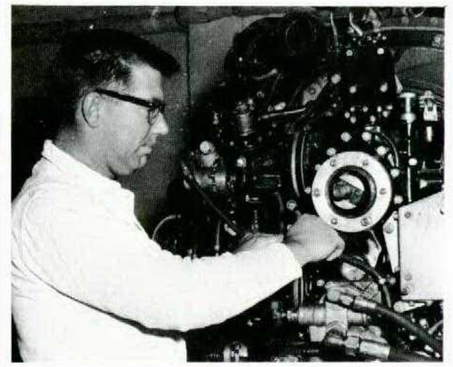
CPL C.E. STEVENS and CPL J.W. ANDERSON

Cpl Anderson and Cpl Stevens, were the crew of the MV Heron, engaged in target towing for an Argus aircraft of 407 Squadron. The exercise was being conducted on the Texada Bombing Range in Georgia Straits. Low ceilings and poor visibility in rain were prevalent on the range at the time.

While on a bombing run at two hundred feet the crew of the Argus, concentrating on the bombing task and hampered by the poor visibility did not observe a light aircraft converging on a collision course with their aircraft. With about one-half mile separation between aircraft the crew of the Heron observed the light aircraft, radioed the information to the Argus crew, and advised an immediate left turn. The left turn was executed at once.

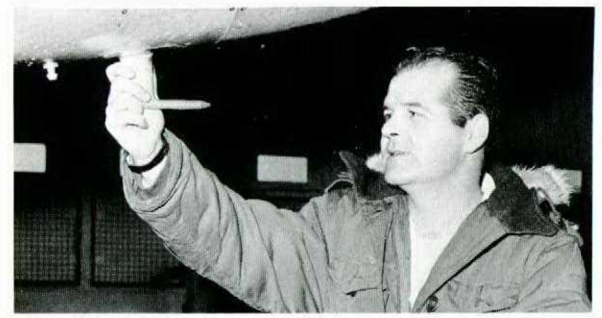
Cpl W.E. Munden

Cpl J.W. Anderson and Cpl C.E. Stevens



Cpl D.B. Pugh

Sgt E.T. Simmons



Cpl W.G. Wilson

The crew of the Argus stated that the concentration of their attention to the final portion of the bomb run combined with the poor visibility, made it unlikely that they would have observed the other aircraft in time to avoid a collision.

By being alert on the job Cpl Anderson and Cpl Stevens spotted the light aircraft in marginal visibility conditions, assessed the collision hazard, and transmitted correct and timely evasive action - advice which undoubtedly prevented a near miss from becoming a catastrophe.

CPL D.B. PUGH

While conducting a pre-flight inspection on a T33, Cpl Pugh noticed a defect in the turbine nozzle guide vanes. Investigating further by crawling up the tail pipe, he found a pronounced restriction in the turbine rotation. This was brought to the attention of his supervisors and when the aft section was removed a bolt was found missing on the labyrinth seal. Considerable damage had occurred to the inner facing of the turbine wheel and labyrinth seal.

Although the turbine nozzle guide vane damage was a result of other causes, Cpl Pugh's thoroughness and decision to conduct further investigation demonstrates his professional attitude; as a result this hazardous condition was brought to light and possibly prevented an engine failure in flight.

CPL W.G. WILSON

During a routine "A" check on a transient T33, Cpl Wilson noticed a small accumulation of ice in the pitot head; further investigation revealed that the pitot-heat circuit breaker had popped. After resetting, the same thing happened each time the pitot heat was selected. A broken connector in the pitot-heat circuit was found to be the cause.

Because of Cpl Wilson's alertness and perseverance the flight hazard of a failed pitot static system was avoided.

On a recent trip to CFB Chatham, COL RD Schultz, Director of Flight Safety, personally honoured CPL R. Noble by presenting him with a Good Show scroll.

SGT E.T. SIMMONS

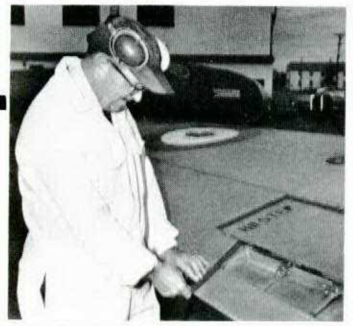
As NCO in charge of a servicing crew, Sgt Simmons was checking a Hercules prior to an operational flight. A minor entry in the aircraft form CF336 stated that #2 power lever was loose and not operating correctly. Sgt Simmons checked the power lever and it appeared to operate normally in all respects. On rechecking the form he decided that a more thorough inspection was required; while carrying this out he heard metal parts fall inside the quadrant. Further investigation revealed that the two cam bearings on #2 power lever had worked loose and fallen inside the quadrant. The cam bearings had dropped to the base of the quadrant among pulleys, cables, micro-switches and wires.

Through his alertness, initiative and attention to detail Sgt Simmons uncovered a deficiency which could have resulted in a serious accident.

continued on next page

GOOD SHOW

Cpl P.N. Fletcher



Cpl V.A. Reynolds

Cpl E. Shantz

Cpl C.J. Doyle

CPL P.N. FLETCHER

Cpl Fletcher was assigned as the back-end man during a routine start of a CF104. After engine start and during the "one" check, Cpl Fletcher noticed a very small hydraulic leak on the main hydraulic-pump return line at the connection to the pump. On further investigation, he found that the jam nut on the adapter had vibrated loose and could be very easily moved by hand. When the adapter was moved approximately one-eighth of a turn, sufficient fluid escaped to cause the whole system to drain in approximately one minute with engine operating. By discovering this leak, Cpl Fletcher undoubtedly prevented an inflight emergency.

In detecting this fault Cpl Fletcher displayed keen observation and a high degree of professionalism.

CPL V.A. REYNOLDS

While carrying out an "A" check on a T33 aircraft, Cpl Reynolds noticed that the clearance between the aileron and the wing surface seemed to be less on the left aileron than on the right.

To confirm his suspicions, he entered the aircraft cockpit and hand-pumped the flaps from the full down position to the 20-degree down setting and again checked the wing; the left aileron overlapped the flap by 3/8 of an inch, a misalignment which could have caused the aileron to jam.

As it is not a normal requirement to check the aileron travel with flaps partially down, Cpl Reynolds, by his comprehensive check, demonstrated commendable integrity and alertness. By diligently performing a routine job he uncovered a dangerous condition which could have had serious consequences.

CPL E. SHANTZ

During an A & B check on a CUH-1H, Cpl Shantz discovered that a pivot bolt, holding a collective scissor to the collective sleeve, was loose. An inspection of this particular bolt is not called for during this check, however, not satisfied with the amount of free play evident in the collective scissors, Cpl Shantz displayed commendable initiative in extending his check.

Through his initiative, Cpl Shantz uncovered a dangerous condition which could have caused a serious accident. This type of professionalism indicates the major part played by conscientious technicians in the interest of flight safety.

CPL C.J. DOYLE

While carrying out a routine Daily Inspection on a T33, Cpl Doyle discovered that the connection grounding the battery to the airframe was loose. An attempt to tighten the connecting bolt resulted in the anchor nut turning freely.

Removing an inspection panel he found that the anchor nut had worked loose from the airframe, and that arcing due to the poor connection had melted one of the anchor-nut retaining rivets and enlarged the connector-bolt clearance hole in the airframe.

Cpl Doyle's thorough inspection and subsequent follow-up action, resulted in the rectification of a fault which could have created a serious in-flight fire or electrical failure, and the possible loss of an aircraft.

beeper snooper

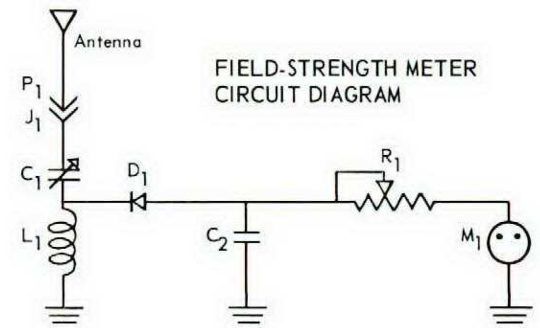
Squawking survival beacons, inadvertently activated, plague many units at one time or another. To clear the beeper from the emergency frequencies often requires a long search through parked aircraft or parachute shops, inspecting many chutes before the culprit is found.

Developed by the Langley Research Center the beeper snooper is small, inexpensive, lightweight, and requires no power supply. It is sensitive within 50 feet of an activated beacon and can be used by inexperienced people.

For indoor use the snooper can be placed at selected spots to cover all work and storage areas. Because they require no power, they are always "turned on". When a meter pointer indicates that a signal is being received, the monitor simply carries it in the direction which shows an increase in signal strength. As he nears the beeping beacon, the pointer will peg on the high side. The signal strength to the meter is then reduced by turning the only moving part, a potentiometer. With this simple method, the snooper will lead directly to a runaway beacon.

The beeper snooper is used in a similar manner on the flight line. With the potentiometer set for maximum sensitivity, the snooper is held out the window of a cruising flight line vehicle. The meter pointer moves as it nears an aircraft with a beeping beacon. A quick tour of the aircraft with the snooper in hand singles out the chute.

- TAC Attack

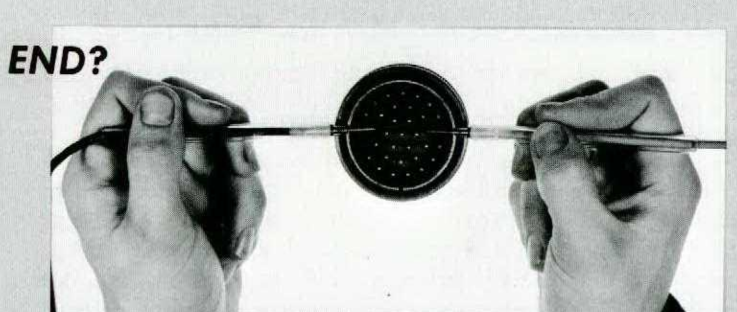


(The snooper is tuned to the desired frequency by adjusting condenser C_1.)

