FLIGHT COMMENT

ISSUED BY

DIRECTORATE OF FLIGHT SAFETY
R.C.A.F. HEADQUARTERS • OTTAWA, ONT.
JULY · AUGUST · 1956

RESTRICTED

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Articles, comment and criticism welcome. Address all correspondence to:

**THE EDITOR, FLIGHT COMMENT
DIRECTORATE OF FLIGHT SAFETY
AFHQ, OTTAWA**

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EDMOND CLOUTIER, C.M.G., O.A., D.S.P
QUEENS PRINTER AND CONTROLLER OF STATIONERY
OTTAWA

F/O I. R. FROOM

F/O FROOM and another pilot, both flying Canucks, were detailed for a routine night air interception exercise at 20,000 feet. F/O Froom was acting as target for a blacked-out identification. Approximately three minutes after the lights had been switched off, the navigator asked the pilot if he could see the attacking aircraft which was behind, slightly above and to the left of them. The pilot stated that he estimated the range at not more than 300 yards. The navigator then told the pilot that the attacking aircraft was disappearing behind the tail of their own. About 30 seconds later they felt an impact which seemed to push their Canuck upwards and into a bank to the left.

When he had regained control of the aircraft F/O Froom switched on the navigation lights and endeavoured to assess the damage. Subsequently it was found that the aircraft had sustained "B" category damage: but all the pilot could determine in the air was that aileron movement was stiffer than usual, though still controllable with one hand, while rudder and elevators seemed normal. Hydraulic pressure was fluctuating between 1500 and 2100 pounds, so he assumed that it would soon be lost altogether. During this time the navigator had been trying to contact the other aircraft but there was no response. Ground control had been informed of the accident and they too tried unsuccessfully to contact the other crew. Then the navigator spotted a fire, and F/O Froom circled at 20,000 feet while a fix was taken. By this time hydraulic pressure had dropped to zero, so the pilot de-boosted his controls. Aileron movement was very heavy at 250 knots and the pilot concluded that the reason for it must be a combination of damage and lack of boost.

On its return to base the Canuck developed a pronounced nose-down tendency, so the pilot shut off the alternate trim switch. A check of the trim indicator revealed it to be in the nose-down position. By holding the trim button in the backward position and re-selecting alternate trims to normal, he effected correct movement of the trim control—after which the alternate trim was again turned off. The aircraft was picked up on GCA and brought onto final. Difficulty was experienced in reducing speed, and at 240 knots F/O Froom selected emergency undercarriage lowering. At 2000 feet and approximately five miles from the runway he selected emergency flaps. At once a yaw and bank to the left occurred but the pilot controlled it with right rudder and aileron, the trouble persisting for about 30 seconds before correcting itself. The landing was successful.

F/O Froom is to be congratulated for turning in a fine performance despite his relative inexperience. Although fully aware that his aircraft had been damaged, he circled the crash site for a fix before returning to base, and then made a safe landing under difficult conditions.

FIT TO FLY

By
W/C T. J. POWELL
Institute of Aviation Medicine

FITNESS IS DEFINED as "being well adapted or suited for a purpose". The purpose of a member of aircrew is to fly an aircraft to the best of his ability; and for this he must be fit—physically, mentally and emotionally. Fitness is ensured by a strict medical examination before he starts learning to fly, and thereafter by annual examinations plus the opportunity to discuss and obtain treatment for his medical problems as they arise.

Physical fitness has different meanings for different people; the marathon runner and championship boxer may be guided by concepts opposed to those of the circus "fat boy". Yet each person may be entirely suited to his occupation and believe himself to be physically fit for what he is doing.

How Much Exercise?

No matter how tiring flying may be, it is essentially a sedentary occupation and does not require the extreme physical fitness of the athlete. However, there are aspects of flying which demand a degree of fitness unnecessary for a clerk in a store. The latter is unlikely to be subjected suddenly to a survival situation or to extremes of altitude,

low temperature or fatigue. Yet many aircrew take less care of their bodies than does a clerk; he may get sufficient exercise by walking to a stop and elbowing his way through the crowd onto a bus, whereas the daily exercise of a member of aircrew may consist of asking his wife to clear snow off the driveway so he can take the car to work. If this is the case, then his physical condition is below the standard required of aircrew.

Many flying types recognize the need for physical fitness and endeavour to attain it by spasmodic bursts of exercise. Our advice is—steer clear of that method. Thirty-six holes of golf or twenty miles of crosscountry skiing every other weekend will NOT keep a man fit—and it MAY result in a premature cessation of all his activities.

