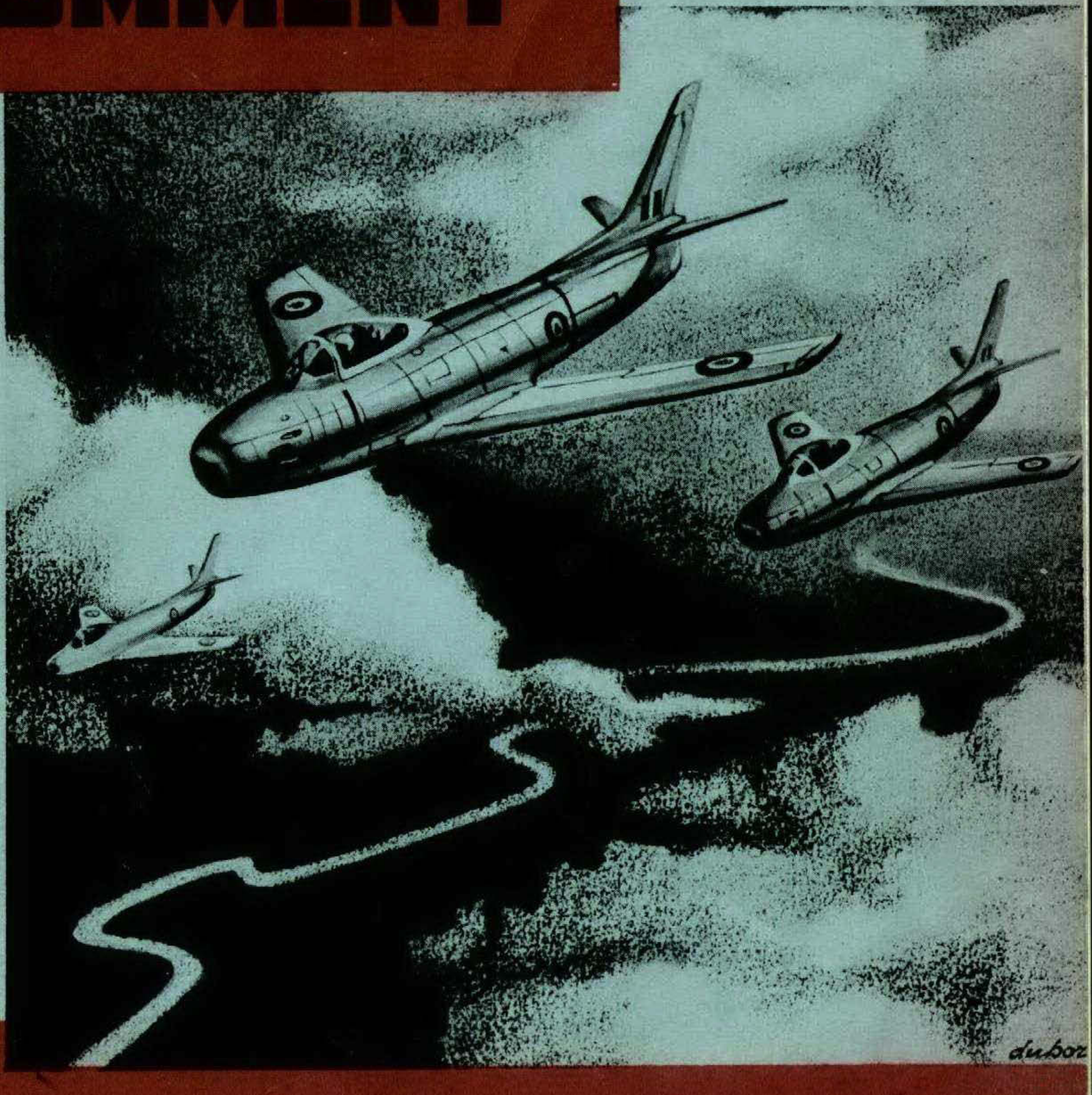
FLIGHT COMMENT



ISSUED BY

DIRECTORATE OF FLIGHT SAFETY

R.C.A.F. HEADQUARTERS • OTTAWA, ONT.

FIRST QUARTER • 1954

RESTRICTED

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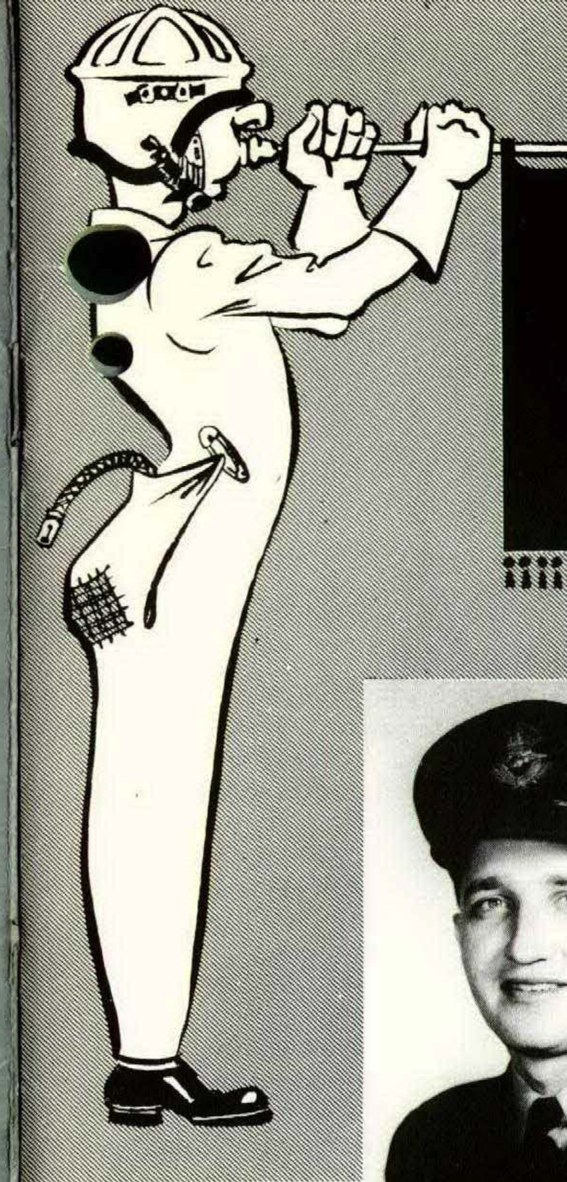


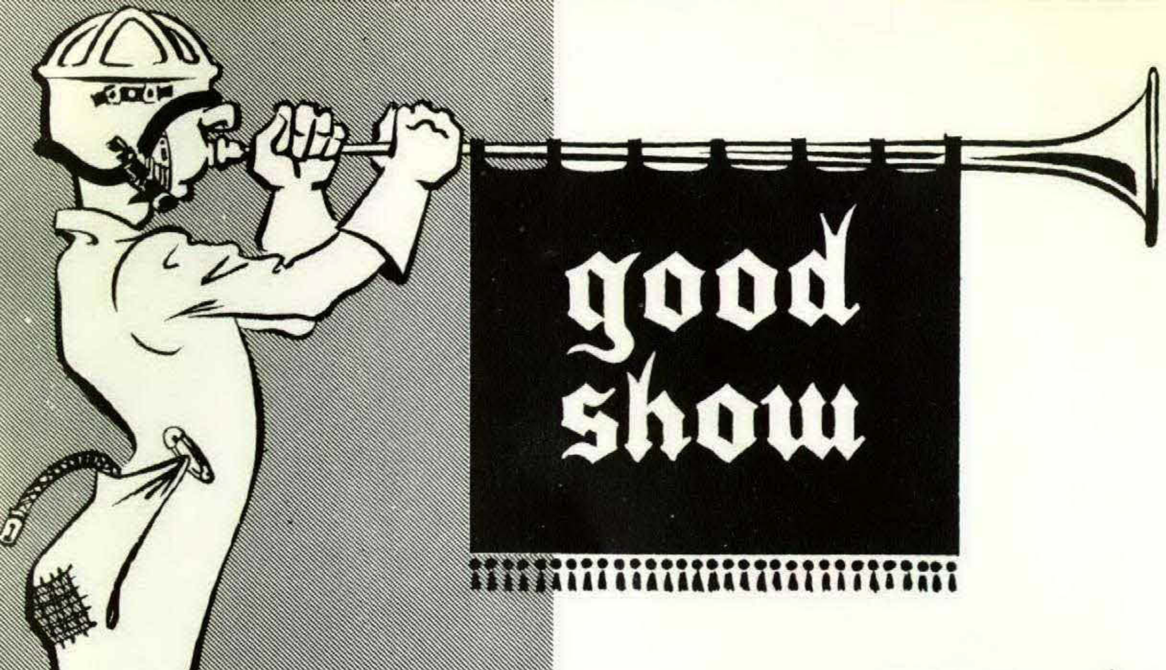
good show

30586 F/L E.G.D. Maynard

F/L Maynard of the Institute of Aviation Medicine was recently called out to investigate reported irregularities in the operation of the oxygen system on Canuck aircraft. Unable to discover anything wrong, he returned to IAM, taking with him an oxygen regulator for further tests in the decompression chamber.

During these tests—in which he was his own guinea pig—F/L Maynard hyperventilated himself. Fortunately, because of his experience in the study of aircraft oxygen systems, he was able to recognize this condition and correct it. Eventually he found that an intermittent leak in the regulator was causing a pressure build-up which his body attempted to counteract by involuntarily increasing the rate of breathing. The leak was traced to the regulator's first stage valve and the prime reason for the trouble was assessed as poor overhaul technique.

Because of these findings it has been possible to overcome this problem and remove all suspect regulators from service before they could cause a serious accident. In addition, all CF-100 units have been shown how these particular regulators may be checked for excessive leakage.

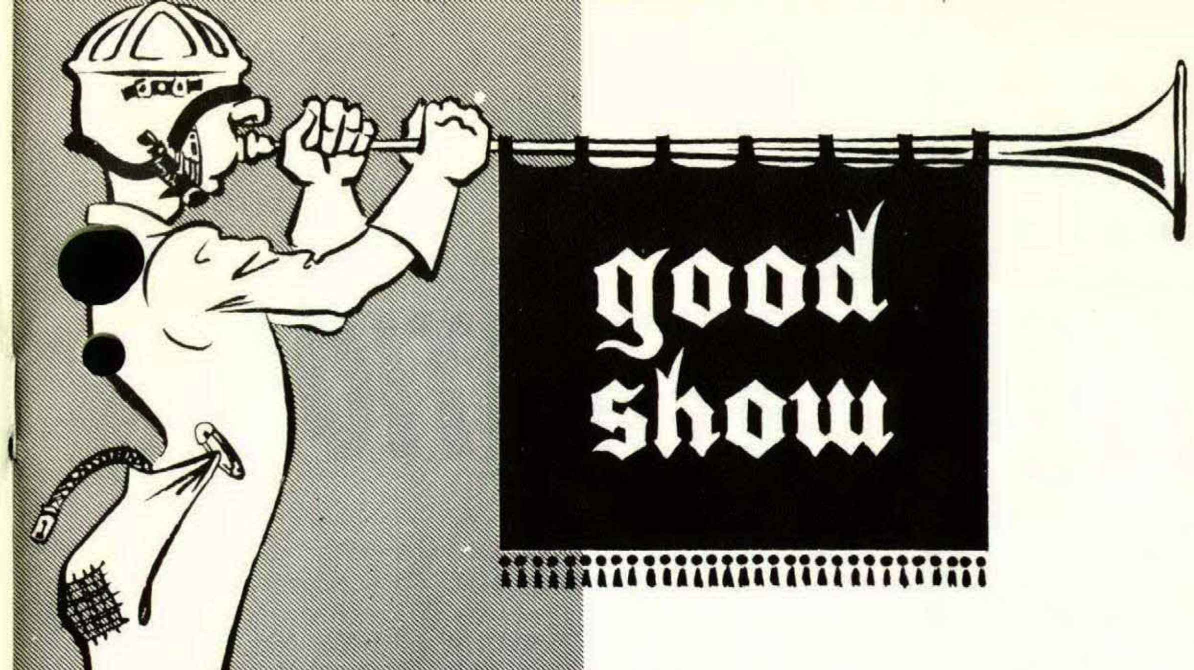


33206 F/O W.H. McKay

F/O McKay had just completed a practise GCA and overshoot when his Sabre 5 flamed out. A series of loud rumblings and explosions in the tail cone preceded the flameout. As the rpm dropped through 80 per cent, F/O McKay utilized the fuel isolation switch, but this had no effect.

He then climbed to 4,000 feet, determined to make a wheels-down landing on the airfield which was about seven miles distant. F/O McKay was unable to position himself for a jet forced landing circuit as he had to make a straight-in approach at low altitude. However, he made a successful landing despite the odds, thereby saving his aircraft from possible total destruction.

F/O McKay displayed skilful judgement in safely landing his aircraft on the runway despite loss of power at low altitude. His airmanship is very commendable.

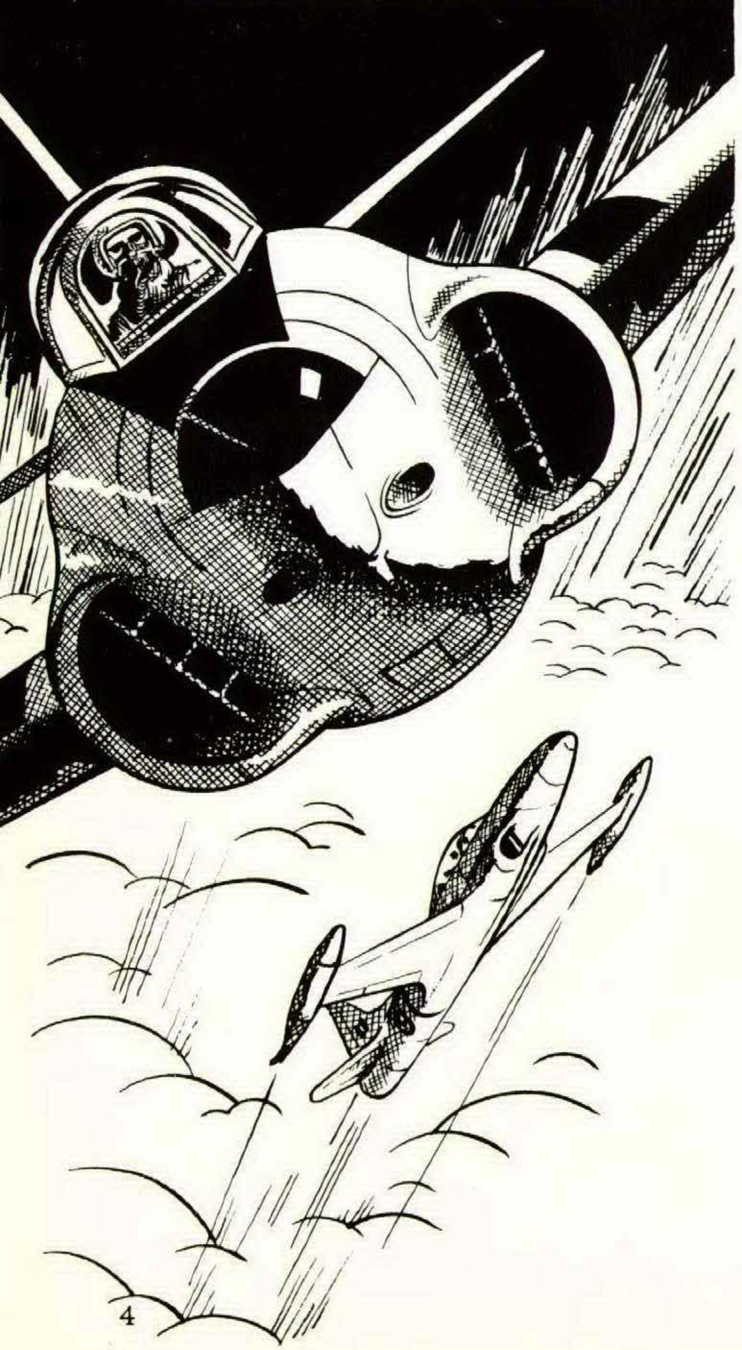


17664 F/L L.H. Cummings

F/L Cummings was flying a float-equipped Norseman from Sea Island to Harrison Lake, B.C. In the vicinity of Mission, B.C., at 4,000 feet, the engine failed. A large quantity of oil escaped after the engine failure, covering the windshield and obscuring forward vision. F/L Cummings, in spite of this handicap, made a successful forced landing on the Fraser River, and beached the Norseman. The engine failed through loss of oil, which resulted from a broken push rod being forced through its housing.