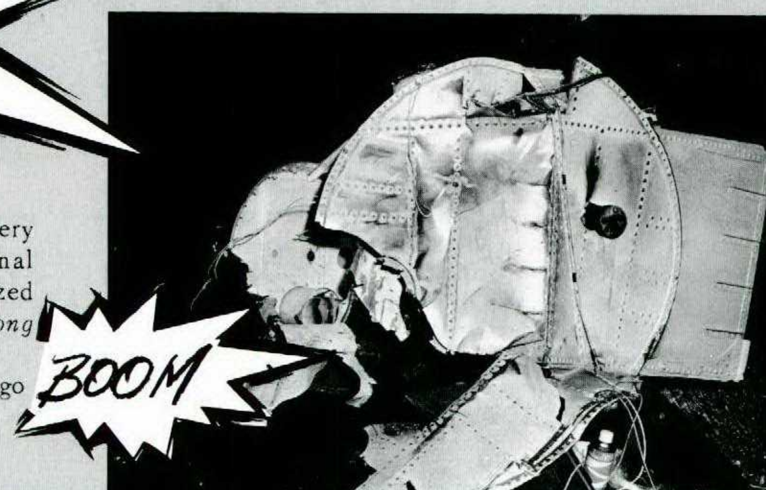
PARTS LIST

Part	Description	Federal Stock Number
C_1	0.9-7 pf capacitor or 1.5-15 pf capacitor	5910-928-8300 5910-666-7977
C_2	6800 pf capacitor	5910-727-9387
R_1	500000 ohm potentiometer or 500000 ohm potentiometer	5905-822-7660 5905-241-7094
D_1	1N34A diode	5961-170-4430
J_1	banana jack, insulated, mounts in 5/16" hole with insulating washer	5935-258-9896
P_1	banana plug, to mate with J_1	5935-615-1372
L_1	4-turns of No. 20 wire, ¼" dia. x 3/8" long	6145-839-7432
M_1	0-50 microamperes, 3" meter	6625-535-4594
Antenna	2-ft No. 14 bus bar wire or 2-ft No. 14 solid wire	6150-990-8220 6145-681-8372
Case	universal meter case, Bud 1936A	6625-814-5621

STOP!
HAVE YOU CHECKED THE OTHER END?



Cannon plugs can go BOOM!



In a recent accident, a technician applied battery power to an electrical connector to perform a functional check. Unfortunately, not only was the test unauthorized and this technique dangerous, but he chose the *wrong* cannon plug - one which led into a fuel tank!

You better believe it, electrical connectors can go BOOM

Bird control and avoidance

CAPT. B.R. ARNOTT DFS

Just when we thought a downward trend was developing in birdstrikes, 1969 had to go and happen. It wasn't really a record year; 1967 holds that honour with 254 strikes, an all time high, but we did have 227 which is a lot more than the 197 recorded in '68. All of which seems to indicate that there's actually no trend at all at the moment - just a lot of bent airplanes and twitchy pilots. Witness the following, from an accident message received at DFS:

> "Aircraft was being flown on a low-level recce mission; altitude 800 to 1000 ft, airspeed 420 knots. Pilot reports that aircraft struck a bird which entered the cockpit through the center panel of the windscreen. He was momentarily dazed but realized what had occurred; he could not see very well so he applied full power and pulled back on the control column. He managed a few glances at the attitude indicator and altimeter, was obtaining thrust from the engine, and decided that no immediate danger was apparent. The aircraft was levelled off at 10,000 feet and an emergency declared."

After a few minutes the pilot had regained his bearings and, with the assistance of another recce aircraft that formated on him, managed to recover at home plate.

Inspection revealed that several birds had struck the aircraft. Damage included:

- fuselage skin torn and dented around the windscreen, and in other areas
- a hole 10" by 6" in the center windscreen
- both the glass and supports of the left-hand windscreen smashed
- undetermined engine damage
- a smashed photo pod
- minor cuts on the pilot and glass in his left eye.

THE ENROUTE PROBLEM

That could very easily have been the third CF104 brought down by birds in 1969. As it was we only lost two (one of which was similar to the above incident except that the pilot was forced to eject) bringing the grand total of CF104 kills by birds to 10 confirmed and 2 possibles. In addition, there were two other accidents due to birdstrikes that involved C category damage - one to a CF104 and one to a CF5.

The CF104 is extremely vulnerable to birdstrike damage for several reasons. In the first place most of its work is done low-level, in the birds' environment, and in the second place, it has only one engine. In retrospect the loss rate isn't too surprising. The CF5 on the other hand, has two engines, as should all follow-on fighters, so that even if the environment (low-level) remains the same, the write-off rate due to birds should drop appreciably as the CF104 is phased out. This is not to say however, that the problem will thus automatically solve itself; two of the five accidents last year had nothing to do with the engine. As we've seen, a shattered windscreen is enough to cause the loss of an airplane - and even if the result isn't total destruction, it costs money to pound out dents, replace photo pods, stitch up aircrew and so on. The whole point is that the problem of birdstrikes to low-level aircraft is at least as serious as it has ever been, and promises to stay that way for a long time. The solutions aren't all that obvious, and in a period of austerity, are sometimes difficult to sell - but there are solutions and, fortunately, some of them are being implemented.

Operation Birdtrack

Birdtrack is a joint project of the Canadian Armed Forces and the Canadian Wildlife Service (CWS) that has been in operation at Cold Lake since 1966, with CFHQ direction and support provided by the Directorate of Flight Safety. Last year was its most successful yet. Its ultimate aim is to find the correlation between bird migration and weather, thus making possible the forecast of bird densities over a large area. A side benefit has been an active bird forecast and warning service for the flying units at Cold Lake. The accuracy of the bird forecasts have reached the point where they are virtually as reliable as the weather forecasts on which they are based. Overall a 70% level of accuracy was achieved. However until now the work has been limited to night time during the fall migration (which isn't as restricted as it sounds, since most migration takes place at night, and the fall migration seems to pose more difficulties to our operation than the one in spring). At any rate, in 1970 the first spring forecasting will be attempted and during a three-week period at the height of migration, the first day and night forecasting will take place. If this is successful, and is followed by another successful fall programme, it could well complete this phase of the research.

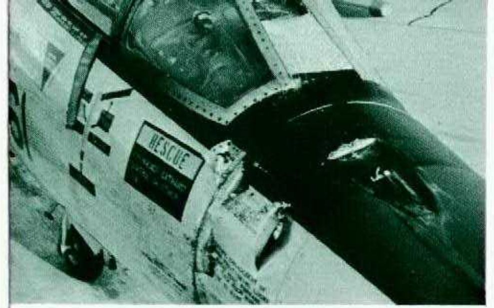
Two practical applications should be forthcoming:

- a textbook for use by meteorologists to produce bird density forecasts, in conjunction with their weather forecasts.
- a portable version of the type of radar set in use for Birdtrack - a radar that can be driven to any area accessible to a panel truck.

By determining the number of birds flying through the beam and applying the appropriate formula, the bird density in the area may be radioed back to base. This unit could be driven to the low flying area, under the approach path of a runway, or in fact, anywhere that aircraft will be flying low-level. Such a vehicle will probably be tried out by the CWS this spring.

Dual Visors

This subject is being thoroughly covered elsewhere, both in this issue of Flight Comment, and in separate correspondence. The requirement has been given an urgent priority and it is hoped to have some form of all-weather face and eye protection out in the field before the fall migration.



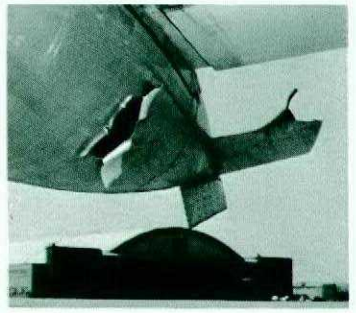
Damaged forward fuselage on CF104.

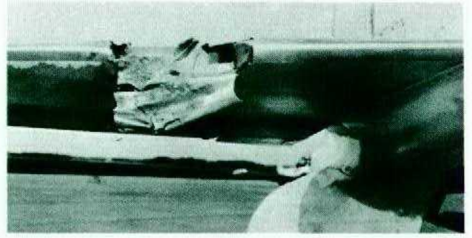
A two-pound bird struck at 420 knots exerts an impact force of 70,000 lbs.

If at all possible - *KEEP YOUR VISOR DOWN!*

The windscreen wouldn't have stopped these ducks either.

Ruptured CF104 tip tank.





Goose versus T33 tail - both lose.

Bird Warning Notams

This year, again, the Department of Transport will be issuing a Class II NOTAM (Notice to Airmen) prior to each of the two migration periods. As more information is discovered about migrations, it will be included in these NOTAMS. The 1970 spring edition should be in the process of distribution as you read this. It shows known and suspected migration routes, and gives details on bird altitudes, migration habits, and so on. Advance copies will be sent to all Commands and Base Flight Safety Officers - it may be well worth your while to have a look.

Microwaves

The apparent ability of microwaves to temporarily stun birds, and thus force them to drop from the path of an aircraft has been under investigation for several years by the National Research Council. A device mounted on the front of an aircraft, projecting a beam forward and "zapping" birds as it goes, seemed to be the ultimate answer to the low-level enroute problem; however progress to date has not been encouraging.

THE AIRFIELD PROBLEM

A different but equally serious hazard to aircraft is posed by birds on airfields. Last year for example approximately 42% of the strikes on Canadian Forces aircraft occurred during landing or takeoff. Since aircraft speeds are lower in this region, the impact forces are less likely to cause catastrophic destruction of an airframe. However high power-settings and high takeoff weights mean that engine damage, if it occurs, may be catastrophic - and unfortunately the danger is as great to multi-engined aircraft as it is to the single engine fighters.

Unlike the enroute problem, some progress has been made in controlling the situation during recent years. A great deal has been learned about making an environment unattractive to local bird populations - the list includes everything from exploding carbide cannons to falconry - but there is still very little at the moment that can be done about transient flocks of birds that drop in to RON. One of the primary weapons has been the shellcracker - an exploding shell fired from a shotgun. However the shellcrackers available commercially today are prone to premature explosion and their use has, in most cases, been banned in the CF. The Directorate of Ammunition at CFHQ has taken up the task of designing an improved shellcracker; its appearance should be a large step forward in airfield bird control.

SUMMARY

To sum up, we not only have a problem which you very well know, but we will continue to have a problem for some time to come. Bearing this in mind the following points may help to minimize the bird/birdman collisions that will inevitably occur:

- Keep your visor down, if at all possible. (This applies to the Tutor especially - at 240 knots its windscreen may not withstand the impact of a four-pound bird.)
- Keep your defrosters on. Tests have shown that a warm windscreen is more flexible and is therefore better able to withstand an impact.
- Keep your speed down, if at all possible. The force exerted by a two-pound bird, struck at 300 knots is 36000 lbs - the same bird at 420 knots produces a force of 70,000 pounds. This applies to transport aircraft as well as fighters; especially when descending and entering a control zone.
- Keep your altitude down - in Canada the normal height of migrating water-fowl is well above one thousand feet, so don't think you're playing it safe by flying a low-level route at two or three thousand. From a strictly bird-avoidance point of view, you'll probably be better off at 500 feet or less. The birds at least are small down there. (Air Div drivers can ignore this - in Europe the reverse is closer to the truth.)
- Have a look at the bird warning NOTAMS. They do have useful information that may help you to avoid the whole problem in the first place.

What's new... IN LIFE SUPPORT EQUIPMENT

For those wondering, here's a report on the current status of design and procurement in life support equipment.

AIRCREW CLIPBOARDS The recent loss of a T33 dramatically illustrated the unsuitability of the present clipboard. A search for an acceptable replacement is expected to result in procurement during 1970.