Exercise should be taken regularly in amounts suited to one's physique. The individual who walks two brisk miles a day is probably in far better physical shape for aircrew duties than one who plays a half hour of squash twice a week. It may be of interest to mention here that experiments undertaken with civilian airline pilots have proved that regular, moderate exercise is a valuable method of combatting the mental fatigue engendered by long flying trips.

Man is an animal who responds to emergency situations with a finely balanced, instinctive mechanism geared for a quick exit. But the trained individual does not respond with this elementary procedure of simply getting to hell out of the way. He remains and attempts to control the emergency, although the automatic responses of his body are there and have prepared him for escape. The mental control required to remain, and the readiness of the body to decamp, are antithetical forces whose opposition can cause a feeling of tension with subsequent mental depression. The finest method of removing such tension is to allow the body to respond and become healthily tired through congenial exercise. Obviously this cannot be done in an aircraft. However, no flight lasts so long that remedial exercise afterwards will not be of value.

In-Flight Exercise

During flight a simple, if boring, method of exercise will prove useful. Each muscle group in the body has a muscle group which is its antagonist. The muscles which bend the knee are opposed by muscles which straighten the knee; the muscles which bend the finger are opposed by muscles which straighten the finger. Therefore muscular exercise can be taken, without moving a limb, by causing both muscle groups to contract at the same time. Contraction causes the muscle fibres to work harder and also "milks" blood out of the muscles and limbs back towards the heart.

People accustomed to fainting on parade should learn this trick of static muscular exercise because, without apparent movement of their limbs, it enables them to overcome the blood's tendency to settle in the lower parts of the body. An inflated "G" suit acts in the same way; and alternate inflation and deflation should prevent swelling of the limbs

Antagonistic muscle flexing will keep you awake on long flights

which often occurs when one has been sitting immobile for a long time. Antagonist, muscular exercises will achieve the same effect and may also reduce muscular tension. Since some individuals find the muscular control for these exercises hard to learn, it might be wiser to practise the skill while sitting quietly in the mess. An excellent beginning is to "walk your toes" inside your shoes.

Fatigue

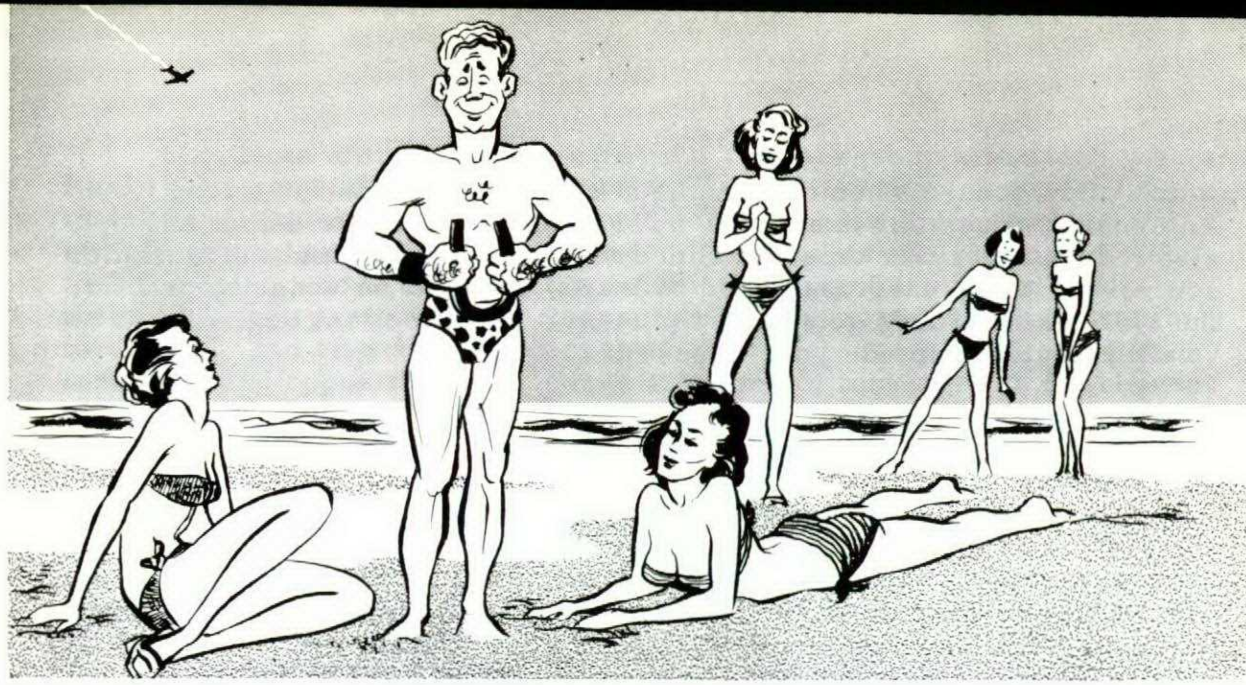
Everyone knows that flying, especially flying high performance aircraft, is fatiguing. We would like to be able to calculate this fatigue, but measurement has proved impossible. Because we cannot even define fatigue we have no base from which to start. However we can state that everyone has experienced fatigue; and certainly we know many of the causes which produce it. There are two types of fatigue, active and static. The first is produced by exercise which, when not taken to excess, produces a pleasant feeling of lethargy conducive to sleep and a feeling of well-being. Static fatigue is more common, more insidious at its onset, and has a special effect on mental processes which active fatigue does not produce. Here are some of the causes of the static fatigue which affects aircrew:

Emotional and Physical Discomfort

- Concentration
  - responsibility
  - attention
  - apprehension
- Boredom
- Cold
- Vibration
- Noise
- Acceleration
- Hypoxia
- Glare

This is not a complete list but it can be seen that flying accoutrements serve to protect one from a great number of fatigue factors. The two factors for which they can give no protection are boredom and concentration. Therefore, the greatest effects of static fatigue will be on the mental processes. The mental condition of a pilot is of vital importance, especially at the end of a long flight when simple, stupid mistakes are easily made through fatigue—mistakes which would seem quite inexplicable to a man who is not tired. They are the sort of errors one makes when undergoing experimental anoxia in a pressure chamber.

Physical fitness does not merely imply a muscular development which may be proudly displayed on the beach. It is the adaptation of the



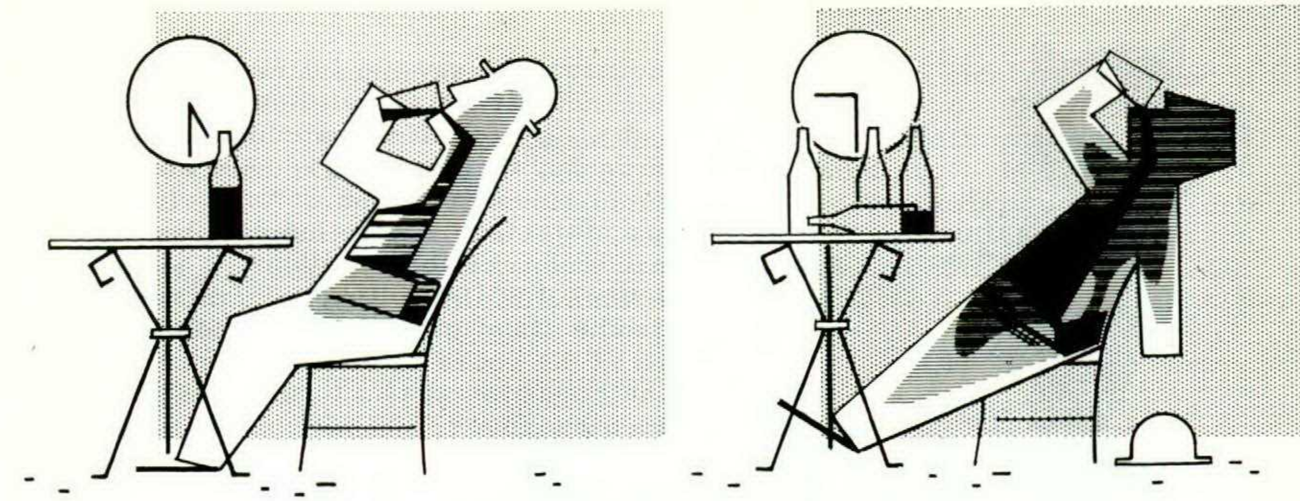
Development displayed on the beach

individual to his job. Many factors in physical fitness are under the individual's control, and a more detailed examination of some of them is desirable.