F/L Cummings' decision to immediately throttle back and make a forced landing undoubtedly saved the aircraft from serious damage. He is to be congratulated for his airmanship.

the facts on HYPERVENTILATION



by W/C J.C. Wickett

Wing Commander J.C. Wickett, AFC, CD, is Officer i/c of the Flying Personnel Medical Establishment, RCAF Institute of Aviation Medicine, Toronto. W/C Wickett was born in Medicine Hat, Alberta. Prior to embarking on his Service career, he took his B.Sc. at the University of Alberta. Enlisting with the RCAF as a pilot in 1938, he later joined Training Command as an instructor at CFS. In 1944 he went Overseas to command 418 Mosquito Fighter-Bomber Squadron and was later shot down and taken POW. After VE-Day he returned to Canada as CC, CFS.

Released from the Service in 1945, W/C Wickett enrolled in medicine at the University of Western Ontario, attaining his M.Sc. and M.D. degrees. His extensive knowledge in the field of medicine, coupled with his considerable flying experience, qualify him eminently to write on such subjects as that dealt with in the following feature. ''Flight Comment'' is indebted to W/C Wickett for the illuminating and authoritative articles which he periodically contributes in the interests of furthering the work of the Directorate of Flight Safety.

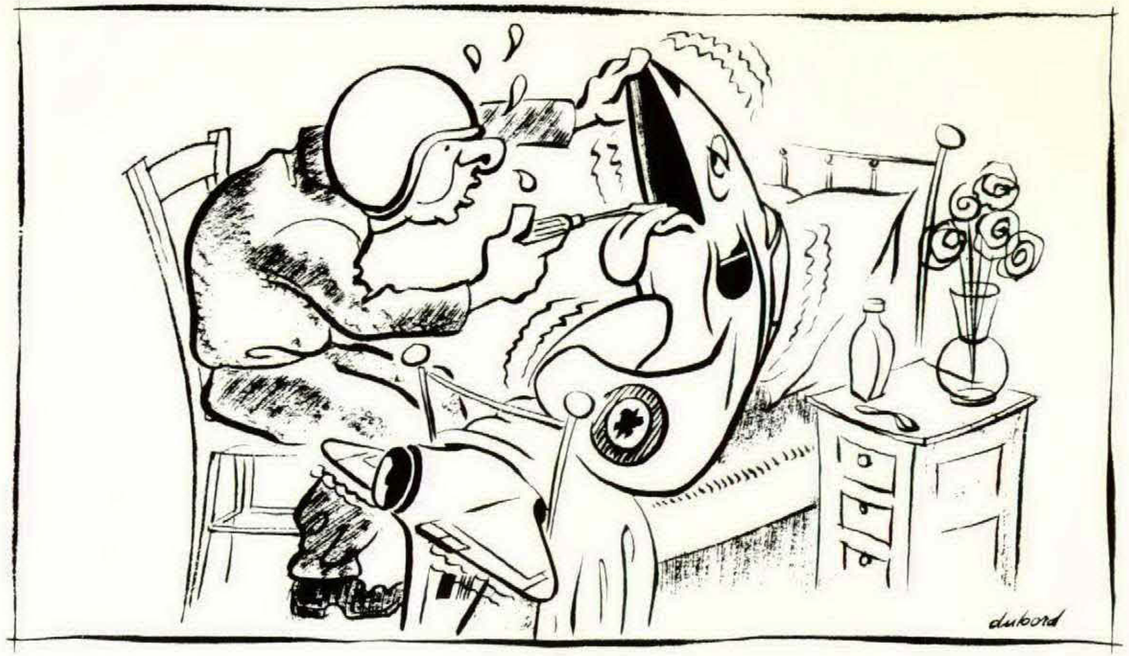
* * *

"Hyperventilation alkalosis" is a new term, and in fact, a new condition which has arisen to plague present-day aircrew. As usual with medical terminology, it is quite a mouthful and doesn't at first glance have any obvious meaning.

A breakdown of the words, however, clarifies the term. "Hyper" means "over" or "too much"; "ventilation" is "breathing"; and "alkalosis" indicates that the body has become alkaline as opposed to acid. Therefore, "hyperventilation alkalosis" means that the body has become alkaline due to overbreathing.

It must be realized that the body requires a very exact balance between acids and alkalis if consciousness and life are to be maintained. Very complex biological processes are constantly at work to accomplish this. One of the more important ways by which the human body maintains this chemical balance is by respiration. The energy which the body uses to perform work is obtained by the burning of food, and as in all types of burning, there is a large amount of carbon dioxide released. This gas, dissolved in body fluids such as blood, is called carbonic acid. When this acid reaches the lungs it breaks down to carbon dioxide and is lost through exhalation. It is essential to release this carbon dioxide from the body so that the normal acid-alkali relationship may be maintained.

When a man runs a race, his body burns more fuel than it normally does and so more carbon dioxide is produced. This carbon dioxide, if not released by increased respiration, would accumulate and cause an acidic condition. The reverse condition—that of too little carbon dioxide, is just as common and is much more dangerous because it is not as easily rectified. If a man breathes as though he has just run a race when in fact he has not, then he will exhale more carbon dioxide than he is producing. This will lead to a low level of carbonic acid gas in the blood, once more disturbing the balance—this time in the other direction. The body becomes alkaline and the condition leads to dizziness, changes in vision, and finally unconsciousness.



Overbreathing is very necessary when, as in the case of the runner, it is required to rid the body of excess carbon dioxide; but unfortunately, there are times when a person overbreathes without having an excess of carbonic acid gas. Overbreathing is likely to occur under many conditions, the most common cause of it among aircrew being the false belief that a greater quantity of oxygen must be breathed at altitude. It is also a product of anxiety and fear — as when a pilot becomes over-anxious about his aircraft. In either instance cited, hyperventilation may be sufficiently severe to induce symptoms. These symptoms, in the past, have been considered due to anoxia and pilots have attempted to obtain more oxygen by deeper and more rapid respiration. As already demonstrated, this increased respiratory rate causes a greater loss of carbon dioxide and increasing dizziness and disorientation. By the time he reaches this state, a pilot is probably thoroughly frightened and is overbreathing due to this fright and because of his desire to obtain the life-giving oxygen which he knows he must have to stay alive. These factors cause him to breathe even harder — and this vicious circle may progress until he becomes unconscious.

Hyperventilation alkalosis is a very real cause of accidents and near-accidents in the air but, fortunately, it is an easy condition to cure. One must learn to suspect that certain symptoms in the air may be caused both by overbreathing and by lack of oxygen. If the oxygen regulator is working properly, then it is only necessary to hold one's breath for a short time or slow down respiration and the carbon dioxide which is always being produced in the body will restore the acid-base balance and effect immediate recovery.

EDITORIAL

"FLIGHT COMMENT", issued by the Directorate of Flight Safety, is the successor to "Crash Comment" as an AFHQ contribution to the field of accident prevention and is designed to promote the ideals of safer, better flying in the minds of Air Force personnel, groundcrew and aircrew alike. It is our sincere hope that all of you will welcome this new publication and discover in its pages stimulating ideas and material of real interest and value to you in your respective careers.

"FLIGHT COMMENT" is dedicated to the protection and preservation of RCAF personnel and aircraft. Our positive conviction is that the air is just as safe as men make it, the responsibility lying directly in the hands of those of you who service our aircraft and those of you who fly them. We believe that accident prevention is the key to Flight Safety. Cures in the flying game are often too late. There is no better way to handle an accident than to keep it from happening. The purpose of "FLIGHT COMMENT", then, is to aid and extend those concepts throughout all phases of RCAF operation.

This publication is just one aspect of a broad Flight Safety program in the RCAF, but it could assume a stature of impressive dimensions. We are counting on each one of you for support because the ultimate success of "FLIGHT COMMENT" will only be measured in terms of your response to it.

You can throw your weight behind this new venture through our letters-to-the-editor column where readers' views ought to play a considerable role in moulding the policy and destiny of this magazine. All letters will be treated "Confidential", but to be considered for publication they must be signed. Should the author wish it, however, he may request that his signature be deleted from the letter if it is selected to appear in print.

ARE YOU AWARE ?

THAT THE TERM "FLYING ACCIDENT" HAS BEEN SUPERSEDED BY THE TERM "AIRCRAFT ACCIDENT"?

* * * *

THAT A NEW DEFINITION HAS BEEN PROVIDED FOR THE TERM "AIRCRAFT ACCIDENT"?

* * * *

THAT THE RCAF HAS ADOPTED AND DEFINED THE TERM "AIRCRAFT INCIDENT"?

* * * *

THAT "AIRCRAFT INCIDENTS" ARE REPORTED BY A MODIFIED REPORTING PROCEDURE?

* * * *

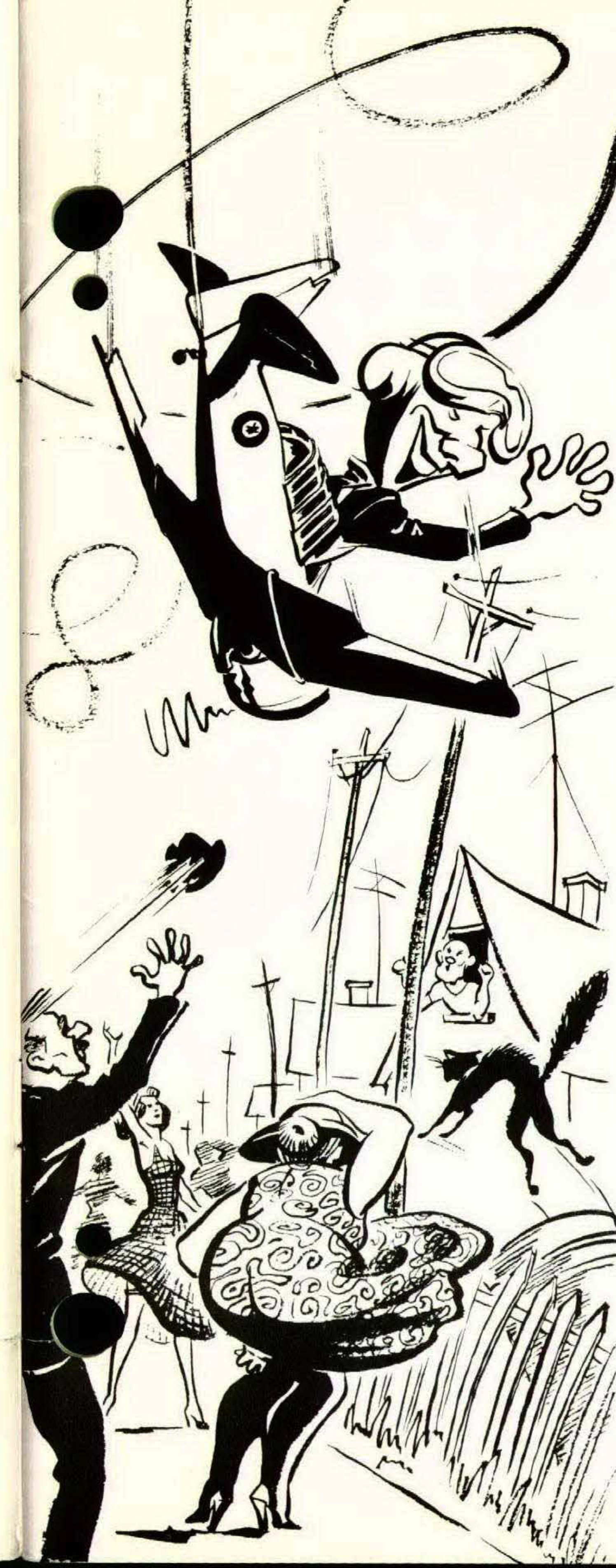
THAT YOU ARE REQUIRED TO REPORT THE DETAILS OF CERTAIN CATEGORIES OF AIRCRAFT ACCIDENTS DIRECT TO AFHQ BY TELEPHONE?

* * * *

THAT A PROCEDURE FOR THE REPORTING AND INVESTIGATION OF FOREIGN MILITARY AIRCRAFT ACCIDENTS OCCURRING IN CANADA HAS BEEN INTRODUCED?

IF NOT

We suggest you read
AFAO, A6/3, dated 28 Feb 54
for
"THE GEN"



memo

TO LIVE PILOTS

"LAME-BRAIN!" "DIMWIT!"

Ever have anyone talk that way to you, Buster? If you're one of those "red-hot" fly-boys who shoot up towns, stampede cows out of a week's milk, scare the daylights out of elderly ladies, and home down on the girl friend's veranda, then you've been called plenty—believe us.

We've occasionally found ourselves mixed up with a crowd of citizens down street. Everybody bogging along minding their own business. Then it happens. A sudden, throaty, shattering roar — and the familiar yellow-and-black of a Harvard goes bangin' through town about a pole-length off the deck. One wing tilts and round she comes again for encores. Yeah—there he is! Stoking the boilers with one hand and waving to the multitude with the other, a big smile on his face making him look all teeth and goggles. That's him all right—Bill Brainshortage, as ever was!

It's then you hear the language. Some of it gets pretty rough. We won't enlarge on that because the Padre reads our proofs, but we can tell you a few other things. For instance, Bill's got the picture all screwy. Like a lot of extroverts who're head-over-heels in love with themselves, he hasn't got the faintest notion of audience reaction. When Bill laughs everybody laughs—he thinks. He's deaf from his own noise. We know this, because we've been right smack in the middle of the mob Bill's putting on the show for. And nobody's laughing. The point Bill's too thick to grasp is that the average guy is a whale of a lot smarter than he was 10 years ago. When he sees Brainshortage up there carving air, he's not entertained. He's got a good idea what a Harvard costs and he knows what is meant by "overstressing" an aircraft. Bill's performance isn't for free. It's costing bucks. Plenty of bucks.