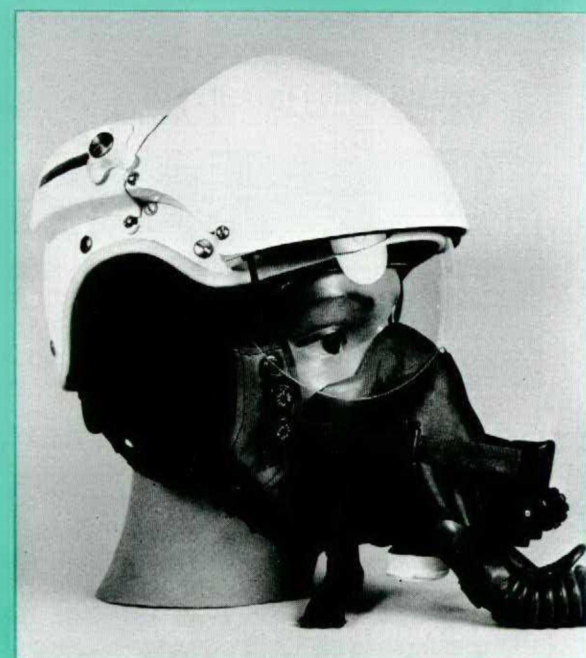
BALLISTIC INERTIA REEL (BIR) Introduced into the ejection sequence, the BIR will haul back the seat shoulder-harness so that aircrew will be in the correct position for ejection, ie, sitting erect. These are currently being delivered.

TWO-PIECE TRANSPORT FLYING SUIT To replace the one-piece suit which has proven unsuitable in the "greenhouse" environment of transport aircraft flightdecks, newly designed two-piece suits are being evaluated.

AUTOMATIC INFLATION VALVES The testing and evaluation of the valves is complete; the selected valve will be introduced this year for jet aircrew life jackets.

IN-LINE MINIATURIZED O_2 REGULATORS **Development of this item for use in ejection-seat equipped aircraft is being pursued. As yet a final choice on the model has not been made.**

INSULATED DINGHY FLOOR Weight and space limitations, as well as the imminent introduction of the "global" seat pack have ruled out this item. Instead, a small inflatable cushion has been designed to offer something in the way of insulation.



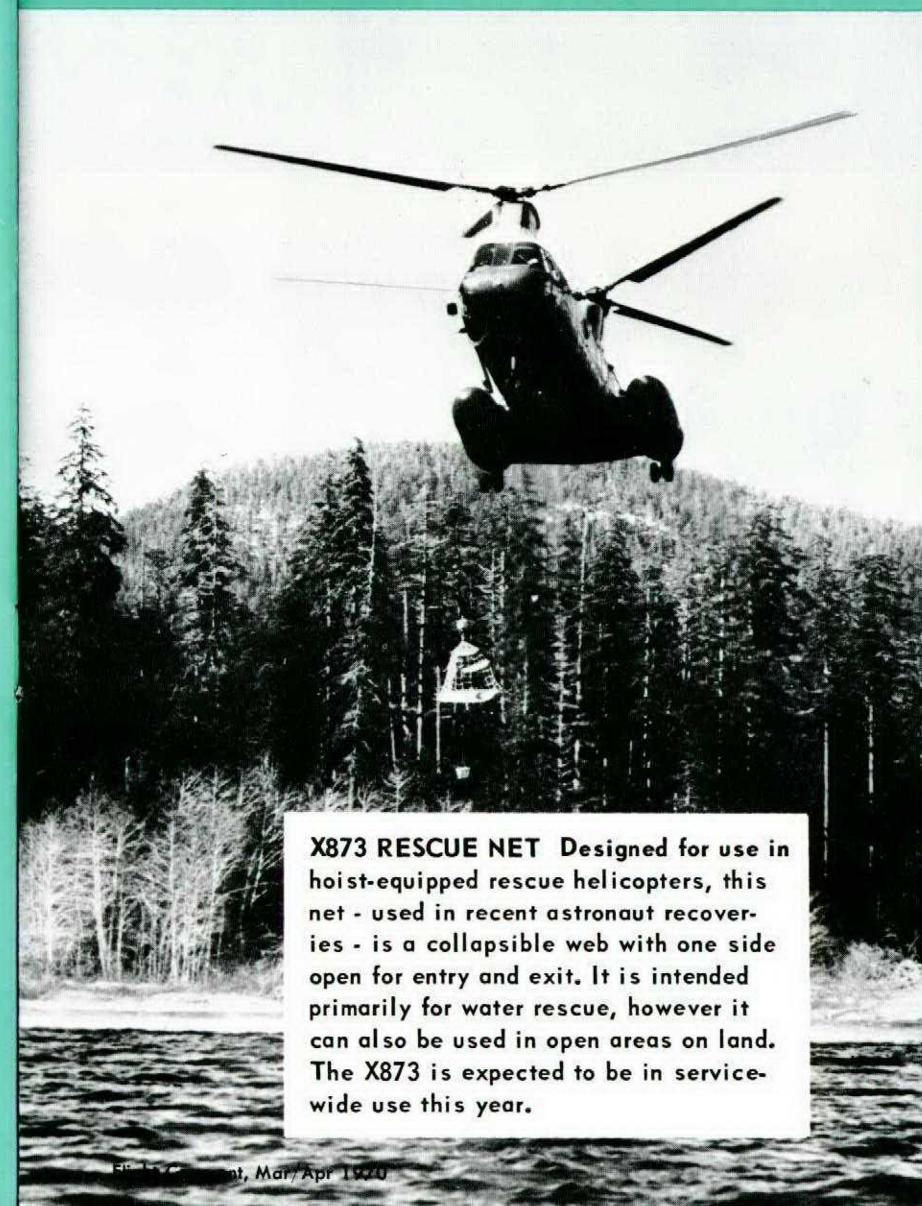
DUAL VISOR HELMETS Work is progressing on a helmet which will protect the eyes and face in the event of a shattered windscreen or canopy. In addition the visor will withstand windblast during bailout up to MACH .9. The target date for a prototype design has been set for April 70.

DOUBLE BLADDER LIFE PRESERVERS
This item has been studied and procurement rejected because of the added weight, bulk, complexity and cost, and because the existing equipment has proven effective and reliable.

GUN DEPLOYED PARACHUTE This equipment, now on user trials is expected to improve the escape system over the entire speed range. A new arming-cable assembly will prevent inadvertent deployment of the parachute.

PERSONAL LOCATOR BEACONS (PLB) The obsolescent SARAH is being replaced by the URT-503 which operates on 243.0 and transmits a distinctive swept tone when activated. It has no voice capability, however it can be received on any standard UHF receiver. (See article Flight Comment Sep/Oct 69.)

RUNWAY COEFFICIENT-OF-FRICTION MEASURING EQUIPMENT Instantaneous and continuous read-out of runway coefficient-of-friction is obtainable with this equipment. The information will enable pilots to determine the expected stopping distance for their type of aircraft, and hopefully eliminate those slippery-runway accidents. Five units will be installed at different bases for user trials.



BAROSTATIC SEAT PACK DEPLOYMENT Because of the dangers it posed for a descent into heavily wooded areas, the idea has been rejected. While it might be desirable for a water landing, it could cause a pilot to be suspended above the ground with his parachute in one tree and his deployed seat pack in another. The feasibility of a water-activated deployment device in the event that manual deployment is not carried out is being studied.

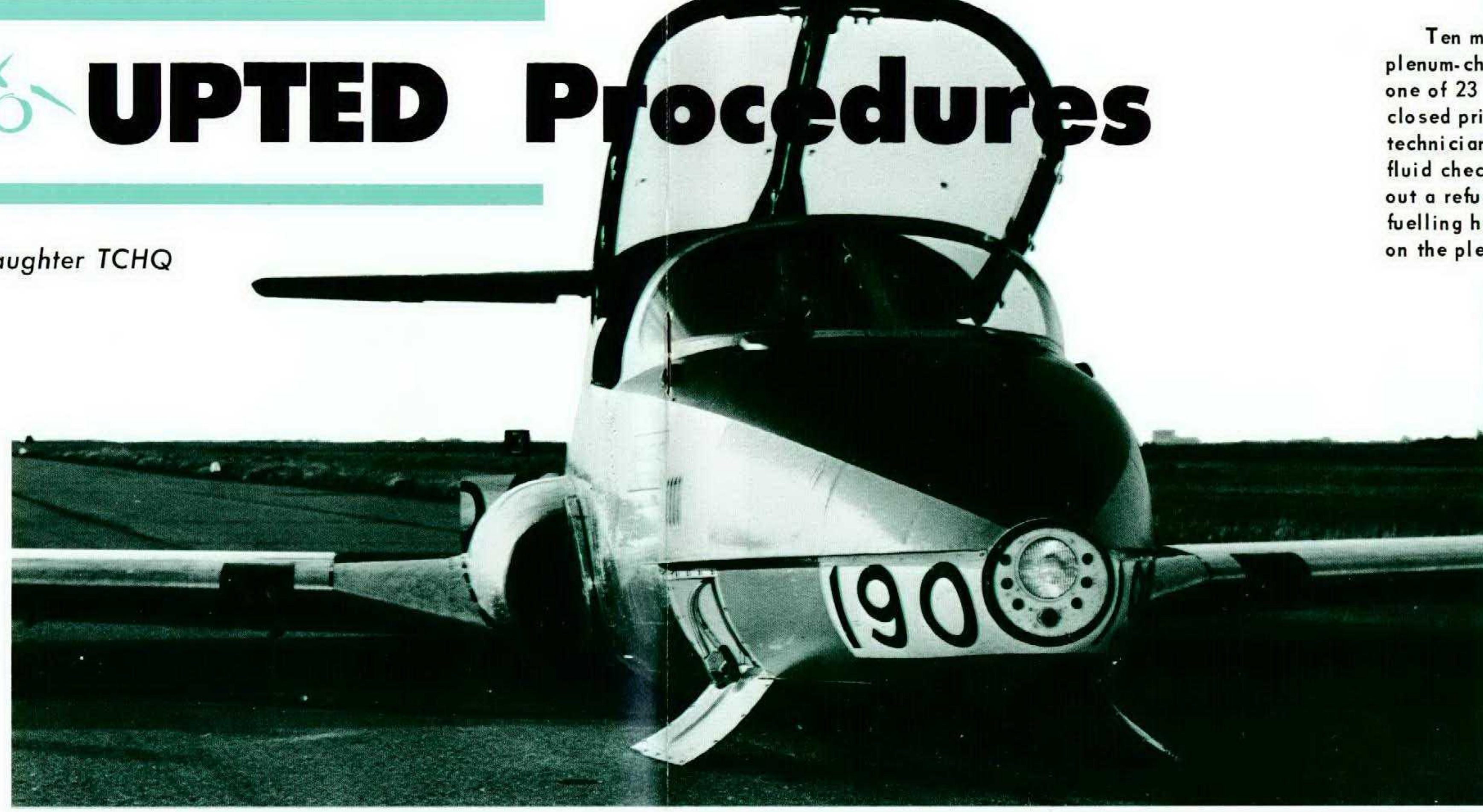
X873 RESCUE NET Designed for use in hoist-equipped rescue helicopters, this net - used in recent astronaut recoveries - is a collapsible web with one side open for entry and exit. It is intended primarily for water rescue, however it can also be used in open areas on land. The X873 is expected to be in service-wide use this year.