Sleep

We know as little about the nature of sleep as we do about the nature of fatigue*. It is quite impossible to give exact answers to the questions: How much sleep do I require? How can I sleep more deeply? How long can I safely remain awake? In general, eight hours' sleep is required, but this may vary between six and 10 hours. Some individuals have learned to distribute their sleep periods during the 24 hours and find that they can do with less sleep than if they had taken it all at one time. The important fact is that each individual should get the amount of sleep he requires. If adequate sleep is not taken before a task is started, then it will not be performed as well as if the sleep had been adequate. The longer the interval between the awakening and the start of a task the earlier the onset of fatigue. It is therefore most important to commence a long and difficult flight as soon as possible after awakening from a good sleep. People who have been kept awake for three or four days demonstrate very little real deterioration of most body functions; but there is a marked effect on their mental ability, for loss of memory, irritability, hallucinations and delusions occur. Very noticeable is the loss of memory for events occurring only a few minutes before. Even a slight deprivation of sleep—four hours during the night instead of eight—has been shown to lower a man's tolerance to altitude and induce a significant mental impairment.

* An account of the latest discoveries in this interesting field appeared in the Mar 17 issue of Maclean's Magazine. See "What You Don't Know About Sleep" by N.J. Berrill.



Alcohol is rapidly absorbed from the stomach

Alcohol

If sleep deprivation is coupled with drinking, then the effects are even more pronounced. A last drink taken at midnight and a further few hours of staying awake will still legally allow you to fly at 0800 hours. But flying on this combination of alcohol and lack of sleep is morally indefensible.

Alcohol is rapidly absorbed from the stomach and small intestine, and the blood alcohol reaches a peak in one half to one hour after a drink has been taken and then slowly dies away. Strong drinks are more rapidly absorbed than those in which the alcohol is well diluted. Alcohol on an empty stomach is much more quickly absorbed into the blood than when the stomach contains food, especially fatty food. Little of the alcohol in the bloodstream is excreted in the urine or in the breath; the greatest portion is destroyed in the body at a rate that is very constant, even in different individuals. About 10 cubic centimetres (two teaspoonfuls) of pure alcohol can be utilized per hour. This amount corresponds to one whiskey or one beer. Therefore it is quite obvious that if more than this quantity is taken per hour the blood concentration will rise.

A blood concentration of 0.05% alcohol is usually produced by two ounces of whiskey and this concentration has a definite effect on the higher mental faculties. A concentration of 0.05% can be produced by six to seven ounces of whiskey taken over a period of a few hours. Locally, an individual with from 0.05% to 0.15% blood alcohol might find it extremely difficult to prove that his ability was not impaired. A blood alcohol of above 0.15% is often prima facie evidence of intoxication and is accepted as such by some courts.

If eight average whiskeys are consumed on an empty stomach, one every 30 minutes over a four-hour period, the blood alcohol will rise to

Smoking makes the heart work harder

0.20% (condition: "dizzy and delirious" in unaccustomed individuals) at four hours and still be 0.10% at 16 hours! If the whole amount is taken in one gulp, the situation is even worse. Blood alcohol rises to over 0.25% (condition: "dazed and dejected") three hours after the drink, and will again be 0.10% at 16 hours! A blood alcohol of 0.10% will usually influence a person to the stage of "delighted and devilish", but not 16 hours after he started to drink. The condition at that time and level constitutes a hangover.

Tobacco

Enough of this depressing subject! Let us examine the effects of smoking. Modern cigarette advertising emphasizes the pleasure of smoking, but no longer are cigarettes claimed to be good for all the ills of humanity. The two principal active ingredients of tobacco smoke are (a) nicotine (b) carbon monoxide. Nicotine is a volatile alkaloid which, when absorbed into the body, has multiple effects, chief of which are a rise in pulse rate, a rise in blood pressure, and decrease in the amount of blood flowing to the skin of the hands and feet. To overcome these effects the heart is forced to work harder. It is usually assumed that if the smoke is not inhaled, nicotine will not be absorbed; however, absorption occurs in the mucous membrane lining of mouth and tongue. Two-thirds of the amount of nicotine absorbed in an inhaled puff of smoke is absorbed in the mouth.

Carbon monoxide is present in tobacco smoke, 1.0 to 2.5% in cigarette smoke and perhaps 5 to 8% in cigar smoke. The amount varies considerably depending upon the rapidity of the smoking, the thickness and tightness of the packing, and the moisture present. It is well known that carbon monoxide has a much greater ability to combine with the haemoglobin of the blood than has oxygen (about 210 times as great). Therefore any carbon monoxide inhaled into the lungs will combine with the haemoglobin. The smoke must be inhaled for this to happen because no absorption occurs until the carbon monoxide is in the fine air passages of the lungs. A heavy smoker who inhales may have from 5 to 10% of his haemoglobin combined with carbon monoxide, thus rendering it useless for the transfer of oxygen. The individual who has 10% of his haemoglobin combined with carbon monoxide at sea level is affected in the same way as if he were a non-smoker at 12,000 feet. Remember that you use oxygen above 10,000 feet and that night vision is markedly affected above 5000.