Surprisingly often—if you want the straight goods—the Bill Brainshortages in the outfit get wiped out by unauthorized low flying. Bashed into the Great Beyond. Or maimed for life. If they live and aren't cashiered from the service, then their Air Force careers are ruined. Generally the aircraft is a total write-off.

Take a good look at the pictures we dug out to accompany our article. Obviously those two Harvards will never again poke an eager nose into blue sky. The pilots who flew them, on the other hand, were very lucky boys. They're still walking around—after a fashion, that is, because they both suffered very serious injuries. Yeah, you're absolutely right, George! They were doing some unauthorized low flying.

* *

The pilot who ended up in the bushes was supposed to carry out a low-level cross-country. He broke off his exercise, did some fancy stunting above his folks' home, and then started making passes over the town. As he was doing a steep turn his Harvard's starboard wing clipped a power line. The aircraft went wildly out of control, damaged several buildings—one of them badly, as you can see by the photograph—and crashed. The pilot was gravely injured and the Harvard finished.

Our second "ham" had been signed out to do low flying, cross-wind takeoffs and landings, precautionary and forced landings, and aerobatics—in a designated area, of course. But he apparently changed his plans and headed for his parents' farm—a spot almost a hundred miles away. Once there he started flying around the farm buildings at altitudes from 300 to 500 feet. Maybe it was poor judgement or maybe it was "mushing". Whatever it was, the Harvard crashed onto the upslope of a knoll in a slightly nose down attitude, slid along the ground and started to burn. A little later the injured and helpless pilot was dragged from the mess by members of his family, just before a tank blew up. Lucky? Brother they don't come any luckier.

* *

You may or may not know this, friend, but the mortality rate from unauthorized low flying is astronomical. There are no initiating causes that take anywhere near so high a death toll. Authorized low flying doesn't come within miles of it for casualties. Why is this so? Why does unauthorized low flying so often end in tragedy?

We can't give you the answer with any degree of statistical precision. But we can pass on three items which might give you something to chew over in leisure moments when you want a subject to think about. In the first place, when a man does something wrong—commits an act that has been forbidden, or knowingly violates some law or rule—violent changes occur in him. He experiences stress, becoming unnaturally tense and abnormally nervous and excited. He develops a heady, reckless feeling and really believes he can pull off anything successfully if he wants to try it. The hitch is that he actually can't. His condition is unsafe. He's literally made himself unfit for the job he's doing. Sheer animal enthusiasm has carried him to the point where the physical is "top dog" and rational intelligence is side-tracked. You

experience the same sensations when you drink too much: sound judgement impaired by blind over-confidence. Remember, now! We've been talking here about unauthorized low flying—the sort of stunting you pull off on your own. As far as your personal performance is concerned, you're just not the same pilot. There's quite a difference between doing something you've got approval for and doing something forbidden. Authorized low flying—that's a horse of another wheelbase!

Our second point concerns courage or fearlessness. It has been our observation that a sheer lack of adult judgement is often mistaken for courage. In certain situations people of low intelligence appear to be utterly fearless when actually they are merely too poorly equipped to recognize potential danger. Needless to say, this unique faculty can also be present in people of average and above-average intelligence. We do know that that sort of characteristic has killed pilots before. They didn't low-fly and stunt just because they were fearless or just because they knew flying from A to Z. What else, then? Well, maybe for a few exhilarating moments they managed to confine in a relatively quiet backwater of their consciousness the knowledge that a genuine hazard lurked in the situation they were themselves creating. They had an exalted opinion of their own prowess—an opinion that may even have amounted to a mild sort of megalomania.

Finally we have item three to pass on. Once in a long while we encounter an unfortunate word or phrase in the crash file of a pilot who has been killed while flying illegally: "Immature"—"irresponsible"—"inferiority complex"—"a feeling of social inadequacy". These terms merely reflect common personal problems with which we all have to square off at one time or another in our lives. But it's a hell of a thing to "take it out" on an aircraft instead of making adjustments within oneself. Occasionally an aircraft hits back. A pilot dies. And a Harvard or Sabre is finished.

* *

Now hold on, chum! Don't go roarin' off in a rage. Sure we've been just talking. There's plenty we haven't got figures for. Remember, though, that the greatest projects in this world all started as an idea in some guy's head. We've been speculating a little from our own knowledge and experience. No harm in it. Especially if we can save a life here and there — and maybe yours.

Fortunately we have some statistics for you. Take the crashes we've illustrated here with photographs from our records. They occurred last quarter. Because they may give you some idea of the odds against you when you engage in unauthorized flying, we'll tell you something about all the crashes recorded in that category for last quarter. Fasten your belt, son. This'll be bumpy.

THREE-QUARTERS, OR 75% OF THE AIRCRAFT INVOLVED WERE TOTAL WRECKS.

ONE-HALF, OR 50% OF THE PILOTS INVOLVED IN THOSE CRASHES WERE VERY SERIOUSLY INJURED.

ONE-QUARTER, OR 25% OF THE PILOTS INVOLVED IN THOSE CRASHES ARE DEAD.

Need we say more?

Whoso neglects learning in his youth,
loses the past and is dead for the future.
- Euripedes -

*

The man who speaks the truth that is in him, although
all the world hisses, is a sight of such moral grandeur
that all mankind should bow and honor him.
- Clarence Darrow -

YOU ARE OLD, AIR CHIEF MARSHAL

"You are old, Air Chief Marshal," the young P/O said,
"And your body's exceedingly fat,
Yet you fly thro' the air with the greatest of ease,
Pray what is the reason for that?"

"The cause of this strange aeronautical grace",
Said the Boffin, relating his powers,
"Was the arduous practice in cockpit routine
And learning instructions for hours."

"I know," said the P/O, "but answer me this,
I've seen you do circuits and bumps,
Yet you never come down with your undercart up,
Like me and the other poor chumps."

"You see," said the Marshal, with almost a smirk,
"It's a habit, good training, and sense
To look round the cockpit and needles and knobs,
Relax yourself; never sit tense."

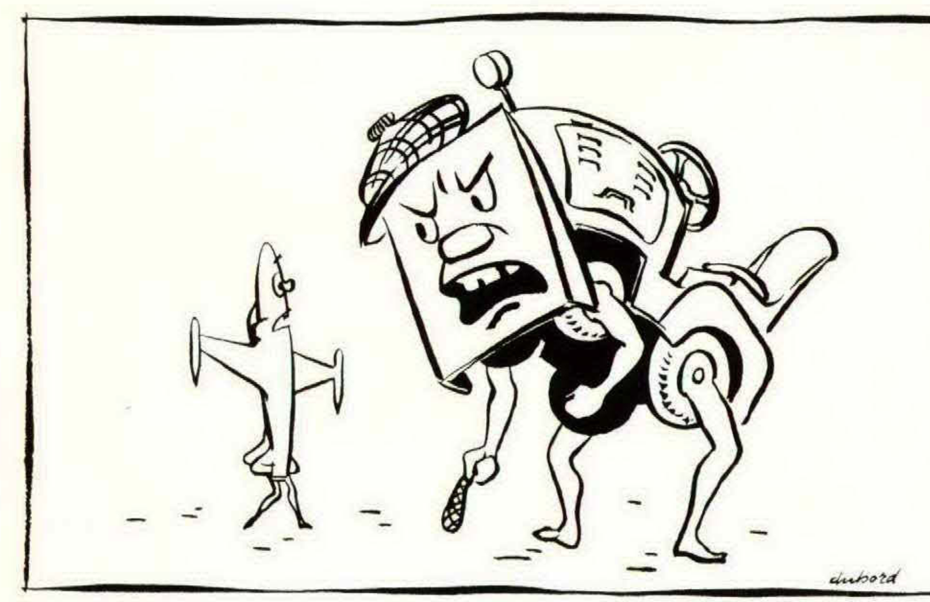
"Watch the pitch and the flaps and the mixture as well,
The airspeed and angle of glide.
It's so very much simpler to land on the wheels
Than prang on the belly or side."

"Watch the chap in the band box," the old boy said next,
"With his lights, and his lamps and his flags.
Pay regard to his gestures, his foibles and whims;
Come in gently — no zigs and no zags."

"In my youth," said the Marshal, "I studied each word
That Flying Control put before me —
And avoided, thereby, those ridiculous prangs,
As frankly the stupid things bore me."

"Before taking off, get your maps, sign the book;
The Form 700 as well.
Check the wind and the weather, the runway in use;
Safety first — for you never can tell."

"I taxi quite slowly with caution and care,
And watch other aircraft about;
It's foolish to argue with bowsers or trucks,
They have the last word, without doubt."



"I look after my helmet, my dinghy and 'chute —
It's true they belong to the King,
But friends who are corpses have proved more than once
To maltreat them's the craziest thing."

"I never take chances when close to the ground:
And when clouds and high hills are about,
I use my R/T for all that it's worth
And keep all my fingers well out."

"Emulate me — young man — if determined you'd be
To grow old and get covered with rings,
Always bearing in mind, 'tis your chest — not your back —
Should be used for displaying your wings."

By now our young P/O had had quite enough
And he started to yawn and to fidget. . . . . . .
But he made up his mind that in future he'd try
To extract the proverbial digit.

(RAF Coastal Command Accident Analysis)

* * *

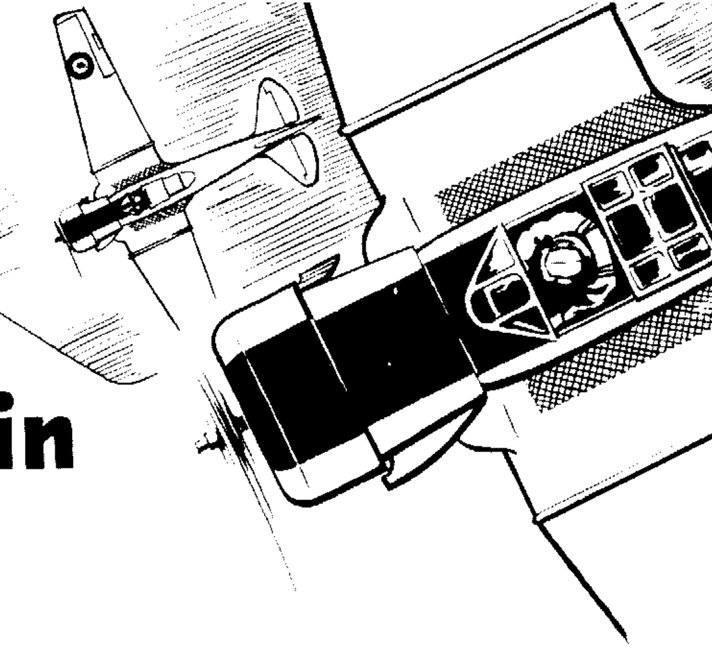
DAMAGED FLUID-CARRYING LINES

Because of improper positioning during manufacture or vibrations set up during flight, new aircraft may have fluid-carrying lines which chafe other lines or parts of the aircraft. The resulting wear on these lines is a potential flight hazard.

Experience has shown that many cases of chafing lines are evident after the first one hundred hours of operation. However, recent inspections indicate that chafing frequently is allowed to continue until a serious condition exists before any corrective action is taken. Any instances of chafing lines should be considered as special subjects during periodic inspections of relatively new aircraft. Special attention at that time will save many maintenance hours later, and it might prevent a major aircraft accident.

USAF "Aircraft Accident and Maintenance Review."

Brown Puff again



When the March AIBrief hit your bulletin board, you may have felt that Flight Safety had merely ground out another effort as a matter of routine.

Not so. The photographs accompanying this article were our principal motives for that Brief. They depict the tragic result of two mid-air collisions that occurred in the last quarter of 1953. In those two accidents, three pilots died.

We do not like showing you these pictures and their inclusion here is not evidence of sadistic tendencies at AFHQ. Frankly, we dislike looking at them ourselves; for one never really gets case-hardened to circumstances in which good men are killed for No Good Reason.

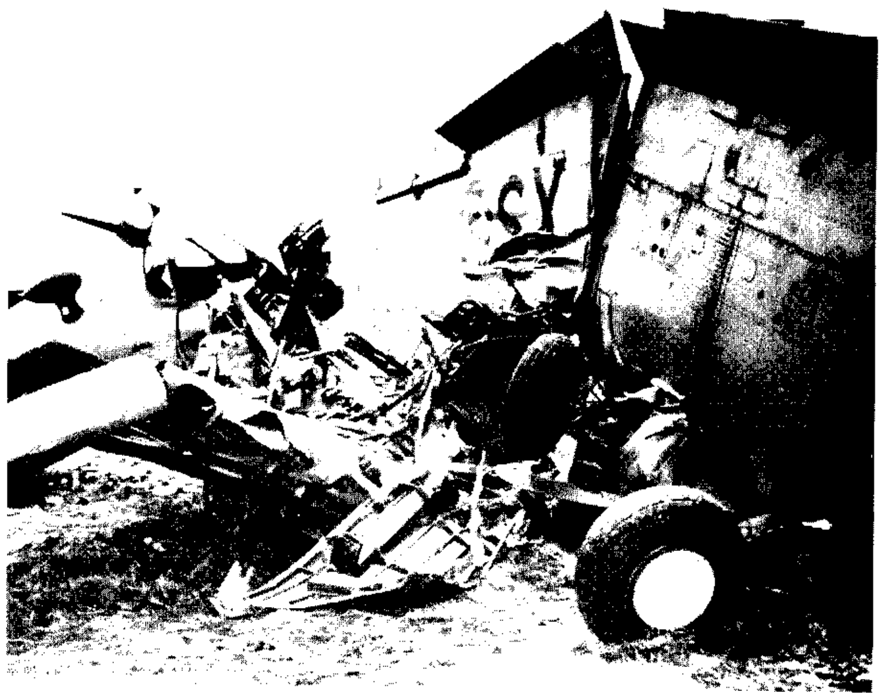
* * *

That is precisely how DFS feels about the crashes illustrated here. The three pilots who died in them were killed for No Good Reason. Someone forgot a rule. Someone forgot to look around. It was just as simple as that. In order that you may form your own opinion, however, we have assembled all the details on these two accidents for you.

ACCIDENT "A"

"The first Harvard, piloted by a student with an instructor, was on final approach. The second Harvard, piloted by a solo student, had carried out a short downwind leg and a normal crosswind leg, and then turned on final between the first aircraft and another further out on final approach.

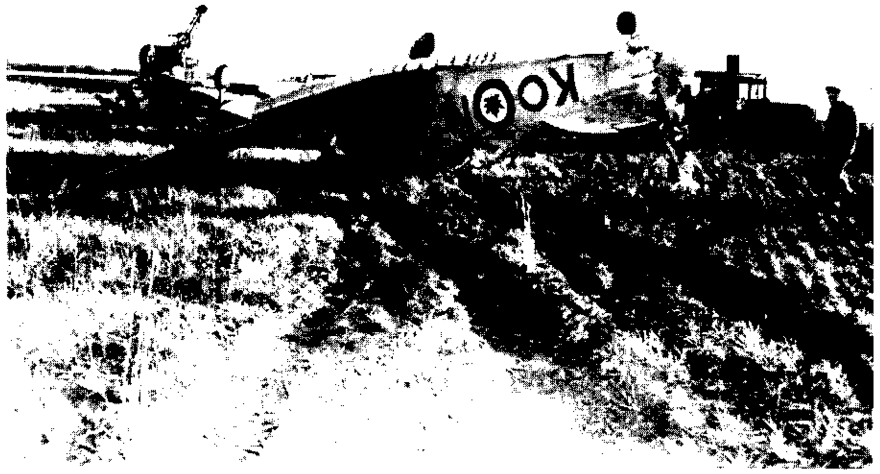
"The solo student misjudged his turn onto final and consequently did a descending S-turn to line up with the runway. This positioned him immediately above, slightly behind, and to port of the first Harvard. The tender fired a brown flare indicating danger of collision, and the first aircraft levelled out immediately as required. The second



continued its descent and collided with the other. Both aircraft crashed, killing the solo student and the instructor and severely injuring the other student pilot."