AIRCRAFT UHF HOMERS To improve the reception of weak signals such as those from a PLB, a pre-amplifier is being fitted in aircraft with UHF homers (CF5, CF101, Argus, Tracker, SAR Dakota, Albatross, CH113 and CHSS-2). With these installed the PLB signal range is doubled. In addition a small lightweight UHF homer is being installed in sufficient T33 aircraft across Canada and in Air Division to provide a quick-response search capability.

INTER-?@/§x°-UPTED Procedures

Capt R. W. Slaughter TCHQ

The instructor and student had completed the upper-air work portion of the mission and returned to the circuit for a series of closed patterns and minimum-roll landings. The trip was routine in all aspects - until the Tutor landed wheels-up. The instructor explains the sequence of events that led up to this accident...



"On the last one, we were cleared number one from the downwind position, but a solo Tutor broke early and cut right in front of us. The tower asked if we saw the other aircraft. I acknowledged the tower transmission because the student was busy with what I thought to be the prelanding check. At the same time there was an aircraft on an instrument approach; it appeared we would descend on a collision course with him. Another aircraft that I could not see was doing a PFL. I never did see the PFL, but I kept the Tutor that had cut us off, and the aircraft on the instrument approach, in sight. By now we were in final turn and I noted that our airspeed was too low. Because this had been a recurring problem, and I had told the student about it on all the other approaches, I became quite angry that he should let it happen again. My sharp remark provoked a retort that the airspeed was correct. I loosened my straps and leaned over to look at his airspeed indicator and found that it was reading about seven knots faster than mine. I immediately assumed his to be the correct airspeed because I recalled that at altitude the aircraft seemed to stall at lower than normal airspeeds. Therefore, I continued to watch his airspeed indicator during the remainder of the approach. Due to a strong cross-wind, the student "crabbed" the aircraft into wind, however, he allowed the "crab" to continue throughout the latter stages of the final approach. When I mentioned that he was too close to touchdown with "crab" on, he put the into-wind wing down and applied an insufficient amount of opposite rudder. I did not take control of the aircraft, but applied rudder and control column pressure, and said "This is how much you need". He rounded out and the aircraft scraped the runway. I immediately took control and applied power to overshoot, but realizing now the problem and deciding that we had scraped too hard to make a safe go-around, I closed the throttle and let the aircraft settle on to the runway.

In this instance, the only indication I had as to the position of the landing gear, was the position of the gear selector handle. The lights were useless because the sun was from the rear; the indicators were difficult to see from my side of the cockpit, and the warning tone was not working because we were doing power-on approaches."

This accident is a classic example of the age-old problem "Interrupted Procedures." Interrupted Procedures amounts simply to the omission of some item of a routine procedure or check as a result of distraction. This problem, like an insidious disease, strikes the individual when his resistance is at its lowest; it should be feared and respected by everyone who is involved with aircraft. It can strike anyone, anytime. In the Canadian Forces, symptoms of this affliction show up in the form of tools left in aircraft, checks or inspections missed, wheels-up landings, doors and panels opening in flight, and so on. Like sabotage, it results in the destruction or jeopardy of lives and equipment; however, unlike sabotage it is an unintentional omission, and it is done by our most respected and responsible pilots and technicians. Like the common cold it can strike any human being; however, unlike the usual common cold its results can be disastrous. There is no sure antidote.

The only solution to this problem must be applied by you at the time it exists. First, you must recognize the situation as it occurs. This is more difficult than it sounds because the problem only presents itself when you are being overcome by many distractions. However, if you find that any of your normally routine procedures are interrupted, for any reason, STOP, solve the problem creating the distraction, then, when you can afford your undivided attention, re-do the entire check or procedure. This may at first appear somewhat unrealistic, but it is not nearly as difficult to justify as an engine destroyed as a result of a misplaced tool, or a wheels-up landing. ■

Ten minutes after takeoff an upper plenum-chamber door came open - only one of 23 air-loc fasteners had been closed prior to flight - the servicing technician explained that while doing a fluid check he was interrupted to carry out a refuelling operation. After the refuelling he forgot to close the fasteners on the plenum door.

Following a runway change the instructor gave his student a PFL from downwind. The landing gear horn was 'punched out' to enable the student to hear the tower and his instructor. The student was low at low key and decided to delay lowering his landing gear. At this point the aircraft that was cleared behind them was pitching very close to their position, diverting their attention somewhat. Tower clearance was received and the instructor replied, "gear down and locked" without looking at gear selector. As they started to round-out both tower and tender operator called, "aircraft on final, overshoot - no gear". The aircraft overshot successfully.

Returning from a nav trip the pilot was asked to do a bearing and distance check. This required takeoff flap and relatively slow speed. On completion the pilot decided to do a flapless straight-in landing as he was in a good position for this manoeuvre. He lined up with runway at five miles, and raised the flaps. At this point he was distracted as he flew through a flock of small birds (no strikes evident). He continued his approach with higher than 65 per cent RPM (no horn, no light for landing gear), confirming to the tower at three miles that the gear was down and locked. At a mile and a half high airspeed necessitated a power reduction at which time the horn sounded and gear-unsafe lights illuminated. He immediately commenced an overshoot; simultaneously the tender operator fired a red flare. A normal landing was then completed.

AN FSO SPEAKS

Winter off-base crash response

Capt A. B. Triolaire
BFSO CFB Portage

(With this article we begin a new regular feature in which Flight Safety Officers will be given the opportunity to air their views on flight safety matters. During the next 12 months each Command will be heard from in this column.)

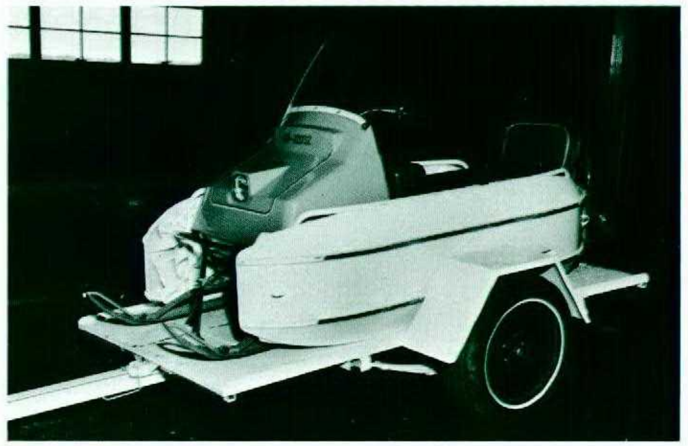
As a result of the crash of a USAF B57 in February 1969 considerable work has been carried out at CFB Portage to improve crash-rescue response. Two main problem areas stood out: Transportation to the site of a downed aircraft, and the need for a search team to find aircrew who may have bailed out.

A cross-country vehicle capable of manoeuvering in rough terrain and deep snow was an immediate requirement. Early last spring a power toboggan was purchased and two lightweight fibreglass toboggans were obtained to carry equipment and personnel. A trailer, to be towed behind the crash ambulance, was custom built to carry the compact toboggan assembly.

During winter operations the trailer will remain hitched to the crash ambulance and therefore, be towed on all crash alarms. The ambulance will be driven as close as possible to the position of the downed aircraft; the toboggans will then carry the fire-fighter crew chief and doctor to the site of the crash. Other equipment required, such as a V-knife and medical supplies will be removed from the crash vehicles and placed in a toboggan. In order to maintain communications with the doctor on board the toboggan, walkie-talkies will be used. This will enable more positive control of the operation, i.e. air-to-ground direction to the scene and provide all those involved with an immediate appraisal of the situation.

To supplement the normal crash response in the event of an off-base crash, a land search team has been set up. This team is composed of approximately 20 men under the leadership of Captain V. Naugler. The members vary in experience level from men trained in land search to avid hunters and outdoorsmen. Clothing and supplies are on hand in a crash-response room in #2 hangar, however not all the equipment required for the team is available as this base is not yet scaled for a land search team.

All team members are volunteers; no difficulty was encountered finding people to offer their services. Interest and team spirit has been generated through weekend practices and trips to broaden the members' background and experience level. Liaison with the Winnipeg land search team has provided the team leaders with a wealth of information for setting up and running a well organized team. They have offered us all the support we need, including lectures and the opportunity for some of our members to attend their exercises.



The crash of the B57 gave us a practical lesson; it poignantly demonstrated deficiencies in our capacity to effect an off-base rescue in winter conditions. Through the use of the power toboggan assembly and land search team CFB Portage has developed what we feel is an effective response capability.

Captain Triolaire joined the service in 1961. After receiving his pilot wings he was transferred to the Air Navigation School to fly the Dakota. In 1966 he moved to 3 FTS where, as a C45 instructor, he worked primarily with Tanzanian and Malaysian students. During this period he was appointed UFSO and deputy BFSO. In 1968 he joined the staff of the C45 Flying Instructors School (FIS) and in April, 1969 became BFSO at CFB Portage La Prairie.

Ramp hazard!

The ASO reported that unmodified, and potentially hazardous, ramps had inadvertently been used for boarding and deplaning aircraft. The unmodified ramps are considered too steep for safety, especially in adverse weather and when moving equipment up or down the ramp.

- Flight Safety Committee

CLOSE CALL · OPERATIONAL HAZARD · SAFETY SUGGESTION

PIs are important

The 104 jock was completing his Post-Start check. When he attempted to remove the seat safety pin he found IT WAS LOCKWIRED IN PLACE!
Undaunted, he advised Squadron Ops of this peculiarity, broke the wire and proceeded to taxi-out. As he neared the button for take-off a truck drove up with the driver frantically signalling the pilot to return to the ramp. The aircraft had been on STATIC display and the seat had been disconnected. *A PI had not been carried out!*

Vision Transition

The increase in stage lengths of air carrier flight has introduced a new problem to pilots, namely, rough landings. Conversely at the end of short-haul trips pilots almost always make a very good landing. Why?

The problem seems to lie in the eye's indisposition to accurate distance and depth perception after relatively long periods of flying at high altitudes. There being nothing outside the cockpit for the pilot's eyes to focus on, his focal distance becomes established at a mere three and a half feet. Therefore, at the end of the trip, when the pilot comes in for his landing, this induced muscular lethargy of the eyes produces inaccurate distance and depth perception. The result: a landing you can't brag about.