*

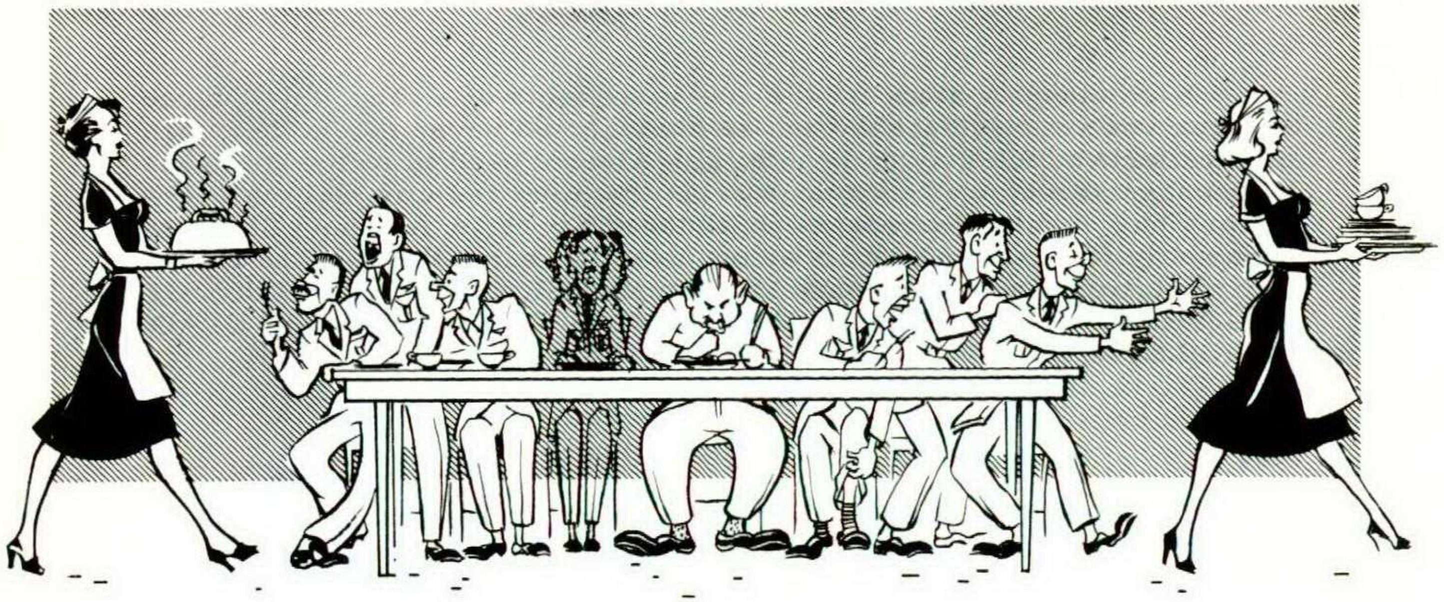
Even though a study of the adverse effects of alcohol and tobacco seem to indicate that they and aircrew should never meet, there are other effects which may be beneficial. Alcohol used in moderate doses by persons accustomed to it does relax the mind and can help in overcoming the mental depression engendered by static fatigue. Smokers apparently feel that tobacco smoke does the same thing. The lesson which aircrew should learn is that MODERATION IN THE USE OF ALCOHOL AND TOBACCO IS ESSENTIAL IF THEY ARE TO RETAIN A HIGH STATE OF FITNESS FOR FLYING.

Food

Only one other common recreation of aircrew can be discussed here and that is eating. You have seen in FLIGHT COMMENT for Nov-Dec 1955 (in the article by F/L Monagle entitled "Exercise May Day") that the best food for survival purposes is a diet high in carbohydrates—that is, sugar and starches. These are excellent for survival but quite inadequate for everyday living. One's diet must consist of a balanced, palatable mixture of carbohydrates, protein and fat, together with the necessary minerals and vitamins. RCAF rations are designed to provide this balanced mixture, the chefs have been trained to make it palatable, and the surroundings and company make the pleasant atmosphere necessary for complete enjoyment of food.

This pleasant combination of all the factors exposes one to the temptation of eating more than his sedentary occupation warrants. The work simply does not "burn up" the vast quantities of food consumed by a hard rock miner or a logger. When the individual consumes more food than is required for daily needs, it is stored as fat. Have you ever noticed that old people aren't fat? That's because the fat ones don't live to be old! Perhaps you feel flying is not for the old and that therefore a few excess pounds merely make you pleasingly plump and fill out your uniform where the well exercised muscles are not. Nothing could be further from the truth for a flyer.