ACCIDENT "B"

"Two Harvard aircraft turned onto final approach at about the same time, neither one noticing the presence of the other. The aircraft closer to the ground was piloted by a solo student and making a low, flat approach. The one above, piloted by a student with an instructor, was making a steep approach.



"When the control tender fired a brown warning flare, the higher aircraft was seen to level out. The lower aircraft checked descent, commenced to climb, and collided with the one above it. The solo student was killed in the ensuing crash."

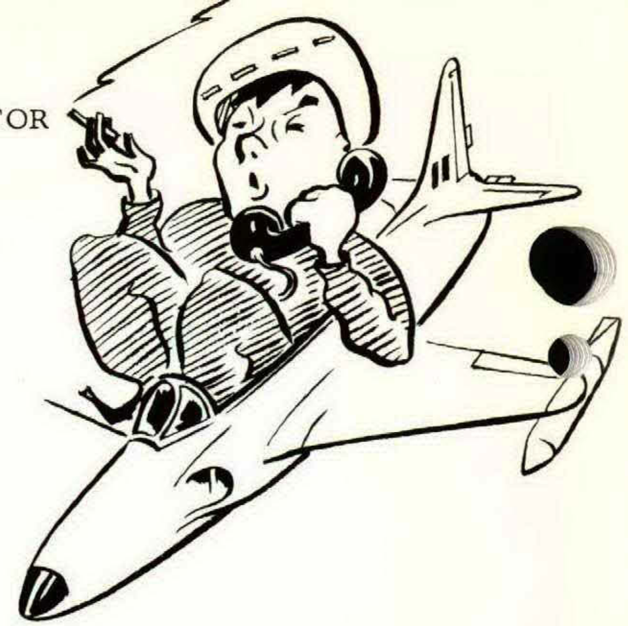
* * *

The procedure that should have been followed when the Brown Puff appeared in these two cases was set out on our March AIBrief. There are four steps to the correct method. Here they are, for those of you who have not seen the Brief:

- ► Power On
- ► Fly Straight and Level
- ► Look for Other Aircraft
- ► Break Away

PXing

LETTERS TO THE EDITOR



DEAR READER:

This page belongs to you. It is a forum in which to air your views, comments and criticism—the theme we had in mind when we selected a name for it: Px-ing—stating one's position.

We are counting on our readers to make this feature one of the liveliest in "FLIGHT COMMENT". Since our first issue is something of a debut, we will be watching the mails eagerly for your letters of praise (no limit here, gentlemen) and fearfully for your letters of censure (keep these down, please).

Seriously, though, we would appreciate your frank appraisal of the new "FLIGHT COMMENT". Is it what you want to see? What do you approve most? What else would you like introduced? What suggestions have you for further improvement? The most interesting and pertinent letters received will be published. We are open to opinions from every quarter of Air Force operation, on all subjects having any connection whatsoever with Flight Safety.

Should a letter-to-the-editor fail to provide you sufficient space to convey your ideas, then mail us an article. Many of you out there must be expert in your particular fields; and if you are, we want to pass on your knowledge to others. When your article is accepted it will appear with your photograph and a brief biographical sketch of your air force career. "FLIGHT COMMENT" will flourish if it excites your enthusiasm. So give us a hand in keeping you enthusiastic. As they used to say before radio died: "Put something in the pot, boy!"

The Editor
Flight Comment
Directorate of Flight Safety
AFHQ, Ottawa

SUMMER'S HERE STAY LEERY !

WHAT HAPPENS to your personal flying habits now that summer is here? Do they sag like the belly on a swayback mare? —Or do you take that relaxed feeling as a warning sign and tighten up your vigilance a notch or two?

No, we're not crazy. These questions are on the up and up. Flight Safety people have a real problem in front of them when summer starts moving back into this part of the world. The admission may come as a surprise to you, but there is one blessing that accompanies the rigours of winter weather and winter flying: Pilots are right up on their toes! They are daily conscious of the problems inherent in cold-weather operations—of the hazards arising out of inadequate regard for the limitations imposed by snow, ice and sub-zero temperatures. It is highly likely that the best flying in Canada is done during the winter months.

Come spring and summer though, everyone lets go with a big sigh, and relaxation sets in. Statistics do not reveal how many accidents stem from relaxation but we're willing to believe the total would shake us. Hot weather, bright sunshine and clear skies for days and sometimes weeks on end can actually be a menace. When flying conditions remain ideal for a protracted period of time, the situation becomes a grim test of the average pilot's determination to keep alert to the weather. There is a quite understandable tendency to forget about it entirely, to disregard briefings, and to develop an impatient desire to get on with the job of just flying. Even for good pilots such an attitude is risky. For student pilots it can be downright disastrous—an observation you will doubtless readily endorse since, obviously, the adoption of an I-could-care-less outlook toward weather at a critical stage in training is most undesirable. Yet the prevalence of this attitude represents the biggest single problem the RCAF faces during its annual program of summer flying.

Lest you think we are just sounding off to look busy, we brought along a few statistics from last summer to give us a case. What do you think we found after digging around a bit? In the first place we discovered that of all accidents which occurred in the "ideal flying" months for 1953, 20%—repeat, 20%—of the total were directly influenced by weather! Makes you think, eh? Of all the accidents influenced directly by weather, 48% occurred on crosswind landings. Below is a table we have worked out to give you an idea of how summer weather can louse up your record.

Summer Months, 1953
Accidents Directly Influenced by Weather

48%	occurred on landing in crosswinds
20%	occurred in poor visibility
14%	occurred in gusty conditions
7%	occurred in hail, turbulence, high winds
7%	occurred in light winds
4%	resulted from carburettor icing

* * * *

At this point it might be well to tell you where you can locate some really top-grade "gen" on weather. In the issue of "Crash

Comment" for the First Quarter of 1953, D.G. Black, Meteorological Adviser for Training Command HQ, wrote an article entitled "Don't Gamble With Summer Weather". We have never read a more interesting or informative article on the subject. Look it up and see what we mean. It will not take more than fifteen or twenty minutes of your time—and you will have rubbed shoulders with one of the most clued-up weathermen in the country.

Meanwhile, here are a few tips to keep your grey matter turning over:

- Obtain a weather forecast BEFORE EVERY FLIGHT
- Talk weather with the forecaster if possible
- Know a weather report from a weather forecast
- Remember that your altimeter might be wrong
- Cloud height in <u>weather</u> reports is "height above ground"
- Cloud height in <u>regional</u> forecasts is "height above sea level"
- Cloud height in <u>terminal</u> forecasts is "height above ground"
- A cloud base is often lower over high ground than elsewhere
- Wherever possible, stay out of thunderstorms
- If you must fly through thunderstorms, select the area of least lightning and reduce your air speed
- When flying in cloud, watch your thermometer. Carburettor ice occurs at temperatures as high as 25°C and most rapidly near 13°C
- Remember that weather changes swiftly. If you took off in ideal conditions it may be the reverse when you return
- When air is still on the ground it may be moving at over 50 mph at 10,000 feet
- Wind at 1,000 feet increases speed at night and may be blowing strong when it has died away on the ground
- Watch for sudden wind shifts and stray gusts when a thunderstorm or squall is moving over an airfield

- Fog develops and drifts rapidly. An airfield free now may be fogbound an hour hence.

CAREFUL FLIGHT PLANNING MAKES YOU THE BOSS

WANTED

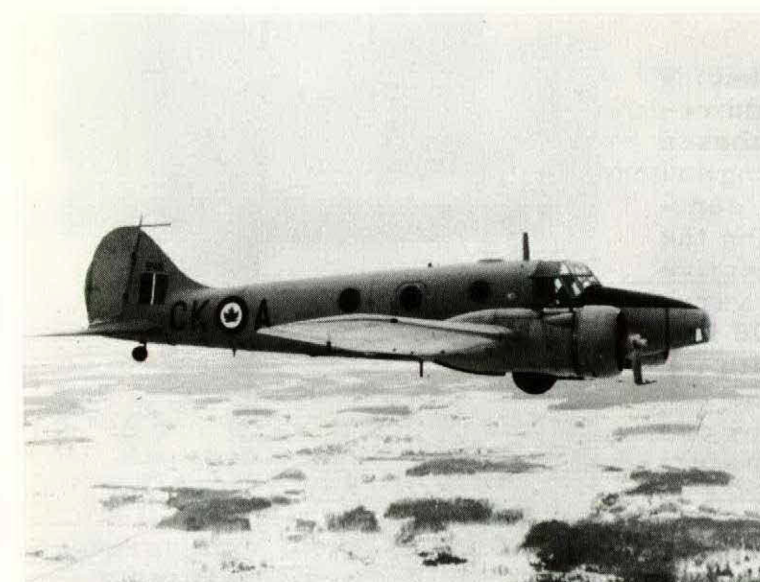
"One picture is worth a thousand words." If ever a slogan had applicability, that one has—to aircraft accident pictures.

All RCAF units are encouraged and urged to submit more photographs with their D.14 reports wherever it is likely that these will augment accuracy in making assessments, and—what is more important—ASSIST OTHERS TO STAY OUT OF TROUBLE!

Generally A-category accidents are well photographed; but B, C and D reports often display a painful shortage. If a screw-driver or other foreign matter is the cause of an accident, then enclose with your D.14 photos of the object itself and of the point at which it inflicted loss of control or damage upon the aircraft. "FLIGHT COMMENT" invariably uses the best of them in its pages so that others will benefit from your experience.

Old Ansons fade away

The veteran Avro Anson, in which thousands of pilots and navigators were trained during World War II, has retired from active service with the RCAF. The last four, remnant of a mighty war-time fleet of almos 5,000 will fly in formation from Uplands Airport to Trenton where they will be turned over to Crown Assets Disposal Corporation.



Pilots and navigators learned to respect the strength and reliability of the Anson, from the Mark 1 which was sent over from England and assembled here to the modernized Mark 5, produced in Canada and affectionately called the "Beaverboard Airbeater" because of its plywood construction.

While with the RCAF Ansons flew almost six million hours. They have been replaced in the airforce by modern twin-engined trainers. In Britain, the Anson was in constant production for 17 years, the longest manufacturing run of any aircraft in the world.

(AITA "Air Age")

Canso operations in northern waters

by

F/L H.W. LELEU

PROBLEMS

Problems encountered during Northern Operations are varied and numerous and it would hardly be possible to outline or anticipate them all. Every landing in a strange or unknown lake or river is a different operation and at any moment, from touchdown to takeoff, a serious accident could occur. Generally speaking the operation is only as safe as the crew is alert and co-ordinated. If the crew of the aircraft are well trained and have a good knowledge of water handling, fifty per cent of any danger is automatically eliminated.

Prior to a water landing in a strange area, a good reconnaissance of the chosen beaching area and alighting and takeoff path ought to be completed. This entails flying the aircraft over the prospective alighting path at heights varying from 1,000 feet to 100 feet above the surface, with the crew at lookout positions reporting to the captain any obstructions on or in the water. While the reconnaissance is being made the captain should be asking himself: Is the landing and takeoff path safe? Will it be possible to beach or anchor the aircraft? What sort of landing is to be made considering landing path and water conditions? What type

of beaching or anchoring is possible? What instructions to the crew are necessary to complete the operation successfully? While debating the landing technique to be used, the captain should take into consideration every possible factor including the weight of the aircraft, the surface wind, the type of water condition, and whether it would be advisable to stall on or overshoot if a bounce occurs.

F/L H.W. Leleu

The Author

F/L LeLeu is at present a pilot with 408 Photographic Squadron at Rockcliffe, Ont., and has been flying the Canso since 1949, mainly in the Yukon and western Arctic.

F/L Leleu was born in Hamilton, Ont. He enlisted with the RCAF in 1941, was graduated as a pilot, and did a tour overseas with 148 (RAF) Squadron. Back in Canada he left the Service but enlisted again in 1946.

In 1948 he was doing reconnaissance work as a pilot, transferred to 103 Search & Rescue Squadron, Greenwood, N.S., and finally joined 408 Photographic Squadron in 1951.

LANDINGS

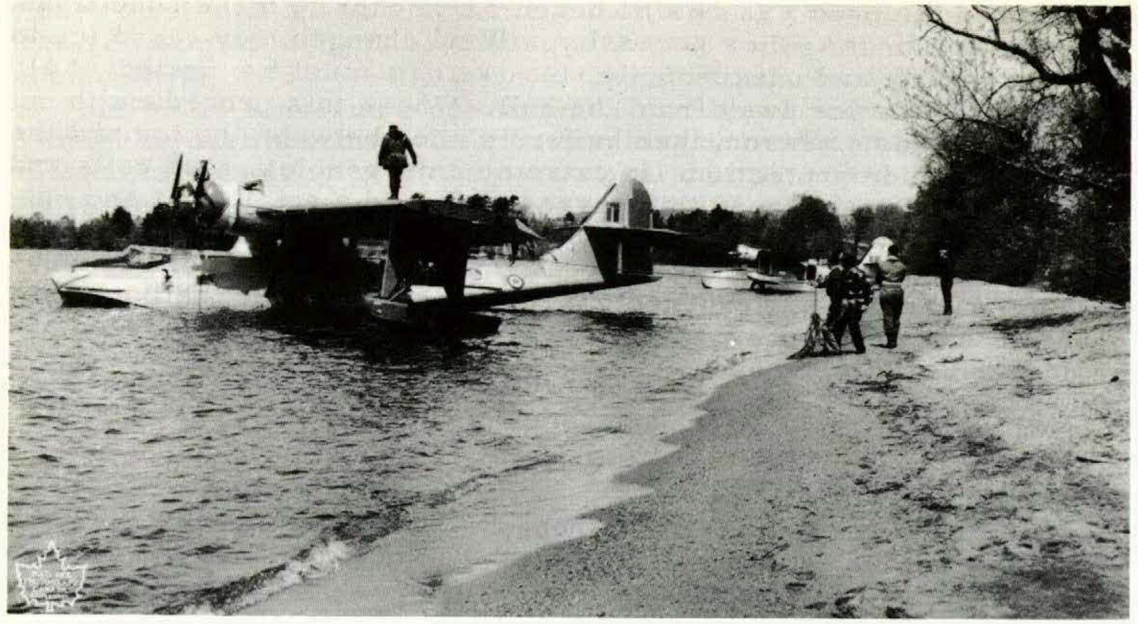
There are three common types of landing that can be completed safely in a Canso. The normal, power-assisted landing is usually preferred and this is routine landing into a wind whose velocity may range from 5 to 25 mph. In higher velocities, it is advisable to land the aircraft directly into wind, using a semi-stall technique. This means employing the type of approach used in a power-assisted landing, after which the aircraft is levelled off above the water and power is used to reduce the air speed close to the stalling point. Finally the throttles are closed and the stick pulled hard back to stall the aircraft into the water. This type of landing is not as dangerous as it might at first appear because impact speed is reduced (possibly 25 mph) by the wind and even further by the knife-shaped keel of the aircraft cutting into the waves at an angle of 45 to 60 degrees.