On short-stage flights where altitudes are relatively low and frequent landings are made, the pilot's eyes are constantly exercised by focusing on objects first inside then outside the cockpit. The result: good landings, smooth as a...well, really smooth and gentle.

Pilots flying the high and fairly long trips recommend the following as a solution to the problem:

- On your letdown to the airport and beginning at an altitude of about 1000 ft give your eyes some tune-up by looking back and forth from the instruments inside the cockpit to the horizon as well as to objects on the ground. Then by the time you come in over the threshold, your eyes will have "limbered up" to give you instant and accurate depth and distance perception. The result: continued good landings.

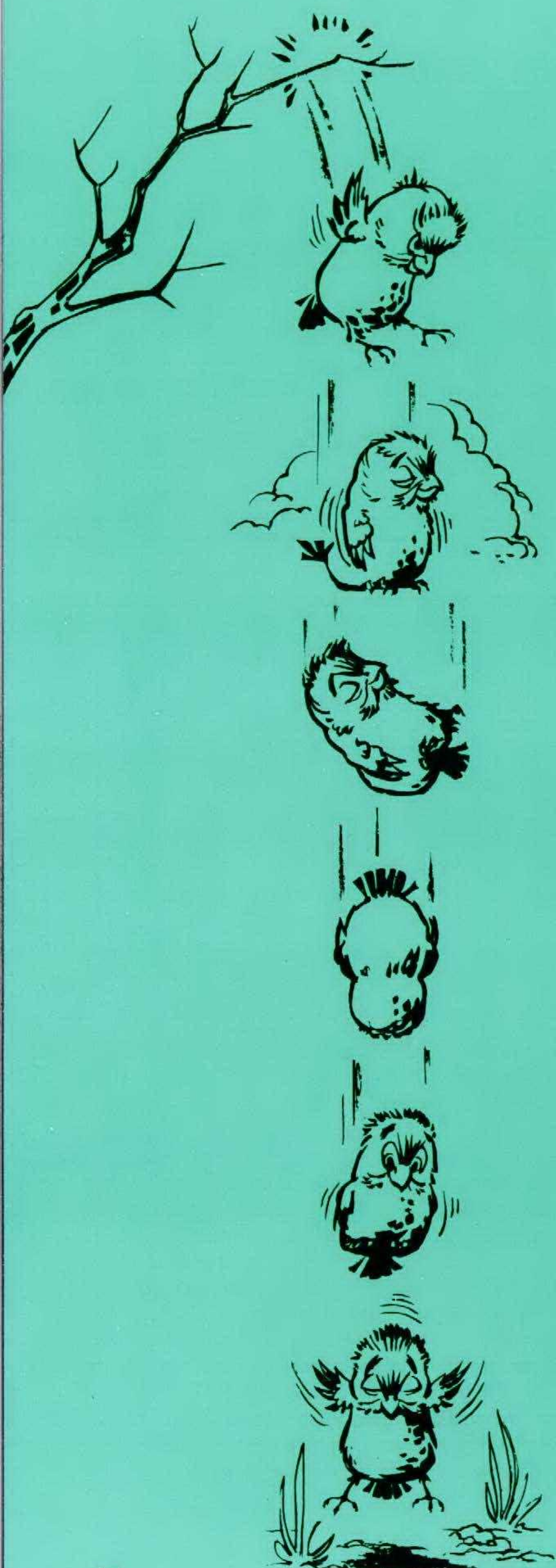
Try it, if you've made some rough landings lately.

- USN Approach

No eyewash, this!

The duty crew were washing an aircraft when a stream of high-pressure water accidentally struck a crewman in the eye. Although injury was not immediately apparent, the man was later admitted to the hospital with an initial diagnosis of internal hemorrhage of the right eye. Plastic goggles were not being worn. This report from another service shows that it's sound safety practice to have eye protection when using cleaning agents and high-pressure water streams to wash aircraft.

PFLs



this or this?

No time for friendship

Supervisory inspection (don't confuse it with Quality Control inspection) is a very critical part of aircraft and equipment maintenance. Most times, this supervisory inspection is the last chance to catch a misassembled part, stray foreign objects, or some other oversight. The supervisory inspector has a tremendous responsibility to the other maintenance people, the aircrews, and to the Air Force. When he signs off a red X, the supervisor must put friendship aside. This is not the time to say: "I know Joe, he couldn't goof a simple job like that."

Very few of us would sign a blank check or contract. Yet every day many red X entries are signed off in an office, or out in front of the aircraft without an actual inspection. This is particularly true of routine jobs such as tire changes, drag chute installations, and intake inspections, despite the fact that these routine chores are some of the most critical - from a safety standpoint. A drag chute or tire failure during a formation landing, a jammed flight control, or a foreign object in the engine are all potential disasters. Some inspectors have been lucky (to say nothing of the aircrews); their goofs have been caught in the docks or during a quick abort. But they're not living up to their responsibility when someone else must correct a condition they should have found during their inspection.

If you're a mechanic, the supervisor's inspection insures that your work has been done right and that the aircraft is safe to fly. It's additional insurance for you. If you're one of the select few assigned to make supervisory inspections, you're a man who can prevent accidents. Remember one thing. When you're inspecting - there's no time for friendship.

Capt William A. Carter Jr.
- USAF Aerospace Maintenance Safety

Accident cause

"The greatest cause of accidents is being physically present and mentally absent" - USN Approach

CLOSE CALL · OPERATIONAL HAZARD · SAFETY SUGGESTION

Safety matches hazard

The recent experience of a pilot shows the potential hazard existing when more than one book of matches are carried in the same pocket.

He had gone to his locker to get a jack-knife from the leg pocket of his flying suit, after which he dropped the flying suit leg and closed the door. As the door was closed a barely audible sound of ignition was heard and upon re-opening it the amazed pilot found himself with a fire-fighting job on his hands - the leg of his flying suit was on fire!

This pilot always carried an adequate supply of matches with him. When removing the knife from his flying suit one of the books of matches had been opened and when the leg was dropped the match heads had rubbed on the striking strip of another package igniting the whole book.

The consequences had this occurred in a noisy hangar or in an aircraft are obvious.

Our thanks for this report bringing to light a hazard which most have never even considered.

believe it or not...

Coveralls protect

Recently a technician received severe burns to his arms, face and ankles, when a fuel tank exploded. With his sleeves rolled up he was without the protection - evident in these photos - that coveralls afford.

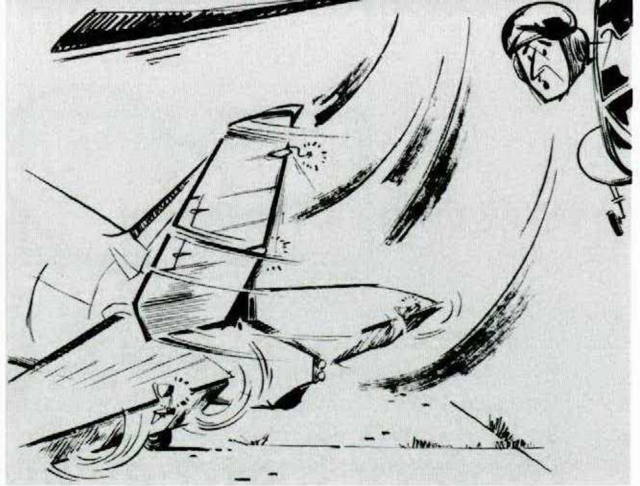
Unscorched sleeves had been rolled up

Prompt reporting

The requirements for prompt action on accident/incident reporting was stressed by the Sqn FSO. He pointed out that this is the responsibility of the aircraft commander. When available the Sqn FSO will be pleased to assist in any way.

- Flight Safety Committee

Rotor wash - watch out!



...dak damaged

The CH113A "air taxied" behind and ten feet above the Dakota which had just parked on the line. Rotor wash from the helicopter caused violent thrashing of the Dakota's rudder and ailerons; the flapping of the rudder broke a balance cable assembly.

Wake turbulence is generally associated with large, fixed-wing aircraft, particularly jet transports. Almost overlooked is the considerable turbulence stirred up by helicopters. As the number of rotary-wing aircraft increases with each year, this presents a growing problem in air terminal areas.

Even though it has no wing tips in the conventional sense, a helicopter in forward flight generates wake turbulence with twin vortices similar in form to those created by fixed-wing planes. Moreover, while a fixed-wing aircraft produces wake turbulence only while moving through the air, a hovering helicopter directs a forceful blast of air downward that rolls outward as it strikes the the ground.

The downwash is compressed into a disc one-half the area of the rotor disc, and speeded up to about twice the velocity developed at the rotor plane. This torrent of air is re-circulated through the rotor, creating a continuous turbulent column of air that radiates part of its force outward, like ripples in a pond. A typical downwash velocity under a CH113 in hovering flight at 50 feet is roughly 40 knots.

This is sufficient to upset nearby unmoored aircraft, to buffet loose control surfaces, and to hurl debris of considerable weight through the air.

Wake turbulence is created by an airplane's wings - or rotor blades - moving through the air to produce lift. The mass of disturbed air follows the flight path in a relatively flat plane but its character changes very rapidly. At about 200 to 600 feet from the source, (roughly two to four wing or rotor spans of the aircraft) it forms into two distinct vortices, one at each wing tip.

These vortices are formed by air spillage about the wing tips which rolls the disturbed air into whirling cylinders. The vortex swirling off the right wing tip spins counterclockwise, that from the left wing rotates clockwise. With helicopters, each rotor blade in effect is a wing, and sheds its own vortex; these numerous vortices soon rearrange themselves when the helicopter is in forward flight to form twin vortices exactly like those formed by fixed-wing planes.

These vortices are quite powerful and may persist for several minutes after the helicopter has passed. Pilots have reported feeling the effects of what they believe to be wake turbulence five minutes and more after passage of aircraft. There is no practical way to predict how long a wake trail will persist, or how forceful it will remain.

Turbulence intensity is directly proportional to the weight and inversely proportional to the wing or rotor span and speed of the aircraft. Thus, a heavily laden, long-range aircraft will create a more violent wake on takeoff than it will on landing when tons of fuel have been burned.

The average velocity and the total energy of the rotor wash in the wake of a helicopter in forward flight is similar to those of an airplane of the same weight and the same airspeed.

The trailing vortices, one rotating clockwise and the other counterclockwise, produce a downward motion in the space separating them. The vortices settle or move downward with time. Helicopter vortices generated more than a few rotor diameters above the ground retain their individual integrity - they do not merge - but in operation closer to the ground their motion is slowed, and they begin to spread across the ground.

Weather and wind have a direct effect on the persistence and force of the vortices. A wind of only about five knots, or even convective action due to heating, will contribute to rapid decay or complete disruption of the vortices. Vortices close to the ground are "worn down" and dissipated by ground friction. In smooth air, however, the continuity of vortex cores can be maintained for miles - a jet plane's contrails are a good illustration - before they are torn apart by wind shear, turbulence, convection, or internal friction of the rotating mass of air.