Readers are likely aware that "bends" and "chokes" are caused by the release of nitrogen bubbles in the body when pressure on the body is reduced. Nitrogen is much more soluble in fat than in other tissue, so the more fat a person has the more likely is he to experience bends. Fatal cases of the bends rarely occur among thin people. They do occur among the fat ones. If you think you are overweight, consult your Medical Officer. He can advise you regarding both your diet and the rate at which you should try to lose pounds. Most important, he will give you the moral support required during the first week or ten days when your stomach is aching with unsatisfied hunger contractions. Losing weight can be done, but preventing a weight gain is easier. Remember that that extra round of bread and butter eaten for dinner requires a brisk walk to "burn" it in the body—eight miles of brisk walk! Don't you think



One-third of the day's calories should be taken aboard at breakfast

it's easier not to eat it? Remember, too, that beer and other alcoholic drinks are high in calories and must be included when you are computing the day's caloric intake.

Experiments have proved that small, frequent meals are better for sedentary, mental workers. Thus the coffee break does not necessarily waste time, and it does increase productivity. How the mechanisms of the body keep the "food" of the blood stream available in the proper quantities for use by the brain, muscles and other tissues is reasonably well understood today, but it need not concern you. What should interest you is that a light meal consisting mainly of starches and sugar does not "stick to the ribs" and will leave you hungry and perhaps "light-headed" only two or three hours after you've eaten.

No matter what the real explanation is (and there are a number of theories to explain this), taking some food at this time will relieve the hunger and other sensations. Whenever you have this 11 o'clock "sinking" feeling after a light breakfast of corn flakes, toast, jam and sugared coffee, a snack of a few biscuits or a chocolate bar will tide you over to the next meal. Preventing the onset of the sinking feeling altogether can be accomplished by putting away a breakfast containing the proper amounts of protein, fat and carbohydrates. At least one-third of the day's calorie requirement should be taken at breakfast. Unfortunately many people have a great aversion to the sight of food in the early morning and content themselves with a mere glass of juice and a cup of coffee. The only advice we can give them is that a further snack at 10 o'clock will be safer and allow better work to be done. Don't forget that if you start the snack habit you must include them in the calculation of your daily food intake and reduce your other meals by a corresponding amount.

Drugs

Now to the use of drugs by aircrew. As readers are aware, regulations forbid the use of drugs such as Dexedrine and the remedies for motion sickness. While most individuals react as expected to drugs, others do not, for some drugs produce bizarre effects in certain people —effects which may be disastrous if they occur unexpectedly during flying. The safe rule is not to fly when taking any drug. If you require one, you probably shouldn't be flying with the condition for which the drug is prescribed. Self-medication with any of the drugs commonly found in the bathroom cupboard should not be indulged before flying. We cannot emphasize too strongly that self-diagnosis and medication is not for the flyer. When you take aspirin for a headache, you may relieve the pain, but not necessarily the cause. The RCAF has an excellent medical branch from which you may seek advice; no symptom you have will be regarded as too trivial for investigation. Remember that one of the main jobs of this branch is to keep all aircrew healthy and fit for flying.

*

As pleasant as they are, the minor vices of overeating and excessive drinking and smoking are not for aircrew. You cannot be fit for flying if you over-indulge, although regular, moderate exercise will help to counteract some of the ill effects. Such exercise will also fit your body to overcome the difficulties of high performance flight, help to prevent static fatigue, and, if taken after an arduous flight, provide the relaxation the body requires. Remember also that if you do take regular, moderate exercise you haven't as much time to over-indulge in the pleasant vices so many of us find so delightful.

To end on a sombre note, it is obvious that the fit individual is much more capable of dealing with a survival situation than one who has maltreated his body. No man can function at his highest efficiency unless he is mentally, emotionally and physically in a state of well-being.