When wind velocity has been below 5 mph for a considerable time waves will tend to flatten out and water conditions will become what is termed "glassy". Descent toward and landing on glassy water at a distance from shore must be made on instruments—a precaution that is particularly necessary for the last two hundred feet. The reason for this is that it is practically impossible to judge height above glassy water. A roundout might accidentally be made while the aircraft is still 100 feet in the air and the resulting stall would more than likely prove fatal. Once on instruments the aircraft approaches touchdown at reduced speed and in a nose-high attitude. Landing is governed by the rate of descent which, for the last 100 feet, should not be more than fifty feet per minute. A faster rate of descent will generally cause the aircraft to "bounce out" of the water—and once an aircraft "bounces out" on glassy water there is no alternative but to overshoot and repeat the approach.

BEACHING

Northern operations, insofar as beaching problems are concerned, can be broken down into two classes: those below the tree line and those above the tree line. Generally, landings below the tree line call for the same routine as those in southerly latitudes where trees can be used to tie down an aircraft after a beaching has been completed. Above the tree line, securing the aircraft often becomes a difficult operation.

There are few securing facilities, but large rocks and bushes can be used; and where these cannot be found, the Canso's anchor can be taken ashore and "dug in" so that it may be used as a deadfall. Obstructions are usually spotted while the aircraft is in the air but an additional safety measure may be provided after touchdown by posting a man on each wing. By hand signals to another crewman using interphone, these lookouts can relay warning of obstructions to the pilot and avoiding action can be taken. When operating in strange waters, the posting of crewmen—together with the lowering of undercarriage—are usually the first precautions taken by the captain of the aircraft. The lowering of the undercarriage not only slows the aircraft down but, in high winds, will greatly assist in taxiing and manoeuvering.



There are no formal regulations covering beaching and securing in high winds so the procedure to be used is decided by the captain. In an onshore wind of 20 to 25 mph velocity, a sail-in type of beaching is customarily attempted, the aircraft being moved backwards toward shore by wind and waves. For this type of beaching, reverse rudder is used in order to maintain directional control. If the water is shallow the aircraft will be stopped by the lowered wheels before the tailplane is overlaid. Should it be expedient to move closer to shore the anchor can be dropped, the undercarriage raised and the aircraft permitted to drift by paying out anchor cable. Where wind velocity is in excess of 25 mph, the Canso's backward drift can be checked by leaving the engines idling at a low rpm.

Where offshore, high-velocity winds occur, a nose-on beaching can be managed easily. If tie-down facilities are absent, digging-in of the anchor on shore can again be utilized.

*

Early in the year it is often necessary to land on lakes and other open-water areas where ice is still present. Drifting floes, broken loose from large pans or shore ice by the action of a Canso's wake or running currents and tides, are an added hazard in northern water operations. Captains must take every precaution while taxiing and manoeuvering under these conditions or serious hull damage will result. Slow taxiing speed plus a bow lookout is the normal precaution.

When the need arises to beach or anchor in these conditions, extreme caution is again a necessity. Wind changes may cause ice to close in swiftly and unexpectedly. Lookouts must be posted at all times to steer ice away from the hull. Where this procedure is not possible for some reason, then buffers placed between the ice and the hull will provide protection. In extreme emergencies, rope coils and sleeping bags have served this purpose. Should a small boat and outboard motor be available, this combination is ideal for pushing smaller floes away from the aircraft—a method that can also be used to clear a takeoff path. The biggest enemy is transparent ice, for, unlike snow-covered floes which are easily spotted, it can remain as unseen and as dangerous as deadheads.

MAINTENANCE

After landings in salt water it is necessary that some action be taken to protect the Canso from corrosion. The best methods are to have the aircraft land in a fresh water lake as soon as possible—preferably on the return trip to base—and by flushing and washing the aircraft thoroughly.

*

Considerable damage can be done to anchors and anchor installations if an aircraft is subjected to heavy seas while standing offshore for loading and unloading. In some cases anchors are the only

means of combatting the heavy swells which threaten to drive the aircraft ashore. A sudden lurch may snap the cable itself or pull the anchor away from it. Canso hulls frequently receive serious damage during beaching or while the aircraft is sitting in a beached position.

Heavy swell and unknown shore conditions are the chief headaches. Replacement of hull plates, fitting of numerous small patches, and replacement of rivets—these are the principal repairs undergone in the course of a season's operation. Nose wheel doors are subject to damage through beaching, the ribs cracking or bending so as to prevent satisfactory closing of the nose wheel compartment. Replacement doors are the only remedy for this particular problem.

*

An engine failure or any major unserviceability at most northern points (other than an airfield base) creates a serious problem in respect to the supply of parts, personnel and equipment and the conduct

of maintenance work involved. Possibly we might end this account of our operations by citing a typical example—loss of an engine at Wager Bay in 1952. The new engine was flown in by another Canso which had to have its cargo door opening enlarged to permit the entry of the engine. Additional personnel had to be flown in via another Canso along with tools and special equipment required to carry out the replacement of the engine.

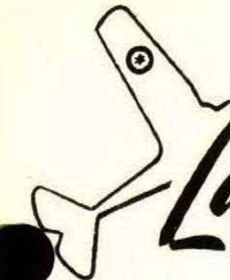
The aircraft bearing the new engine was beached first near a handmade dock of sand bags. The engine was removed with the aid of a portable crane which had to be pushed out over the dock; and engine and crane were then pushed back to shore. The Canso with the unserviceable engine was then beached near the sand bag dock and the engine removed and lowered to the ground, from where it was man-handled back to shore. The replacement engine was pushed back out to a position under the aircraft and raised with the aircraft engine gantry. Among the incidents which cropped up during the four-day period involved, high winds shifted the aircraft, necessitating the re-building of the dock at a different angle and the installation of planks in the sandy beach to prevent any further shifting of the aircraft. The tents used as living quarters collapsed during the spell of high winds and a heavy rain fell during the whole of one day. The unserviceable engine had to be left on shore as it was considered dangerous to attempt bringing it out. The takeoff run was not sufficiently long for a Canso to lift clear of the water burdened with the weight of an extra engine.

*

Aware of the many responsibilities connected with operations in the remoter sections of Northern Canada, Air Transport Command evinces considerable respect for the safety aspect of flying in its training program. To qualify for Canso ops, it is essential that a pilot know all the proper techniques peculiar to his job. For this reason he is scheduled to fly as first officer for from one to two years under a highly-experienced captain.

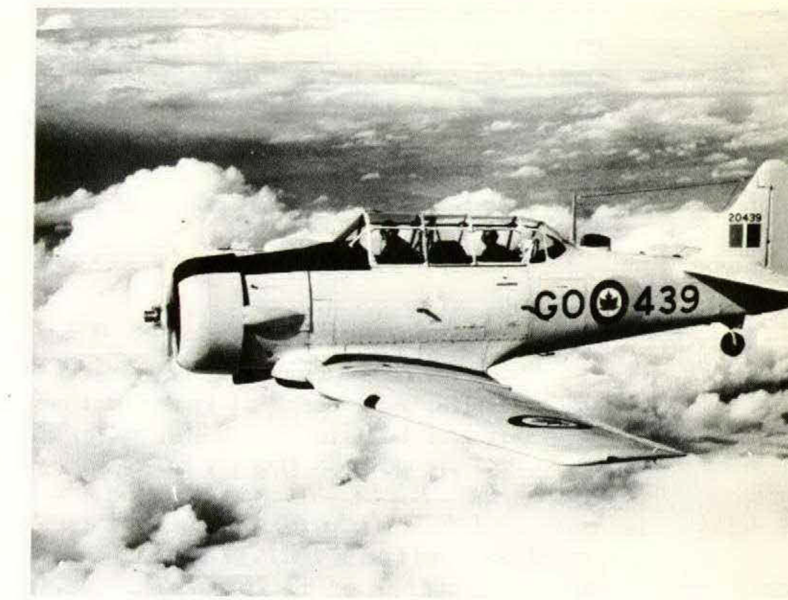
During this period, he undergoes continual training, the captain of the Canso acting virtually as a full-time instructor, passing on to his first officer all the benefits of his own methods and experience. ATC feels that in the period allotted for this training, the new pilot will assimilate sufficient knowledge that he will be fully prepared to anticipate most of the problems which he can be expected to encounter during the balance of his career in northern operations.

Even after he becomes a captain himself the Canso pilot is regularly subjected to a vigorous post-training program designed to assist him in maintaining a top level of performance. Senior members of his squadron make it a point to fly with him, frequently putting him through proficiency tests and flight checks. This process continues from the time the pilot becomes a captain until the day he leaves his command—a concrete example of the important role which Flight Safety plays in contributing to the success of Canso operations in northern waters.



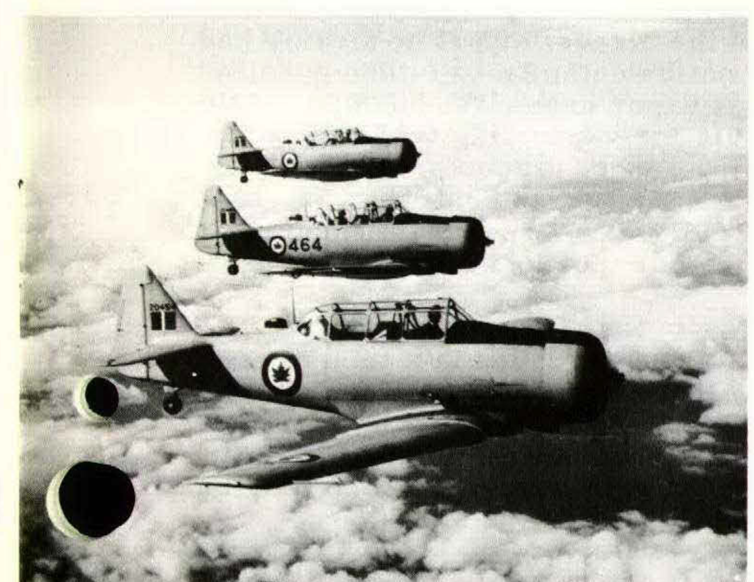
Last Harvard out in April

The last Harvard will be trundled from the assembly line of Canadian Car and Foundry, Fort William, in mid-April ending another era in the history of this time-honoured aircraft.



While the assembly jigs will be stored away to make room for new production programs, manufacture of spare parts is expected to continue for at least a year. Cancar delivered its first Harvard in 1951 and has produced almost 600 for the RCAF the USAF and NATO countries. This latest production run is the second for the Harvard in Canada. During the war Noorduyn Aviation turned out 2,775 between 1941 and 1945.

The Harvard has entered the select class of "timeless" aircraft which, like the venerable DC-3 Dakota, still are doing an efficient job after years of service which have seen flashier models come and go.



Designed by North American in the U.S., the Harvard flew first in 1938 and entered production the following year. Thousands of pilots earned their wings on Harvards during the war and learned to love and respect its flying capabilities. Its throaty snarl is now familiar all over the world. In Korea, Harvards did operational duties never expected of them. They functioned as "mosquito bombers," flying in low on enemy targets hidden in the Korean hills and marking their location with smoke rockets so that they could be pin-pointed by high-flying jet fighters.

(AITA "Air Age")

storage and handling of JET FUELS

The common concept of jet fuel is that it is little more than kerosene, not volatile, and hence, that it does not require cautious handling. The purpose of this article is to abolish that belief and list some of the precautions which are necessary when handling jet fuel.

JET FUEL GRADES

Various grades of jet fuel have evolved during the development of jet engines, in a continuing effort to insure both satisfactory performance and adequate supply. Grade JP-1 is basically kerosene. Grades JP-3 and JP-4 are basically blends of petroleum fractions similar to gasoline and kerosene, but the blends impart to the finished fuel certain characteristics that may not be common to either gasoline or kerosene alone, such as volatility, vapor pressure, burning qualities and flammable range. Volatility is the vaporizing tendency of the fuel, as indicated by its entire boiling range. Vapor pressure is the pressure that the fuel vapor exerts when the fuel is confined at a given temperature, and is indicated by Reid Vapor Pressure measured at 100°F. Flammable range is the range of vaporized fuel and air mixtures that can be readily ignited.

The vapor space above Grade JP-1 and kerosene in a tank at normal ground temperatures is below the lower flammable limit. The vapor space above Grade JP-3 and aviation gasoline in a tank at normal ground temperatures is usually above the upper flammable limit. On the other hand, Grade JP-4 produces atmospheres which may be flammable under these conditions.

Specifications for the various grades are as lenient as possible to permit maximum production. This allows a wide latitude in characteristics for a given grade.

*

Grade JP-1 fuel was the original low freezing point kerosene type on which jet engines were first developed. It has a minimum flash point of 100°F, and a Reid Vapor pressure very close to zero. The flash point is the temperature to which the fuel must be heated to cause it to give off vapors that can be ignited. Grade JP-1 fuel, because of its limited availability and because of engine starting difficulties at very low temperatures, has become obsolete for military use.

*

Grade JP-2 was an experimental product which was never adopted. It is therefore disregarded here.

*

Grade JP-3 fuel, with a Reid Vapor Pressure of five to seven psi and a flash point of about -40°F, superseded Grade JP-1 because of increased availability and improved cold-starting characteristics. This grade has handling characteristics quite similar to aviation gasoline. Its one adverse property was high fuel loss through aircraft fuel tank vents during high rates of climb, due both to vaporization and to entrainment of liquid fuel with the escaping vapors.

*

Grade JP-4 fuel, with a Reid Vapor Pressure of two to three psi and a flash point of about -35°F, has superseded Grade JP-3 as the standard military jet fuel in order to reduce the excessive fuel losses experienced with JP-3 fuel. These types of fuel losses dictated the low vapor pressure requirement as compared to Grade JP-3 and aviation gasoline. Grade JP-4 has somewhat less availability than Grade JP-3, but it is considered adequate.

*

Grade JP-5 is a kerosene-type fuel that is specified only for limited Navy use. It is therefore disregarded here.

Whereas aviation gasoline contains tetraethyl lead, has controlled anti-knock value (octane number), and is dyed for identification, jet fuel contains no tetraethyl lead, has no anti-knock requirements, is undyed. The vapors of aviation gasoline and jet fuels will ignite at about the same temperature. Jet fuels have higher average boiling points than do aviation gasolines, so that they will not evaporate as rapidly as do aviation gasolines.

Fire Hazards: Volatility Effects

Grade JP-1 fuel which is of the kerosene type, is relatively non-volatile. Under normal ground temperatures and atmospheric pressures, the vapor in the space above the liquid in fuel tanks is too lean to support combustion. Relatively warm fuel, however, when carried to high altitudes where atmospheric pressure is low, will form flammable mixtures above the liquid in tanks. When spilled on hot surfaces such as exhaust pipes or hot runways, this fuel will vaporize sufficiently to form combustible vapor in the vicinity of the spill.