Light aircraft on takeoff and landing, and during flight at lower altitudes in the airport vicinity where helicopters are operating, should be especially alert to the hazards of wake turbulence. Serious danger lies in flight through the wake, flight between vortices, and flight directly into one of the vortices. Each has a different effect on the penetrating aircraft.

A light plane flying through the two parallel vortices of a helicopter will undergo aerodynamic loads similar to those imposed by heavy gusts.

The design limits of the penetrating aircraft easily could be exceeded, resulting in destruction of the plane.

Fortunately, the strength of the vortices decreases rapidly, and little danger of structural damage is likely if the wake is penetrated more than a minute after passage of the generating aircraft.

Light planes should never attempt to cross the track of larger aircraft at the same, or lower altitude.

Flying between the vortices subjects the penetrating aircraft to strong downward pressure which can literally knock a plane out of the air. When a light plane with a climb capability of 1000 to 1200 feet a minute encounters this avalanche of air, there is only one likely direction of travel - down. At low altitudes, this can be disastrous.

Accompanying hazards are the vortices on either side. A pilot caught between them could find himself in worse trouble by attempting a left or right turn. Either way, he would be turning into the core of a vortex.

This combination of vortices is encountered during climbout, landing approach, and formation flying. This vortex carries dangerous potential up to two minutes after the generating helicopter has left the scene.

Flying directly into one of the vortices probably represents the most dangerous penetration since it subjects the intruding aircraft to violent rotational forces. This spinning air can produce a roll rate of about 80 degrees a second which is about twice as fast as some light planes can roll using full aileron deflection.

In a test employing a T28 and an H19, both aircraft of approximately the same gross weight, a 36 degree-per-second roll was induced in the T28, even though it passed, 1000 feet aft and 200 feet below the H19. The pilot, highly experienced and alert to the possible consequences, had to use about 90 per cent of the total available lateral control in less than one-half second to stay nearly level. This could have been very hazardous within 300 feet of the ground.

The greatest area of danger from helicopter vortices

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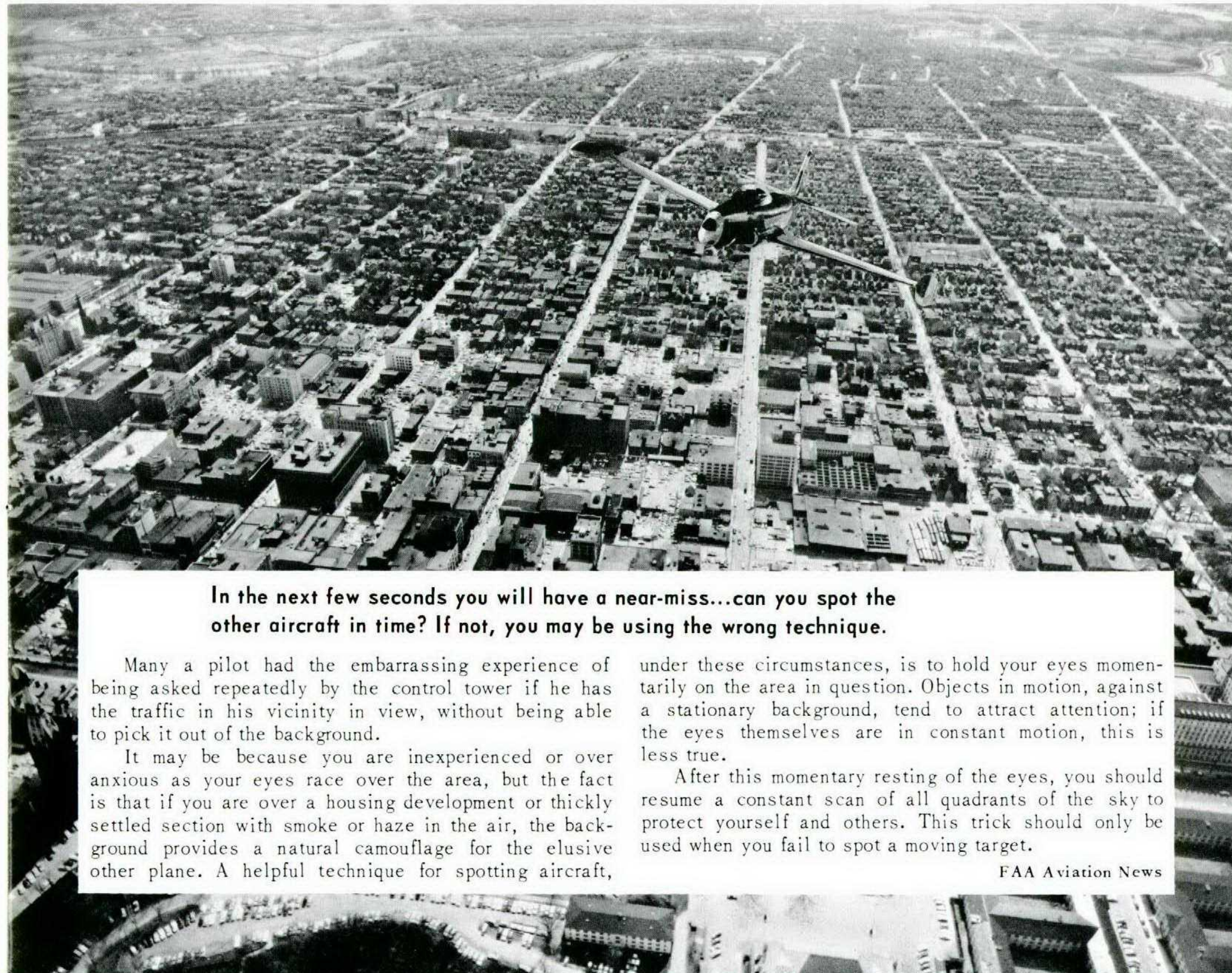


In the next few seconds you will have a near-miss...can you spot the other aircraft in time? If not, you may be using the wrong technique.

Many a pilot had the embarrassing experience of being asked repeatedly by the control tower if he has the traffic in his vicinity in view, without being able to pick it out of the background.

It may be because you are inexperienced or over anxious as your eyes race over the area, but the fact is that if you are over a housing development or thickly settled section with smoke or haze in the air, the background provides a natural camouflage for the elusive other plane. A helpful technique for spotting aircraft, under these circumstances, is to hold your eyes momentarily on the area in question. Objects in motion, against a stationary background, tend to attract attention; if the eyes themselves are in constant motion, this is less true.

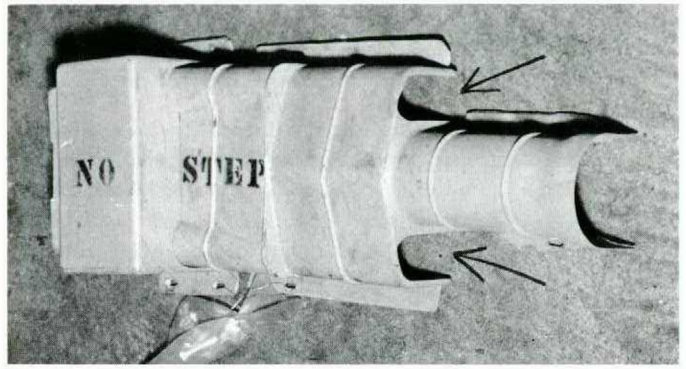
After this momentary resting of the eyes, you should resume a constant scan of all quadrants of the sky to protect yourself and others. This trick should only be used when you fail to spot a moving target.

FAA Aviation News

gone green apple

Returning VFR from an AI mission, everything was normal as the Voodoo proceeded to initial for an overhead pattern. The break seemed okay until the pilot, rolling out of the left-hand turn, found that the right aileron seemed to require more force than usual. Rather than complete the pitch, he flew a shallow 360° turn and a straight-in approach and landing. During the turn and final approach the right aileron continued to require more pressure than the left. This problem had not occurred previously on the mission nor during a mission another pilot had flown earlier the same day.

The subsequent FOD check turned up an emergency bailout bottle 'green apple' in the controls near the aileron torque tube. The small nut holding the pretensioning spring inside the attaching sleeve of the 'green apple' had unscrewed, allowing the ball to separate.



This serious hazard could have caused the loss of the aircraft. Action is now being taken to prevent the 'green apple' from coming loose and to eliminate the holes which permit such FOD into the control areas.

Hidden master switch

The Base Flight Surgeon reported that during the last night practice crash the ambulance was late *because the driver did not know how to turn on the radio.* He could not locate the master switch which had been cleverly hidden behind a recently installed windshield defroster duct.

- Flight Safety Committee

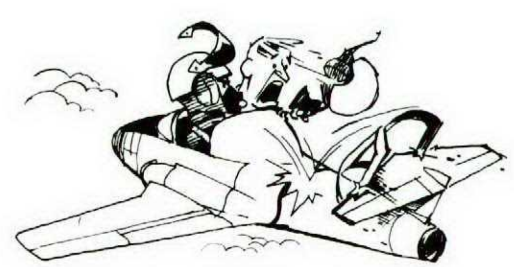
rotor wash -

comes from vertical lift landings and takeoffs. If the wind is blowing in the opposite direction and at the same rate as the lateral spread of the vortex, the vortex could remain stationary for minutes right above the runway - long after the time it could normally have been expected to dissipate.

Helicopters hovering closer than 1000 feet upwind of an active runway create a subtle hazard because of their apparently safe distance and the fact that the craft is not in motion. This is a false assumption. The downwash of a hovering helicopter mushrooms when it strikes the ground, and while a considerable amount of this air is re-circulated through the rotor, some of it will advance at a rapid rate along the surface of the ground. Helicopters should not be operated at high thrust under no-wind conditions closer than three rotor diameters to other aircraft.

Wake turbulence and helicopter rotor wash are fundamentally the same and they have the same upsetting effect on other aircraft. The slow forward movement of a helicopter can be misleading when taken as an indication of wake turbulence. Churning air from any source or by any name is a potential upsetting agent. Look out for rotor wash.

Frank J. Clifford
FAA Aviation News



I said "speed brakes" Smedley

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.

DOT Precision Approach Radar Limits

A recent "On the Dials" article in the Sep/Oct 69 issue of Flight Comment, raised some question concerning Precision Approach Radar (PAR) limits at DOT units.

The article implied that DOT PAR controllers were calling an aircraft as "passing precision limits" when the aircraft was 300 feet above runway threshold elevation. As the article explained, DOT PAR limits, published in Canada Air Pilot, are generally 300 and 1, whereas GPH 205 in some cases shows military limits for similar DOT bases as 200 and ½. DOT controllers are required to inform the pilot that he is "passing precision limits" when the aircraft passes through the controller's operational limits. Exactly what was meant by "controller's operational limits" was not known and action was taken to clarify this with DOT.