The Author

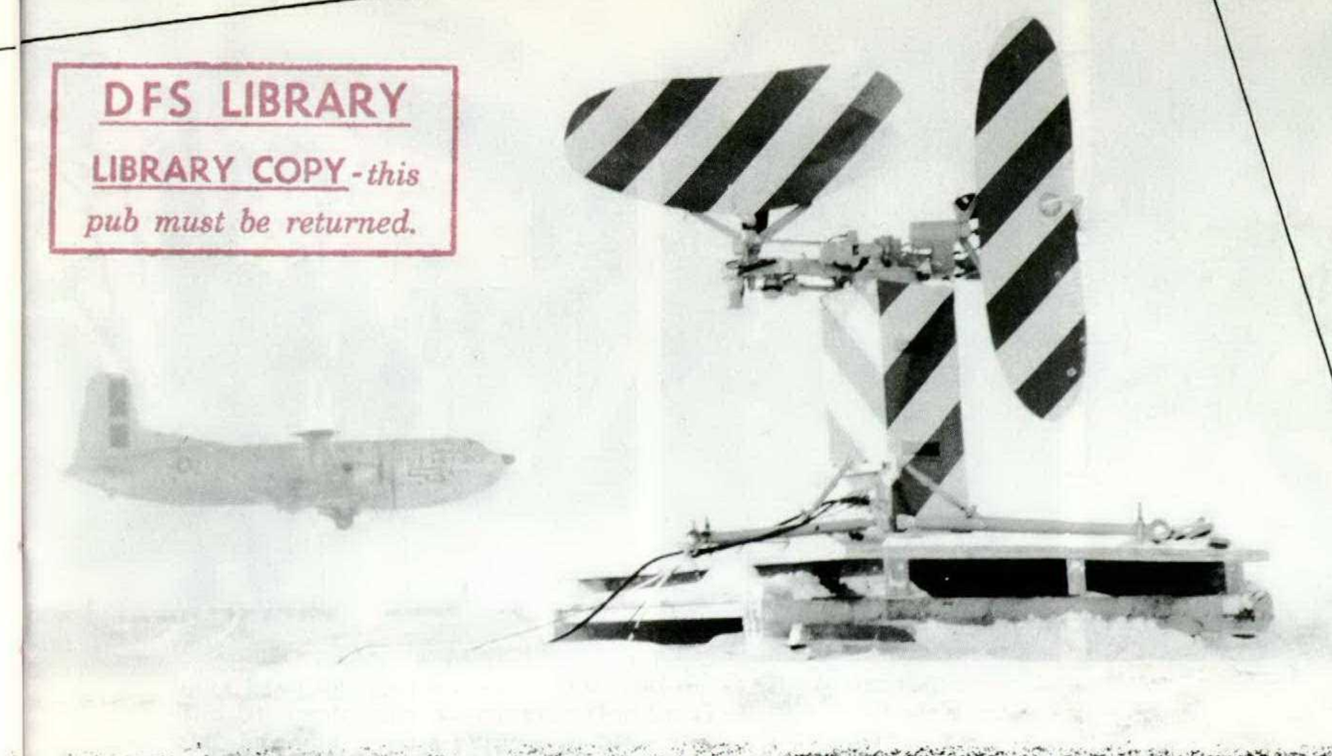
Wing Commander T.J. Powell was born in Nantwich, England and came to Canada in 1932. He studied Biology and Medical sciences at the University of Toronto, receiving a B.A. in 1936 and an M.D. in 1939. He was commissioned in the Indian Medical Service in 1939 and served for several years on the northwest frontier where he commanded the 8th Indian Field Ambulance and raised it to war establishment. He also served in the Middle East as C.O. of the 13th Indian General Hospital.

When the Indian Medical Service was disbanded in 1947 he resigned his commission as Lieut-Col in the Indian Army, returning to Canada in January 1948 to join the RCAF Medical Branch. After a few months as SMO at Greenwood, N.S., he went to Trenton as SMO and remained there for four years. He spent a year's study leave at the RAF Institute of Aviation Medicine, Farnborough, and returned to Canada as O.C. of the Central Medical Establishment of IAM at Toronto. He was certified as a specialist in aviation medicine by the American Board of Preventive Medicine in 1955.

QUAD RADAR

THE NEED FOR efficient and adequate aids to assist pilots to land in conditions of reduced visibility is becoming increasingly apparent and is reflected in the recent purchase by the RCAF of four lightweight "Quadradar" GCA Units. These units are in addition to the 23 "sophisticated" types now strategically located in Canada and Overseas.

Quadradar is a versatile, highly mobile radar gear designed primarily for use on airfields handling light to moderate traffic or in situations where tactical requirements dictate the use of a landing aid that can be transported with ease and placed into operation in a minimum



of time. Four functions are combined in one: surveillance, precision, height finding and airport taxi control—hence the name "Quadradar". Any one of these functions may be selected at the turn of a switch on the control console.

The unit's versatility is demonstrated by the ease with which it can be sited and by the precision coverage of several runways which can be obtained without moving the radar equipment. To change runways, the controller turns the complete operating head in the desired direction merely by depressing a switch at the control console, which may be located up to 10,000 feet from the main radar equipment.