All grades of jet fuel as well as aviation gasoline and lubricating oil, when heated to their ignition temperature in the presence of air, will form flammable vapor mixtures which will ignite due to an open flame, an electric spark, or any hot body such as an exhaust pipe.

Grade JP-3 fuel, which is of the gasoline-kerosene type, is highly volatile. At sea level pressure and temperatures above plus 20°F, the vapor above the liquid in tanks will probably be too rich to support combustion but will burn at filler necks or vents where it becomes diluted with outside air. At sea level pressure and temperatures between plus 20°F and minus 40°F, a flammable air-vapor mixture will probably be present in the space above the liquid in the tanks. In the vicinity of spills, a combustible vapor will nearly always be present.

Grade JP-4 fuel, which is also a kerosene-gasoline type, is of intermediate volatility. At sea level pressure and temperature ranges of plus 80°F to minus 10°F, combustible vapors will occur above the liquid in storage tanks. Under these conditions, any ignition which occurs within the tank will cause violent combustion. Similarly, any ignition at filler necks or vents will travel into the tank and cause violent combustion. This fuel is therefore hazardous to handle under normal storage conditions, but past experience in storing solvents having the same vapor pressures as Grade JP-4 fuel has demonstrated that under normal conditions the fuel can be stored safely in ordinary fuel tanks as long as all possible precautions are taken to avoid sources

of ignition. Where advisable, the vapor space in tanks can be eliminated by the use of floating-roof, floating-diaphragm, or water-displacement type tanks.

JET FUEL CHARACTERISTICS

GRADE	Aviation Gasoline	JP-1	JP-3	JP-4
Reid Vapor Pressure, psi	5.5-7.0	0	5-7	2-3
Flash Point, °F	-40	110 min.	-40	-35
Gravity °API	68	35 min.	45-63	40-58
Specific Gravity at 60°F	0.71	0.85 max.	.727-.802	.747-.825
Approx.Boiling Range, °F	100-338	300-572	100-600	135-550
Aromatic Content, per cent	2-20	20 max.	25 max	25 max.
ASTM Gum, mg/100ml.,max.	3.0	5.0	10.0	10.0
Accel.Gum, mg/100ml.,max.	6.0	8.0	20.0	20.0

Static Electricity Accumulation

In pumping any fuel through servicing hose, a static electric charge may be built up. The amount of this charge increases with high linear rate of fuel flow such as is required for servicing jet aircraft as well as aircraft of any type with large fuel capacity. This accumulation is greater with the higher specific gravity and wider boiling range jet fuels than it is with aviation gasoline. Strict compliance with required precautions as to electrical grounding or bonding of servicing equipment and the aircraft being serviced is absolutely essential.

Fire Extinguishing

Extinguishing of jet fuel fires may be accomplished by the same means, with the same equipment and through the use of the same extinguishing agents as are used for the extinguishing of aviation gasoline and other petroleum fires. Refuelling equipment should always be so located with respect to the aircraft being serviced, that the equipment may be quickly driven or towed away in the event of fire.

Health Hazards

Jet fuels do not contain tetraethyl lead. However, they may contain more toxic aromatics than aviation gasolines. They should therefore be handled with the same health precautions as apply to leaded gasolines. They should not be used for cleaning purposes. Excessive inhalation of the vapor and excessive skin contact should be avoided. The skin should be washed thoroughly with soap and water immediately after jet fuel has been spilled on it. Clothing on which jet fuel has been spilled should be removed as soon as possible and thoroughly laundered.

Spillage On Asphalt

Since jet fuels tend to soften asphalt and do not evaporate as rapidly as aviation gasoline, spillage on asphalt paving should be avoided.

Contamination

(a) Foreign Matter

Jet engine control systems handling jet fuel are high precision mechanisms that will not function properly when the fuel is contaminated with foreign matter such as dirt, water, rust or scale. Even very minute dust particles may accelerate clogging of fuel filters, not only because of the dust itself but also because each particle acts as a nucleus around which ice crystals may form. Entrained water will not settle as rapidly from jet fuel as from gasoline because of the higher specific gravity of the jet fuel. Due to the larger temperature differentials experienced in jet aircraft operation over that experienced in piston engine plane operation, the entrained and even dissolved water in the jet fuel is a more critical problem.

(b) Aviation Gasoline

Contamination of jet fuel with a moderate proportion of aviation gasoline will not normally affect jet engine performance. On the other hand, a very small amount of jet fuel can contaminate aviation gasoline to such an extent that its anti-knock value is reduced and may seriously affect its operating performance. The amount of contaminant may be so small that it cannot be detected except by laboratory analysis.

(c) Lubricating Oil

Slight contamination of jet fuel by piston or jet engine lubricating oil should not cause trouble, but such contamination should be avoided whenever possible.

(d) Hydraulic Fluids and Other Specialties

Any contamination of jet fuels with hydraulic fluids and other specialty products, many of which are non-petroleum in origin, may seriously affect performance and should be avoided.

STORAGE AND HANDLING EQUIPMENT

Segregation of Systems

Jet fuel storage tanks must be kept separate and distinct from other storage tanks. No manifold connections should be permitted between jet fuel tanks and any other tanks. Similar precautions to insure segregation must be taken with drums, pipelines, and dehydrators, and at tank and truck fill stands and hydrant outlets. Refuellers, hydrant carts, pits and cabinets should be assigned exclusively for jet fuel use. Under no circumstances should jet fuel and aviation gasoline be alternately carried in, or serviced from, a refueller or hydrant cart, nor should both fuels be carried simultaneously in separate compartments of any one refueller, to avoid the possibility of delivering the wrong product. Tank vehicles or tank cars which have been used in jet fuel service must be thoroughly cleaned, flushed, and inspected before they are used in aviation gasoline service. These precautions may not be so critical when converting from aviation gasoline to jet fuel service from the product contamination standpoint; however, these tank vehicles or tank cars should also be cleaned, flushed, and inspected to be sure that the jet fuel will not be contaminated with foreign matter such as dirt, water, rust or scale.

Identification Marking

All jet fuel storage tanks, tank shut-off valves, and similar controls should be conspicuously marked to indicate that they are for jet fuel, of grade clearly shown. All refuellers, hose carts, and cabinets, operational controls on dispensing equipment such as compartment valve controls, nozzles, etc., as well as hose reels, and covers of hydrant boxes and pits, should be similarly marked.

Filtration and Dehydration

Large capacity filters no coarser than 10 microns (RCAF—5 microns) in rating should be used on all refuellers, hose carts, cabinets, and pits to minimize aircraft fuel filter clogging or other malfunctioning. (One micron is 1/1000 millimeter or 1/25400 inch).

Packings, Gaskets, and Hose

As long as jet fuels do not contain more than 0.005 per cent of mercaptan sulfur, the same types of synthetic rubber packings, gaskets, and hoses which are satisfactory for use with aromatic aviation gasoline may be used.

Fuel Tank Rusting

Jet fuels themselves are considered non-corrosive. Some jet fuels, particularly the JP-1 type, have been reported to allow more rusting of fuel storage tanks than occurs with aviation gasolines. Some jet fuels act like penetrating oil and tend to loosen rust and scale more than does aviation gasoline. The vapor space above low-volatility jet fuel such as Grade JP-1 in storage tanks will contain a higher concentration of atmospheric moisture than will aviation gasoline because of the low concentration of petroleum vapors, which will increase the rusting tendency. Finally, the higher specific gravity of jet fuels results in their ability to hold fine rust particles in suspension to a greater degree than will aviation gasoline so that rust may be more evident because it is suspended instead of all settling at the bottom of the tank.

Fuel Tank Cleaning

Jet fuel tanks as well as lines must be thoroughly cleaned before placing in service and after placing in service when check of filters indicates an abnormal accumulation of rust or foreign material. When it is necessary to clean or make repairs to a tank which has contained jet fuels, the same methods should be followed as prescribed for cleaning gasoline tanks in Section B of API Accident Prevention Manual 1-B. The same hazards must be recognized and the same precautions taken in cleaning undeground tanks as for cleaning aboveground tanks.

Aircraft Fuelling and Defuelling

In general, the same precautions are necessary for fuelling and defuelling jet aircraft as are used in defuelling piston-engine aircraft. Some of these precautions are as follows:

1. Conduct all fuel operations outside and at least 50 feet from any building or aircraft.

2. Do not conduct fuel or defuel operations within a radius of 100 feet from aircraft radio or radar transmitting equipment or within a radius of 300 feet from ground radio or radar transmitting equipment during the time such equipment is in operation.

3. Disconnect at the ramp outlets all light and electrical cords connected to the airplane before starting fuel operations.

4. Floodlights and flashlights of an approved explosion-proof type are to be used for illumination. All other type flashlights are to be banned from the field.

5. Allow only such power as is necessary to the immediate fuelling or defuelling operation on the aircraft. The ground power unit should be parked properly as far from the aircraft as possible. Entire length of power cable will be used. Only approved power cables with a minimum length of 50 feet should be used.

6. Refrain from operating any electrical switches in the airplane except those necessary for the fuelling or defuelling operation.

7. Prohibit any open flame devices except reciprocating or jet engines within the area of the airplanes adjacent to the aircraft being fuelled or defuelled. These devices include:

   a. Exposed flame heaters of any type;

   b. Welding or cutting torches, lead pots, and any such device;

   c. Flare pots or other flame lights;

   d. Lighted smoking materials.

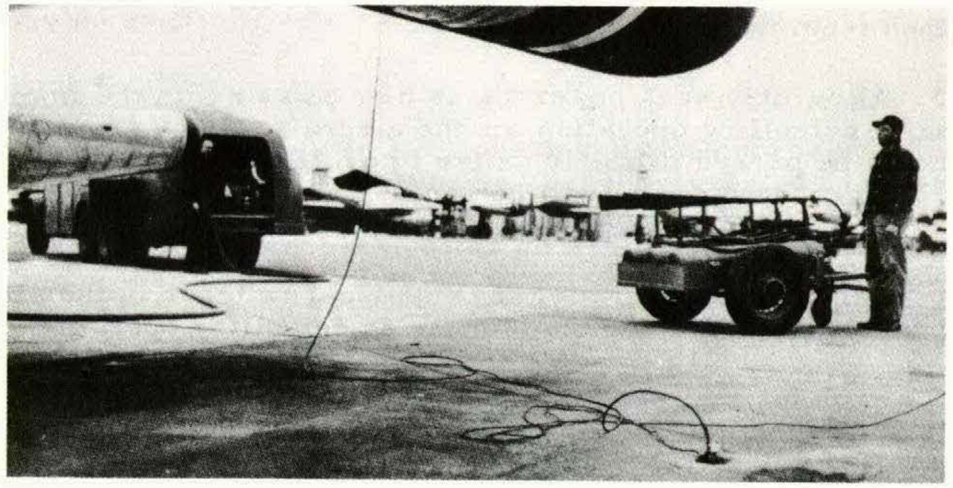
8. The aircraft engines should not be operated during fuelling operations.

9. Remove scaffolding, tool carts, or any object liable to obstruct or prevent free movement of personnel or servicing equipment.

10. Servicing stands must be properly grounded and free of tools and other articles which, if dropped, could generate a spark.

11. Personnel required for the fuelling operation or other work during fuelling operations should be held to a safe minimum consistent with requirements. No personnel should be allowed to work in areas where entrance or exit is restricted.

12. Personnel in the vapor area must not have any type of matches or lighters on their person, shoes with nails and metal clips, exposed metal buttons, key chains, or tools.



Proper Grounding

13. Grounding should be accomplished in the following sequence:

a. Attach the grounding cable to the airplane, then to an approved and identified ground.

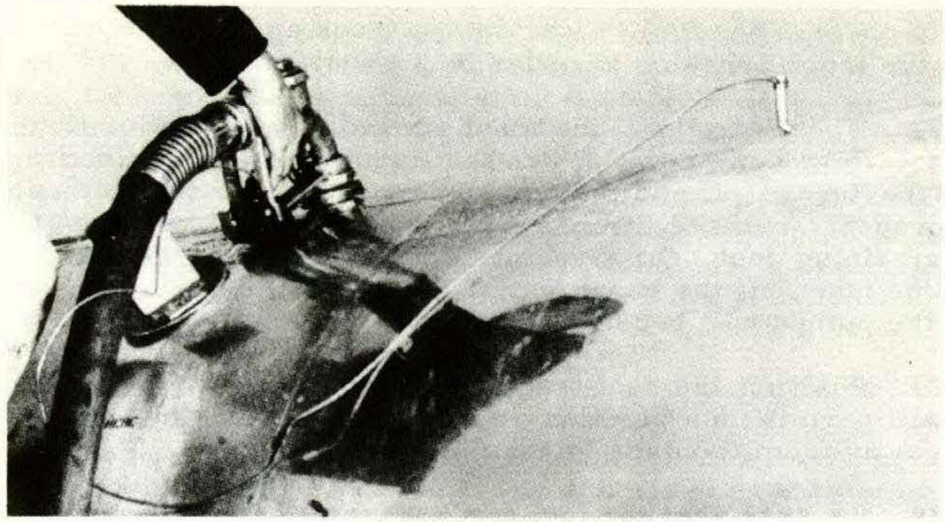
b. Attach the grounding cable to the truck and then to the same approved and identified ground being used for the airplane.

c. Ground the fuel hose to the airplane.

d. Disconnect truck grounds in reverse order of attaching when fuelling operation is completed.

NOTE: Grounding equipment sometimes develops high resistance or breaks. Check all refuelling equipment frequently, to be sure that all grounds are continuous and within acceptable resistance values.

14. Bond the fuel hose nozzle ground in positive contact with the aircraft before the fuel tank filler cap is removed, and be sure that the bond is maintained throughout the fuelling operation until the filler cap is replaced. Personnel handling the nozzle should discharge static from their person before handling or touching metal in the vapor area.



Precaution Often Forgotten

15. Assign adequate manpower to shut off all servicing equipment in case of emergency.

16. Make certain that fire fighting equipment is available and properly manned.

17. Under no circumstances should the nozzle be blocked in an open position. Nozzles shall be of the self-closing type and manually operated at all times.

18. Use the utmost care in topping-off fuel tanks to prevent overflow, as this is a particularly hazardous operation.

19. In the event fuel spills to the ground, the fuelling equipment should be shut off immediately. No electrical or automotive equipment in the area should be operated until it is determined that safe conditions again exist. Small amounts of spillage may be absorbed by cotton rags or oil absorbents. Large spills should be blanketed by foam or washed away with water and allowed to evaporate completely before the area is again used. Do not use metal-backed mops or brooms to clean up spills on concrete surfaces. All mops and rags should be of cotton material.

20. Suspend all fuel operations during electrical storms, a fire, or aircraft crash or crash warning. In such case, fuel hoses shall be disconnected and fuel trucks shall leave the area.

21. When defuelling, a man shall be stationed on top of the fuel truck to observe the fuel level in the truck and be in a position to signal the truck operator in order to prevent overflow.

22. When defuelling, the boost pumps may be used until the flow indicator light comes on. When the light comes on, the boost pumps should be turned off and the remainder of the fuel drained manually. Only properly marked and grounded containers may be used to drain this remaining fuel. On airplanes not having indicator lights, power should be taken off the boost pumps before the fuel reaches a point at which the pumps will become exposed.