It has now been determined that DOT policy is to notify a pilot on a precision radar approach that he is "passing precision limits" when the aircraft passes through 200 feet. This 200 foot level is used at all DOT PAR locations and is the result of controller training and flight checking as well as equipment capabilities. DOT also indicate that the limits published in Canada Air Pilot, generally 300 and 1, are weather minima for itinerant pilots and are in no way intended to reflect the capability of the PAR installation.

Military pilots are governed by the PAR limits published in GPH 205 and the applicable CFP 100A regulations. Since in no case does GPH 205 show DOT PAR limits lower than 200 feet, military pilots should never have occasion to continue descent below the level at which DOT controllers call "limits", unless, of course, visual contact has been made and the pilot is continuing with a visual approach to land.

There are occasions when pilots reach authorized limits *before* the DOT controller reports "passing precision limits". Examples are the PAR approaches at Calgary and Halifax. This also happens when a PAR is flown by a pilot with a white ticket.

PAR and ASR limits, as published in GPH 205, are checked to ensure that the required obstacle clearance criteria are met. Pilots are thus protected against known obstructions if the limits published in GPH 205 are adhered to.

IFR-Military Flying Area

Can I file and fly IFR through a Military Flying area which has not been released to DOT?

This problem has been bothering some pilots this past while and clarification is certainly in order. The answer is "NO" and for the following reasons:

- An MFA, when not released to DOT, is a block of uncontrolled airspace of defined dimensions above flight level 230 to an unrestricted altitude, unless otherwise specified that it has been capped. It is reserved for the use of local military training and testing.
- An IFR clearance issued by Air Traffic Control is valid for controlled airspace only and clearance does not constitute approval or authority for an aircraft to operate within the MFA unless the MFA or portion thereof has been released to DOT. The DND does not and cannot provide any IFR control function in an MFA.
- Unless you can ascertain that an MFA has been released to DOT, do not file an IFR route which will penetrate an MFA. Military Flying areas are depicted in GPH 207 and a short notice is published in GPH 205 under Special Notices.

Hot Tips

We highly recommend that all pilots look through the latest DOT Class II Notam 26/69 dated 30th of September. There's good information to be digested. Also we advise you drivers and in particular the ICPs to have a peek at the latest revision to CFAO 55-9 Instrument Rating - Pilots.

Perplexing alarms

The Base Fire Chief stated that the use of various bells, hooters and buzzers as crash alarms in the hangars and buildings could result in confusion with fire alarms.

- Flight Safety Committee

Take it off

. . . but
be careful where

Here's a further report on static electricity, a follow-up to one which appeared in the Sep/Oct 69 issue of Flight Comment.

Did you ever slide across a car seat, step out, reach for the door handle,...and get a stinging jolt of static electricity?

Have you noticed, in the dry heat of most homes in winter, that shuffling across the living room rug can give you the same wallop when you reach for a grounded item such as a tap or light switch?

Have you undressed in the dark and seen a display of static sparks when you remove a garment, especially one of synthetic material?

Such phenomena are only minor inconveniences in these circumstances, and are quickly forgotten after the first "ouch". *THE SAME PHENOMENON, IN AN EXPLOSIVE ENVIRONMENT CAN KILL YOU.*

The charge created on a car seat has already proved strong enough to fire an electrically primed 20mm round. It is also potentially able to explode an electric blasting cap, ignite a powder charge or a fuel-air mixture, or fire a rocket or missile. This being so, let's see what we can learn from the free lessons afforded by these phenomena.

First, we must remember that the static electricity is being generated by friction, and that clothing is an excellent source of friction.

From the shocks received around the house we may deduce, since it doesn't normally happen in summertime, that low humidity facilitates the build-up of dangerous charges that would normally leak away in higher humidities. In this respect it is significant that synthetic fabrics, which usually have very low moisture - retention properties, build up charges, and are much more liable to spark discharge, than are natural fibres. The higher moisture content of natural fabrics permits the charge to dissipate more readily to harmless levels. For example, the yellow-rubber service raingear (Jacket & Overalls Safety Oil and Acid Protective NSNs 8415-21-4533 to 4537 and 8415-21-4558 to 4562) is liable to spark discharge in low humidities. In conditions of rain or the threat of rain, there's no significant problem, *but the garment should not be worn as a windbreaker in dry conditions if you're working around aircraft or in any explosives environment.*

In the humid environment produced by perspiration, synthetic garments worn underneath outer garments, do not present a threat, but remembering the sparks in the dark, it is obvious that removal of an outer garment generates much more static electricity than does the normal friction of movement.

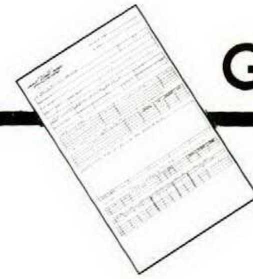
So here are three basic rules for any potentially explosive environment:

- Except for rain gear, outer garments composed of wholly synthetic fabrics must NOT be worn. (Information is available on acceptable mixtures of synthetics and natural fibres. If you have any doubts about a specific garment, ask someone who knows.)
- When outer garments are to be removed, removal must take place in a safe area.
- Under very dry conditions, extra attention should be paid to personal grounding precautions.

There you are. Specific tasks may well require that more stringent regulations be enforced, but these rules represent a basic standard for safety.

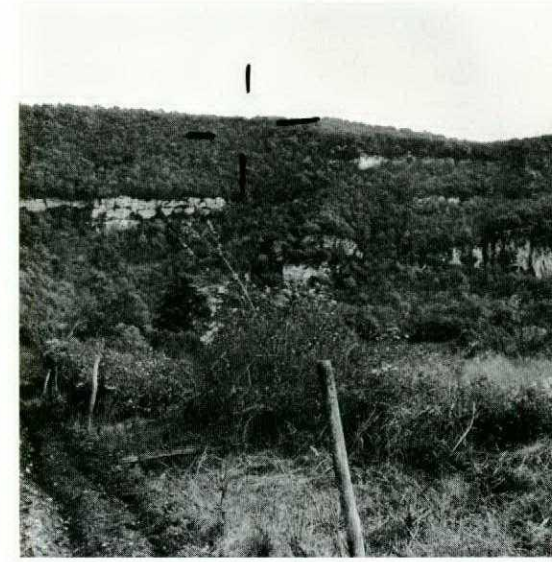
Remember - *IF IN DOUBT, ASK.*

- CF Explosives Safety Programme NEWSLETTER



Gen from Two-Ten

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



CF104, MISJUDGED ALTITUDE A two-plane section was authorized for a high-low-high reconnaissance mission. After proceeding high level to the IP they were to fly the mission independently and then rejoin for the return to base.

Approximately five minutes after leaving the IP the number two aircraft crashed into a 600 foot ridge, 2900 feet beyond the first turning point.

Apparently while preoccupied with visual navigation and trying to find the turning point to take a photograph, the pilot made a tragic error in judgement; he inadvertently allowed his aircraft to descend to an altitude from which he no longer had the time and distance required to clear the ridge in his flight path. His last-second ejection was too late.

T33, ENGINE ACCESS DOOR OPENED Returning from a target mission the pilot heard an unusual noise coming from the underside of his T33. He immediately reduced airspeed and performed a cockpit check; all indications were normal, but the noise persisted. A formating aircraft discovered that a lower engine-access door was bent back against the radar reflector. A successful straight-in approach and landing was completed.

Investigators found that only one dzus fastener had been locked prior to flight; the door had torn away from this fastener and damaged the surrounding metal.

Before the flight a technician had opened the access door to check the throttle micro-switch. After completing his work he departed for lunch leaving the panel unlocked because an engine run-up was still required to determine the cause of another recorded unserviceability. Similarly, he could not sign off the "rectified by" column until the engine run-up was performed. This was done by others while he was at lunch, and *they* signed the rectification. On his return the technician was assigned to another task and subsequent checks by groundcrew as well as the pilot's pre-flight failed to reveal that all the fasteners were not locked.

A Command instruction has since been issued to all maintenance organizations directing that access panels and doors are to be either obviously open or completely locked.

This was the second almost identical incident in less than a month resulting from interrupted procedures and incomplete pre-flight externals.

CHSS-2, TAILWHEEL SEVERED The CHSS-2 was to be ferried by two pilots. After start up, collective control was transferred to the captain while the co-pilot attempted to unlock the tailwheel, *an action requiring both hands.* Thinking the tailwheel had been unlocked and that the co-pilot had resumed control of the collective - the aircraft had moved ahead a few feet and turned 180° to starboard - the captain turned his attention to the tail rotor to ensure its clearance from the starting unit. The co-pilot however, was still working on the tailwheel and no one had control of the collective. At this point the aircraft rolled forward onto its nose and then bounced back heavily on the tail causing damage to both ends of the aircraft.

It's been some time since we've seen a "who's-got-control?" incident - a reminder for the unwary.

CUH-1H, STRUCK GROUND WHILE AIR TAXIING The CUH-1H was engaged in pilot familiarization. The sequence included hovering with the fuel control in the EMERGENCY position instead of automatic (the pilot must directly control the fuel flow to the engine with the twist-grip throttle on the collective pitch lever as in a piston-engine helicopter). After several minutes of various hovering manoeuvres, the student commenced a slow turn to the left, speed 5-10 knots and height approximately 10 feet. During the turn the aircraft started to descend and power was applied to check the descent. As the aircraft was coming out of the turn it started to drift to the right and the student made a cyclic correction. At the same time it descended rapidly, landed heavily on the left rear skid, bounced and landed again, right front skid first. The aircraft received "C" category damage as a result of the hard landing.

The pilot in command had 72 hours on type and had done extensive helicopter flying; he was not however, a qualified helicopter instructor. The student was an experienced fixed-wing pilot, but he had never received a basic helicopter conversion.

Although CFAO 55-21 clearly states that aircrew be retrained *before* being posted to units requiring special skills such as helicopter qualifications, this unit apparently decided to conduct the basic conversion themselves. In doing so pilots were employed in a role for which they were not trained.

T33, LOST The pilot was on a cross-country training flight to gain IFR experience. Contrary to instructions, he decided to fly one leg VFR, during which he carried out a touch and go at an enroute base, where a friend was a tower controller, circled a city further along (his home town) and then pressed-on to destination.

Five minutes later the pilot called Terminal Control at destination, requested a steer to base and reported that his tacan was u/s and his ADF unreliable. Four minutes after initial contact he announced 'minimum fuel', and a few minutes later his engine flamed out. Fortunately, having located the runway with the controller's assistance, he was nearing high key when his fuel gave out and managed to glide to a silent arrival.

Although most of the route was unfamiliar to the pilot, he had made no pre-flight preparation, carried no topographical maps of the route or the destination area, and had even neglected to file a flight plan. Once airborne, he flew low level at high power settings, failed to carry out routine fuel checks, and when he finally discovered that he was lost and low on fuel he elected to remain below 10,000 feet. His declaration of an emergency, five minutes before his engine flamed out, came only after the controller suggested it.