23. Position the fuel truck as far from the airplane as the fuel hose will permit, in a position so that the fuel truck may be towed or driven away from the area in case of an emergency.

24. Be sure that the fuel truck attendant is properly located at all times during fuelling or defuelling operations. Fuel truck attendant must not leave the truck while it is connected to the airplane.

*

Observance of the preceding precautions will minimize the danger involved when fuelling or defuelling airplanes with jet fuel or aviation gasoline.

NOTE

''Flight Comment'' is indebted to the U.S. Air Force for permission to reprint the foregoing article which first appeared in the February 1954 issue of ''Aircraft Accident and Maintenance Review.''

Small liberties have been taken with the original text—to the extent of altering ''should'' to ''must,'' for example—where the procedure discussed is laid down as a requirement in RCAF EO's.

*

In reviewing this article for the applicability of its content to RCAF operations, the Directorate of Materiel Maintenance has provided us with additional information. Apparently not too much is known as yet about the static generating potential of JP fuels except that it is greater than that of aviation gas and is consequently more dangerous and requires more careful handling.

Contrary to popular belief (we were informed by DMM) static is not more easily generated on cold, dry days than on hot, humid days. The truth is that humid air generally tends to dissipate a charge before it builds to a high potential. An example cited dealt with discovery of the confirmed cause of one fuel tender fire.

The vehicle was being refilled from bulk storage via the manhole on top of the tank. The day was hot and humid with intermittent low thunder storms. During fuelling, the manhole cover rested on top of the tank body but was insulated therefrom by its synthetic rubber gasket. Passage of a thunder cloud charged the entire vehicle with an opposite potential but bonding of the vehicle to ground dissipated this charge—except for the cover. The driver then picked up the cover. As he went to replace it, a static spark—which the driver saw—jumped between cover and tank and ignited the load. The exact circumstances were duplicated in a research laboratory and a scale-model refueller was repeatedly ignited from an artificial cloud of silk previously charged.

*

DMM also informs us that: ''Chains dragged behind refuelling tenders for the purpose of dissipating static are useless. Three RCAF tenders tested by National Research Council not only showed varying potential between different parts of the vehicle due to poor bonding but also that the 'static chain' had a resistance of 2×10^6 ohms. An enormous charge could be built up during travel and could well be dissipated where it would do the most harm—at the fuelling nozzle. The only safe way to handle tenders is to bond from tank to ground and aircraft to ground etc.—procedures covered by the appropriate EO's. Steps are being taken to improve bonding between various parts of tenders and thus make the cable bonding to ground and aircraft more effective.''

—•—

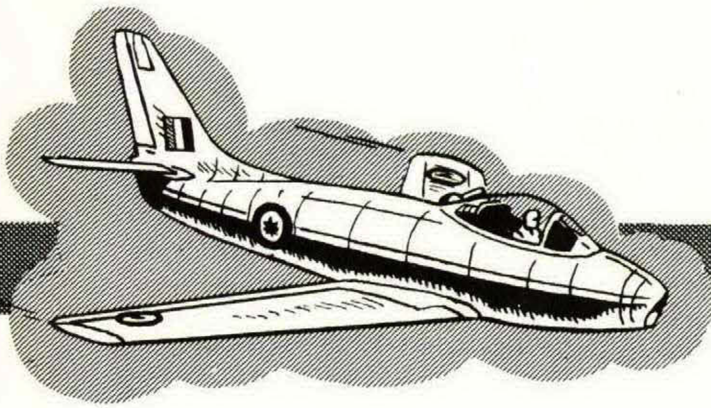
ONE DEFINITION

What is the significance of safety in a democracy? Safety is not just the saving of life or the prevention of suffering. Safety is not just the science of recognizing the consequences of an unsafe act or an unsafe design. Safety is not just a means to preserve wealth or protect capital investments. Safety is not just a means to reduce the cost of insurance. Safety is not just a means to avoid interference with production or operational efficiency. Safety is not just a means to escape public recrimination when disasters occur. Safety is not just a means to win public acceptance of air transportation.

Safety has much greater significance than any or all of these. It is an expression of a way of life and living which distinguishes man from animal, intelligence from ignorance. It is a manifestation of both our ethical and technical civilization.

- Institute of Aero Sciences -

Accident Resumé



SABRE

SLIGHTLY CONFUSED

The pilot was flying in a formation which had been carrying out a cine-gun exercise above an overcast. Arriving over the outer beacon, the leader and wingman commenced a "pipeline" letdown. This pilot was to follow after another orbit. However, he became disoriented and failed to synchronize his C2 type gyrosyn compass with his standby compass. He also failed to correctly identify the inner beacon, so that when he let down through cloud, he did so on a reciprocal heading, homing on a distant radio range. Breaking cloud through a low overcast over water, he realized his error and went over to his standby compass.

Unable to contact base or homer by radio at his low altitude he headed for an alternate landing field. Another pilot contacted him at this time, and on learning his low fuel state advised a bail-out. But the pilot elected to force land, and shortly afterwards, his engine flamed out. He overshot his selected field and ploughed through some trees before coming to rest uninjured.

Blame for this accident has been placed on the pilot because he neglected to take necessary precautions before commencing his let-down, and failed to utilize his equipment to full advantage.

UNTRIED SOP

The pilot was manoeuvring for position, preparing to carry out a simulated attack on a bomber from 24,000 feet. Suddenly, in a moderate turn, the aircraft flicked into a roll to the right and dropped into an inverted spin. The pilot tried normal spin recovery, which proved ineffective; but recommended recovery action for inverted spins was not attempted. The aircraft was finally abandoned at 7,000 feet and the pilot made a successful parachute descent.

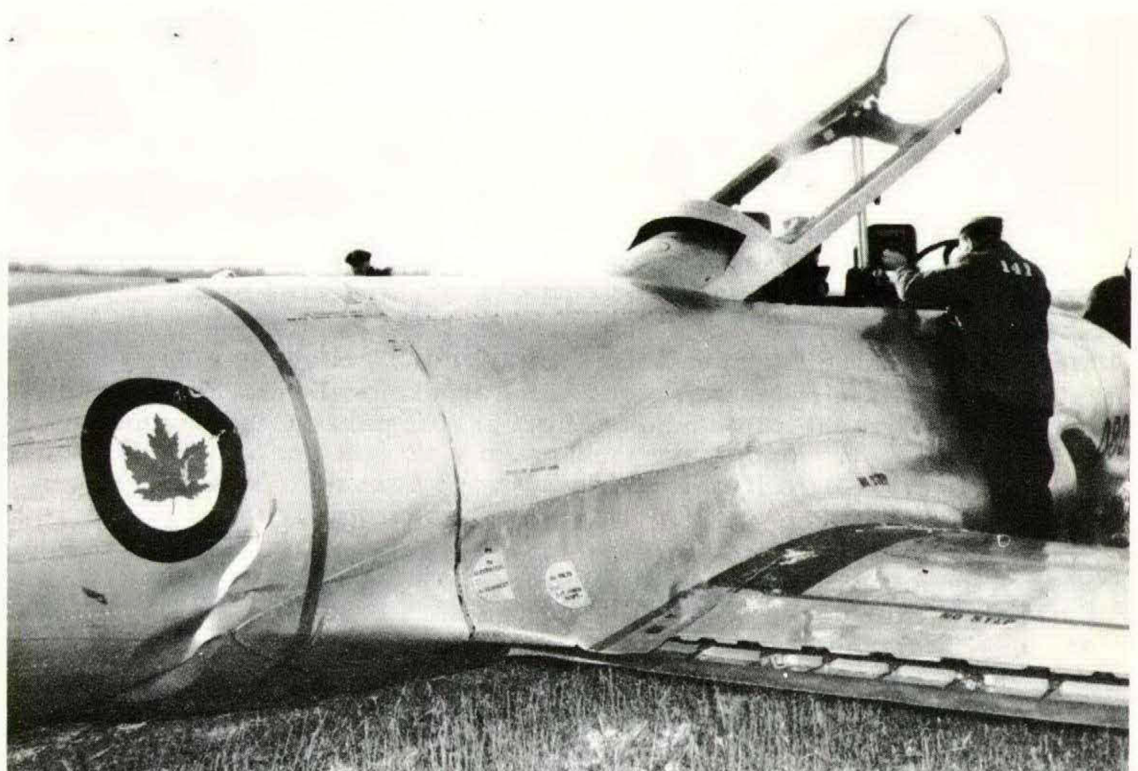
when you have time

TRY EVERYTHING ONCE!

T·33

JOINT-SPONSORED FLOP

A student on first solo was briefed to remain VFR; weather was reported 2500 feet broken, 15 miles visibility, with a higher over-cast. The pilot climbed through a large break in the cloud and lost visual contact with the airfield. Later, he attempted to home to base below cloud using the radio compass, but when he failed to see base after three such attempts he decided the instrument was unserviceable and circled, calling for an ADF homing. Fuel by now was running low. Tower reported the homer unserviceable, and advised him to call GCA.



The GCA operator, unaware of the urgency of the situation started him on a normal approach, but the pilot became panicky, and

inadvertently kept the transmitter button depressed so that reception was cut off; finally he broke off when six miles from base. An instructor managed to contact him and instructed him to climb, but shortly afterwards the engine flamed out and the pilot force landed in a stubble field. Chief responsibility for this accident lies with those who sent the student off in somewhat poor cloud conditions, and kept inadequate track of his progress. However, he did manage a few rather obvious blunders himself.

DUFF ADJUSTMENT

During a descent after a routine flying exercise, the pilot opened the speed brakes to slow the aircraft down. As the brakes extended, a loud bang was heard. Examination of the aircraft on the ground revealed that the starboard dive brake casting had broken. This was attributed to the improper adjustment of the actuator arm after the rubber bumper stops had been removed.

COSTLY FAILURE

On an instrument flying exercise above cloud the aircraft's radio compass became inoperative and the aircraft was brought over base by ADF. A GCA procedure commenced but the GCA unit failed to pick up and identify aircraft on the scope. A letdown to a minimum safe altitude was carried out and an attempt made to reach base by ADF. At this point VHF trouble developed: the aircraft was receiving only. The aircraft climbed on top and a large hole in the cloud appeared. Letdown was made through the hole and the aircraft set course for base, VFR.

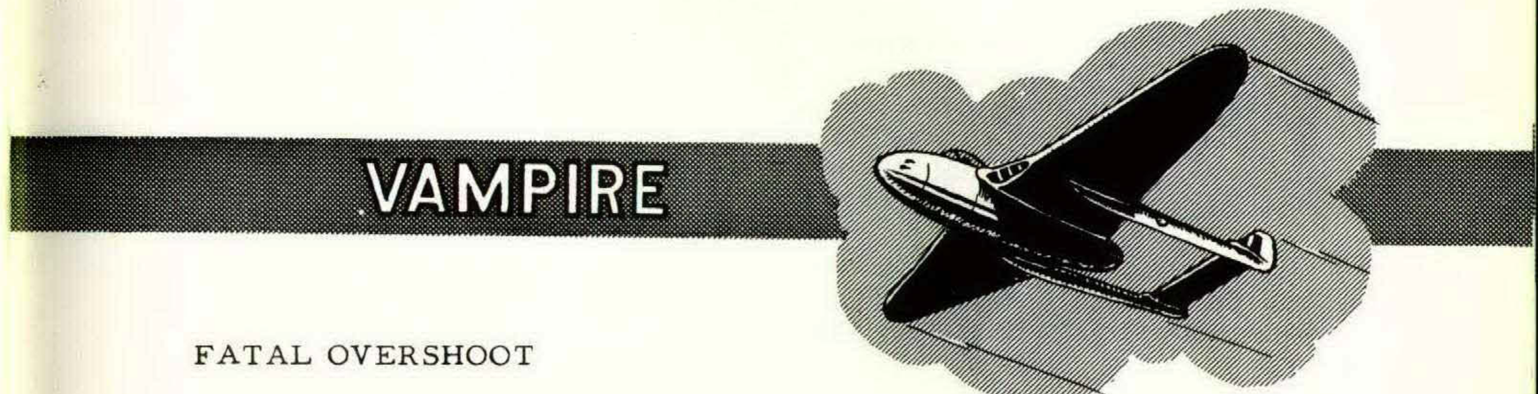
The weather then deteriorated to below VFR limits and the pilot climbed on top, returned to the hole in the cloud, descended, and set course for another base. Enroute a landing strip was sighted. With fuel running low and weather marginal, the pilot decided to land. After inspecting the field closely he made a wheels-down landing. Difficulty was experienced in maintaining direction on the landing roll because of a weak starboard brake and normal deceleration was impossible. The aircraft ran off the end of the 2,000 foot turf runway and was halted when the nose wheel collapsed on striking a shallow ditch. There is reason to believe that the radio compass failed due to insufficient voltage. The VHF set became unserviceable when the band change mechanism stuck.

OVERSTRESS AND FLAMEOUT

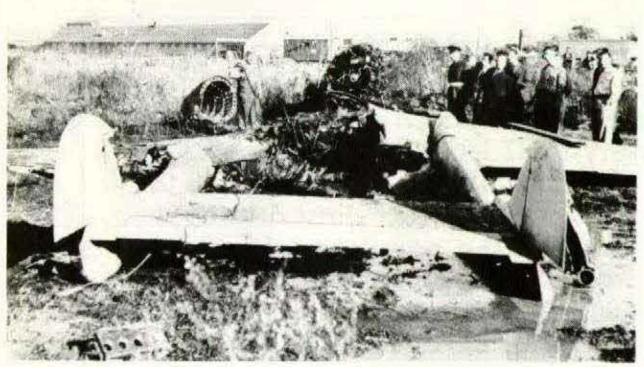
The pilot was performing solo aerobatics when he stalled, imposed negative G on the aircraft, starved the engine of fuel, and caused a flameout. Three attempts were made to relight the engine, all without success, so a wheels-up forced landing was carried out in a fallow field. Aileron boost was lost just before the landing, but no control difficulties were experienced.

WATCH THOSE DZUS FASTENERS!

Loss of power, high tailpipe temperature and excessive fuel consumption were noted during a flight. An emergency landing was successfully completed and a subsequent inspection revealed that the starboard plenum chamber inspection panel had not been secured and was lost in flight. The primary assessment in this accident is "Maintenance" because only one out of 17 Dzus fasteners has been properly secured following a special inspection. Tradesmen, supervisory personnel and the airman responsible for the DI all failed to notice the error. Secondary assessment is "Pilot Error" because the pilot failed to ensure during his pre-flight external check that the panel was securely fastened.

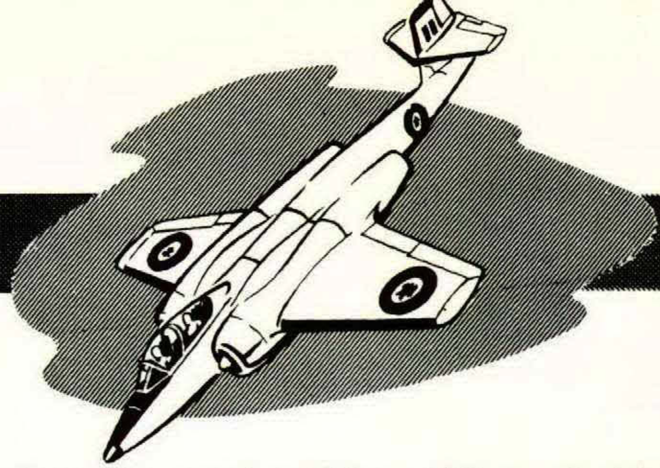


FATAL OVERSHOOT



The pilot took off on an authorized high-level cross-country flight. Ten minutes after take-off, witnesses reported seeing a white puff of smoke or vapor in an otherwise clear sky. One witness saw a Vampire fly out of the puff. Shortly after, the aircraft was seen S-turning, preparatory to landing. The aircraft approached downwind high and fast, overshot the runway, struck an open ditch 340 feet from the end of the runway, and caught fire. The pilot was killed instantly.

CF-100



ARRIVING TOO EARLY

The aircraft was returning to base under IFR conditions at night. During GCA procedure the pilot was informed that the runway in use had been sanded and that braking action was fair. He was carrying out his procedure at air speeds 10 to 15 knots above normal to compensate for a heavy fuel load. The aircraft went below the glide path at 1 mile out on final; ceiling was 800 feet and visibility 3 miles. When GCA began telling him that he was coming over the button, the pilot closed both throttles. The aircraft sank immediately and touched down heavily 30 yards short of the runway.

After running approximately 10 yards, the starboard wheel struck a large rock, the top of which was level with the ground. The complete wheel and brake assembly broke off and then the leg collapsed. The aircraft gained the runway but, due to the condition of the starboard undercarriage, swung off the starboard side and came to rest on a heading approximately 90 degrees to that of the runway.

On descent through cloud the ice warning light had not come on and the windscreen had not iced-up—but on leaving the aircraft, the pilot noted light icing along the leading edge of the wing.

* * *

DISCIPLINE AND LIBERTY

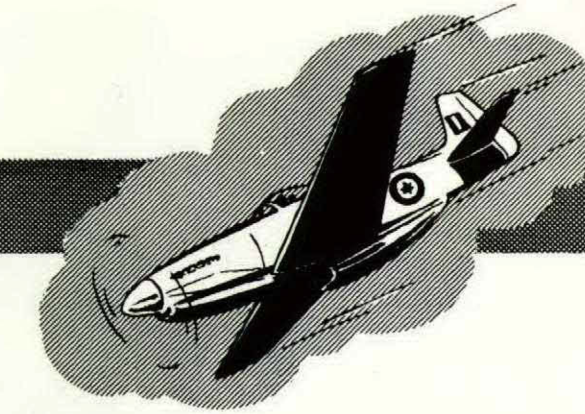
"It is only discipline that enables men to live in a community and yet retain individual liberty. Sweep away or undermine discipline, and the only law left is 'that they should take who have the power; and they should keep who can!'. Security for the weak and the poor vanishes. That is why, far from it being derogatory for any man or woman voluntarily to accept discipline, it is ennobling. The self-discipline of the strong is the safeguard of the weak".

Field Marshal Sir William Slim

QUIT WHEN YOU'RE AHEAD

After touchdown the pilot applied brakes and the aircraft immediately veered to port. Operation of the starboard brake straightened the aircraft; but when both brakes were applied a second time the aircraft again veered to port and full right brake was required to stay on the runway. The pilot then attempted to stop the aircraft by differential application of both brakes. However, calculating his deceleration to be insufficient to stop him before he reached the end of the runway, he chose to run off the port side onto sand. At the last moment he noticed a mound of crushed gravel which he was unable to avoid; and the nose gear struck it and collapsed. The pilot—who had been carrying out instruction at another aerodrome where there were longer runways—was aware, prior to his return to base, that the starboard brake on his aircraft was weak. As for the gravel, contractors had been requested to remove it prior to the accident but had not done so.

MUSTANG

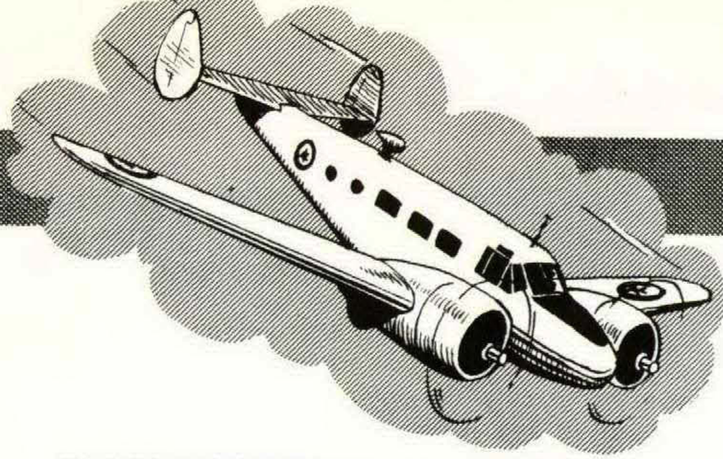


LAST GAMBLE

On a low-level, cross-country exercise, low cloud and poor visibility conditions were encountered although they had not been forecast. The pilot, hoping to pick his way through the low cloud, continued the exercise. When extremely low cloud was encountered a 180° turn to port was commenced. During the turn, the port wing struck tree tops and the aircraft crashed. The accident is assessed "Pilot Error".

TOO LOW IN POOR VISIBILITY

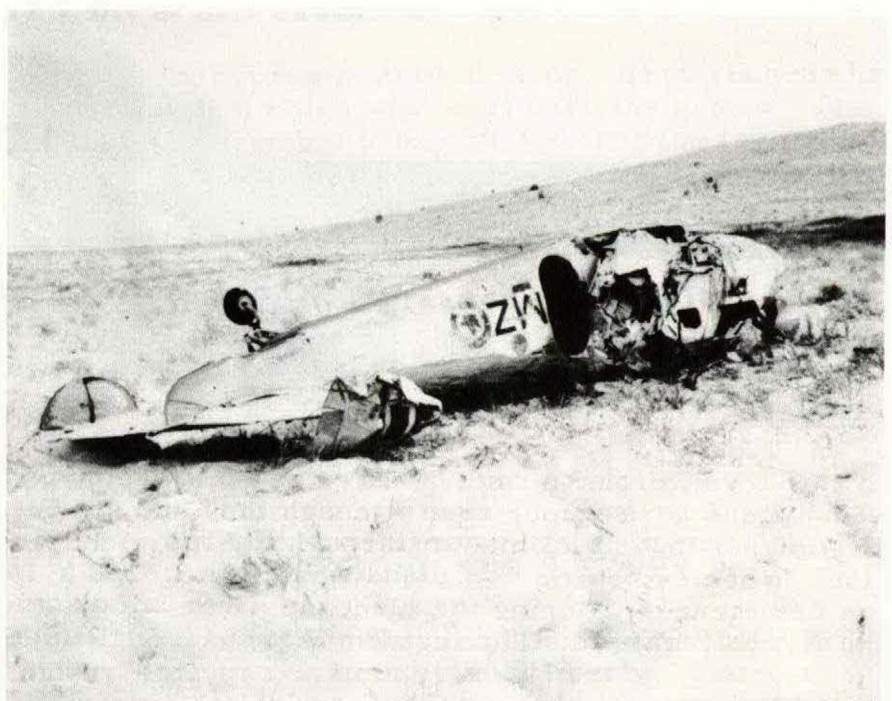
The aircraft was being flown at a low altitude, over calm water, in poor visibility conditions. While executing a 180° turn to starboard the pilot climbed slightly and, on rolling out of the turn, commenced a gradual descent. Then, apparently realizing he was too low, he attempted to climb. The tail struck the water, and the aircraft bounced and crashed, killing the pilot.



EXPEDITOR

COMPASS TROUBLE IN SNOW

The pilot of this aircraft was attempting a radio beacon approach under IFR conditions. Apparently he erred in his interpretation of the radio compass which was oscillating because of precipitation static caused by a light snowfall. He held his heading too long before turning on final, overflew the correct track to make the field and crashed

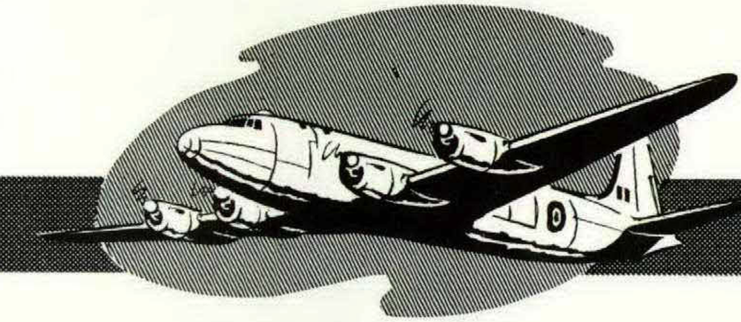


into the hills west of the airfield. The pilot, co-pilot, navigator and a service passenger were all seriously injured. It is important to understand the limitations imposed on a radio compass by snow precipitation.

COMPLETE THAT 180!

The pilot had been detailed to ferry an Expeditor—one of a formation of five aircraft—on a long cross-country with one overnight stop. Enroute this pilot reported to the formation leader that his aircraft was low on fuel and that he would land at an intermediate base to refuel. The following morning he departed on a VFR flight plan. However, the weather fell below VFR—a condition that had not been predicted during weather briefing—so the pilot decided to make a 180. While passing over a radio range station on this heading he learned that the weather at his destination was "3,500 scattered, 10,000 feet overcast, visibility 10 miles." Upon receipt of this weather information the pilot decided to again attempt to reach his destination. Ten minutes later an aircraft was seen by ground observers flying very low in a valley and then disappearing into the clouds. It crashed in a shallow lake killing both the pilot and a service passenger. The pilot pressed on into inclement weather when he was not qualified to fly IFR.

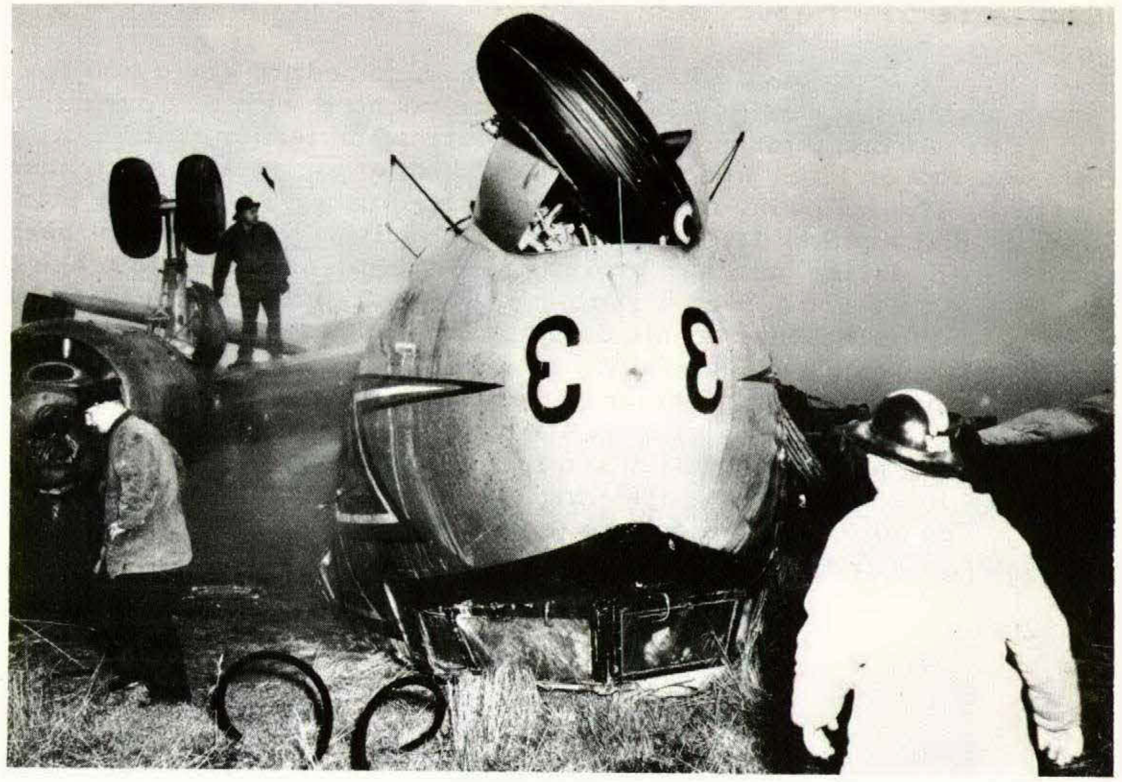
NORTH STAR



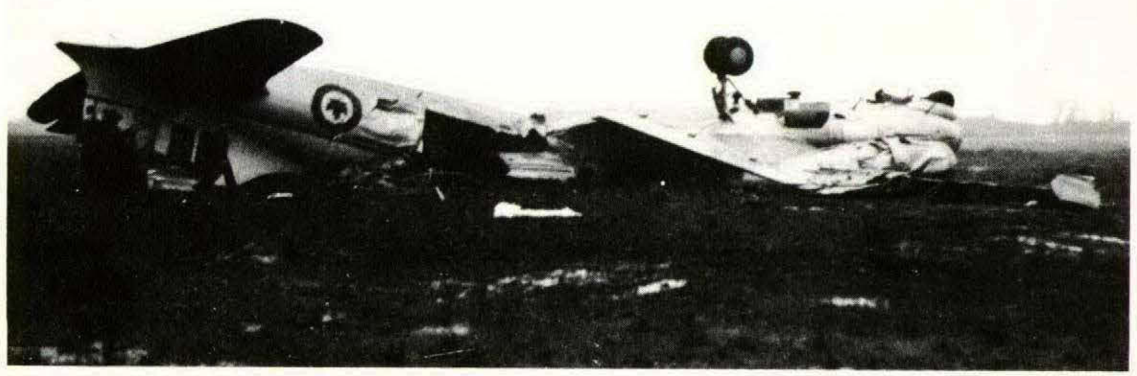
A WRONG DECISION

The trip was a routine transport flight. The crew had been properly briefed on weather conditions expected enroute and were advised that, after take-off, it would be wise to climb westbound and cross eastbound at or above 10,000 feet, thus avoiding an area of moderate icing. However the captain did not see fit to follow this advice and accepted a clearance to climb eastbound immediately after take-off.

At 10,500 feet one of the engines overheated and power had to be reduced. As a result of reduced power and icing the aircraft was unable to continue the climb. An emergency was declared and the aircraft was headed back to base. During descent, more ice accumulated, making it necessary to use full power to maintain a rate of descent of 500 feet per minute. An ILS approach was made as the weather at the time was "500 broken, visibility two miles".



When the pilot transferred from instruments to visual control he found that his aircraft was to the right of the runway. A quick correction was made and power reduced. Visibility was restricted by windshield fog or ice, and before overshoot action could be taken the aircraft struck and collapsed both nose wheel and starboard undercarriage. The North Star rolled, coming to rest inverted.



Priceless prose

Appearing on a D.14:

"No electrical repairs carried out initially other than replacement of damaged pilot heads."

The pilot was asked:

"Did you do any tests for anoxia during the climb"?

Pilot answers:

"Yes. Wingtip to wingtip check— and also lips for colouring".

DFS