All told, an incredible display of ineptness which, fortunately, did not result in disaster.

C45, ENGINE FIRE The C45 was just airborne when the low fuel pressure light illuminated. Suspecting a fuel pump failure the instructor took control while his student operated the wobble pump. Fuel pressure was regained by the use of this pump.

During the traffic pattern the cockpit began to fill with smoke and fumes, although all cockpit instruments continued to read normal. Electrical equipment was turned off and the tower advised of the problem. The smoke and fumes subsided for a time but returned again on final, however a successful landing was completed.

On the ground the pilot discovered that his port engine was on fire. The aircraft was immediately abandoned and the fire fighting equipment took over.

Flame from a failed exhaust tailpipe had burned through an adjacent flexible fuel line; the leaking fuel then ignited and the use of the wobble pump maintained the fire.

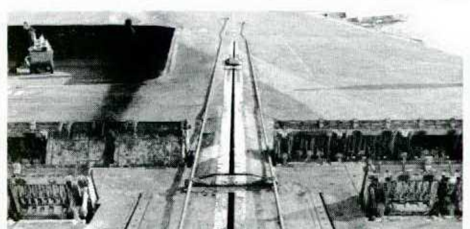
Three corrective measures are being implemented as a result of this incident:

- the routing of the flexible fuel line is being changed to keep it clear of the exhaust stack.
- the inspection interval has been decreased.
- the EOs are being amended to indicate the possibility of an engine fire after the loss of fuel pressure. The EO will also outline the pilot's corrective action.

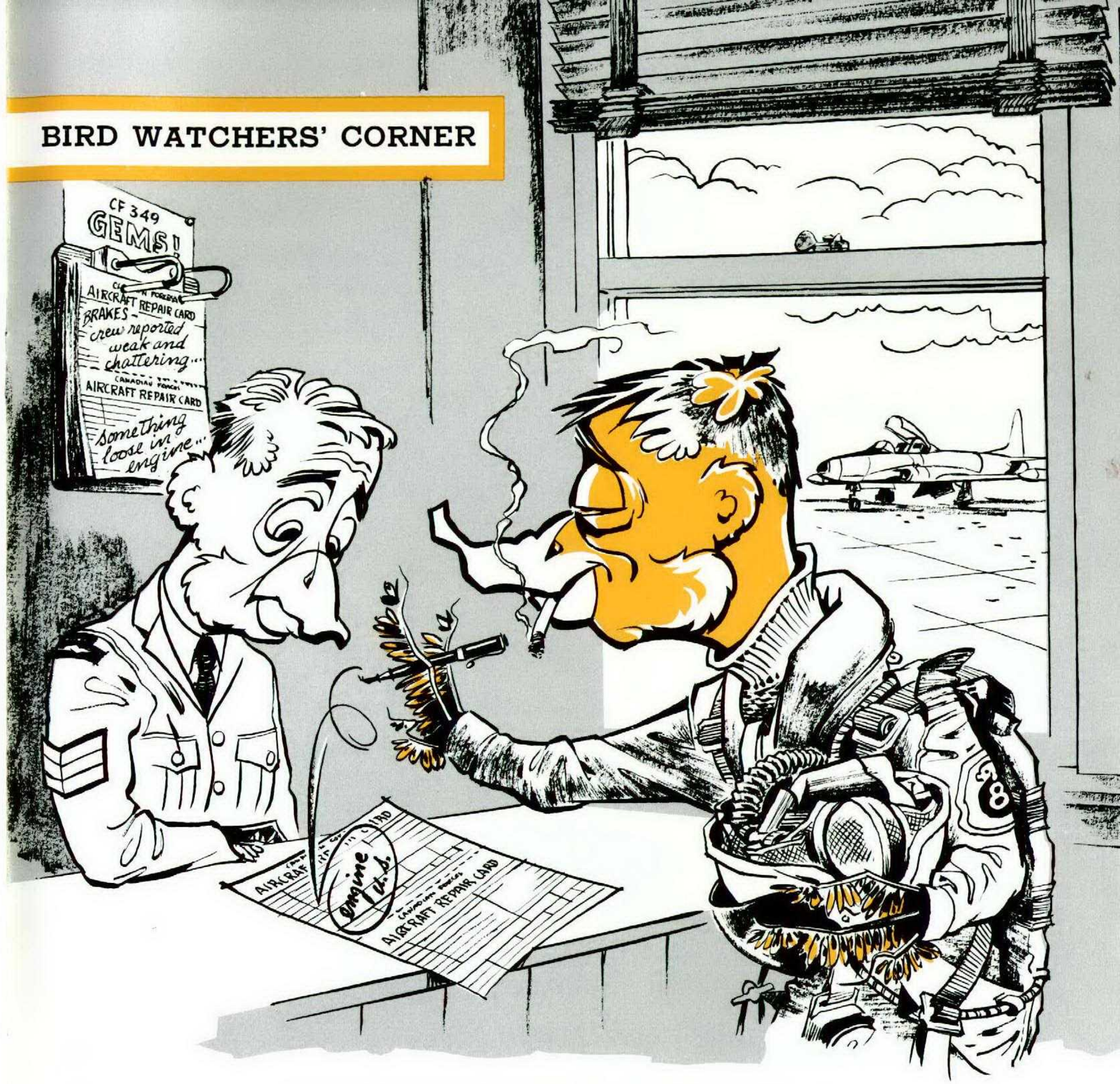
TRACKER, FUSELAGE DAMAGED DURING LAUNCH During a catapult launch the loading chocks were accidentally raised, resulting in two 7-foot long parallel punctures in the aircraft's fuselage. Although the catapult seemed "soft" to the pilots, they had no indication that the accident had occurred.

The aircraft recovered at a shore base where the crew apparently decided to dispense with the external check prior to the next flight. The damage consequently was not discovered until the aircraft arrived back on the carrier. Fortunately, the structural damage did not result in a catastrophic failure.

This type of incident has a painfully familiar ring. Some pilots are apparently not convinced that a complete and careful external check precedes every safe flight.



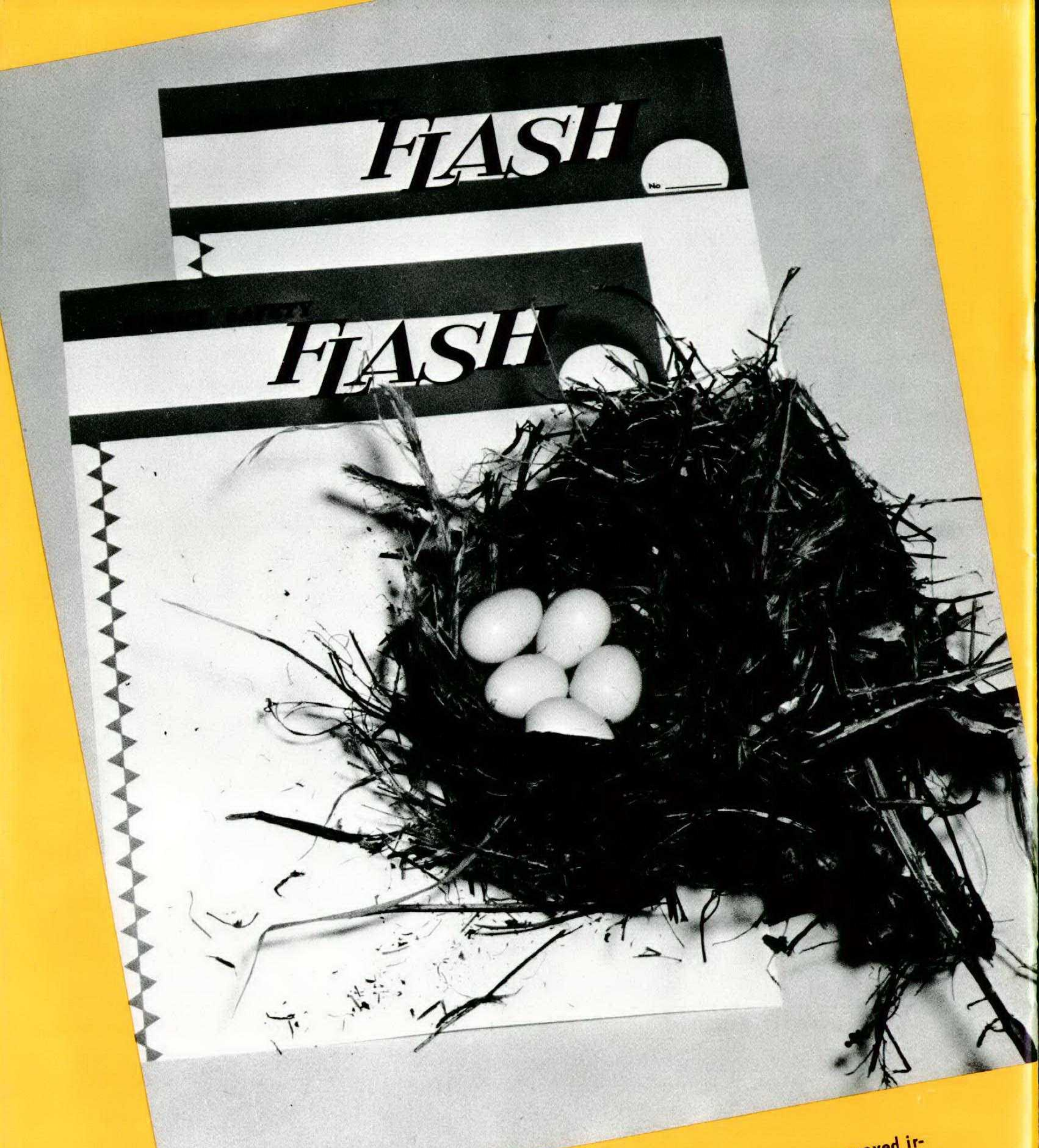
BIRD WATCHERS' CORNER



WRITE ITUP SWIFT

This interesting ornithological oddity, renowned for his quick plume and ambiguous brevity is found in small numbers in every avian community. A close relative of The Walkaround Swift, he is almost as fleet afoot as on the wing, but unlike his reckless relative his fleet footedness is a post-flight activity endangering other winged creatures more than himself. At the conclusion of each flight he makes mysterious marks in the maintenance form and then rapidly vanishes. Amid cries of "Itchecksoutalright—whatdidhewrite?", the technical birds can only scrawl the solemn symbols 'ground-checked serviceable'. In the background the Write Itup Swift may be faintly heard calling:

XTYLUTISONTHEFRITZ - ITS-UP-TO-YOU-TO-FIX-THE-BITS



it's that season again

The T33 flap area proved irresistible as a nesting ground. The "bird" had been on the tarmac for several days...