The remoting feature of this equipment will be used with the first four units obtained by the RCAF, and the control consoles are planned for location in either control towers or adjacent IFR rooms. Several advantages will be gained by installation at these points. It will provide acceptable operating conditions, enable routine interchange of controllers with tower personnel, and permit adequate use of all functions of the equipment, both by the tower and GCA controllers.

Quadradar was accepted by the RCAF in March of 1956 and the first unit allocated to Station Churchill. It was intended to supply a much needed approach aid for use by the rapidly increasing northern air traffic which moves through this base and to act as a medium for cold weather tests. A test of the mobility characteristics of the equipment was combined with this first installation. Preparatory work con-

sisted of selecting a site, obtaining and preparing suitable shelters and power supply, and attending to a host of related details.

Partially packed, the unit was loaded on an RCAF ATC C-119 in Los Angeles, California and flown directly to Churchill. The weather on arrival was 35° below zero and there was a strong wind, the result of which was a high chill factor. Not the best working conditions, to say the least. Although time was not the essence of this test, an attempt was made to get the unit operating as soon as possible. Two and a half hours after the arrival of the aircraft, the transmitting head was assembled and mounted on a special sled which had been designed to carry it to its site about a mile distant. The operating console was placed in the shelter and the necessary cables were positioned. In another two hours the sled had been dragged to the site by bulldozer, the supporting cables hooked up, and the radar gear tuned.

Except for a flight check, the Quadradar was open for business. And business was not long in coming. Only two days after installation of the equipment, operators assisted six aircraft to make a safe emergency landing in conditions of extremely low visibility.

Considering the frigid conditions under which the initial test was carried out (the extreme cold slowed down the installation and caused cable connections to freeze up), the operation was a complete success, and indicative of the potential value this equipment will have in future RCAF operations. The three remaining units are expected in the latter part of 1956 and will be located at selected ADC and TC stations. These three will be the heavier, 200-kilowatt version rather than the 50-kilowatt model delivered to Churchill. At a later date the Churchill unit will be modified to the more powerful equipment.

PXing

LETTERS TO THE EDITOR

Nature Lover

Dear Sir:

The hearts of all bird watchers have been uplifted by your new feature (the Birdwatchers' Corner). Our local club has observed a number of different species lately. True lovers of this absorbing hobby will undoubtedly be pleased to hear that these species can be seen at practically any airfield.

G. A. Heck, S/L
Detachment Commander
CEPE (NAE) Uplands

S/L Heck supplied us with several dreadful examples of "birds" he has spotted from his lookout in a bird blind. They will appear in our "corner" in future issues of FLIGHT COMMENT. Come on, readers! What "birds" have you seen? The world is waiting for its next James Audubon.— **ED**

Radar Advisory

Dear Sir:

How many RCAF pilots understand and use the Radar Advisory Procedures as outlined in CAP 482? Do they all understand the use of IFF equipment? It seems to me that an informative article in FLIGHT COMMENT with a suitable map showing approximate GCI sites is opportune. Surely there could be no objection from a security point of view since FLIGHT COMMENT is RESTRICTED. Our cousins south of the border have seen fit to publish such an article "GOLF - COCA - INDIA" in the March 1955 issue of their Flying Safety magazine.

Would it be possible for the Directorate of Flight Safety to publish an article similar to "GOLF - COCA - INDIA" in FLIGHT COMMENT? Publishing a small standardized pocket folder which might contain GCI procedures, information available to aircrews and a map of the North American Continent showing approximate site locations and their identification, would be useful. May I, on behalf of CEPE personnel, take this opportunity of thanking all concerned for the excellent articles published in FLIGHT COMMENT.

R. H. Janzen, S/L
Acting Detachment Commander
CEPE Namao

In reply to the first question in your letter on the Radar Advisory Procedure, we agree that at one time there may have been some ignorance on the part of pilots concerning the services available from the ACWUs. FLIGHT COMMENT produced an article on this item in the Nov - Dec 55 issue to bring the facilities to the attention of aircrew. The printing of an article showing locations of GCI sites cannot be approved. In any case, does a pilot need to know where his station is? He just calls up and asks for the information he wants.

The advice necessary for aircrew to use either the Radar Advisory Procedure or the Emergency Procedure is contained in CAP 482—SFID. Possibly a review of this book by all pilots would acquaint them with services and procedures available. You are referred to the Mar - Apr 55 issue of FLIGHT COMMENT and the article "What's All This About SFIDS?"— **ED**

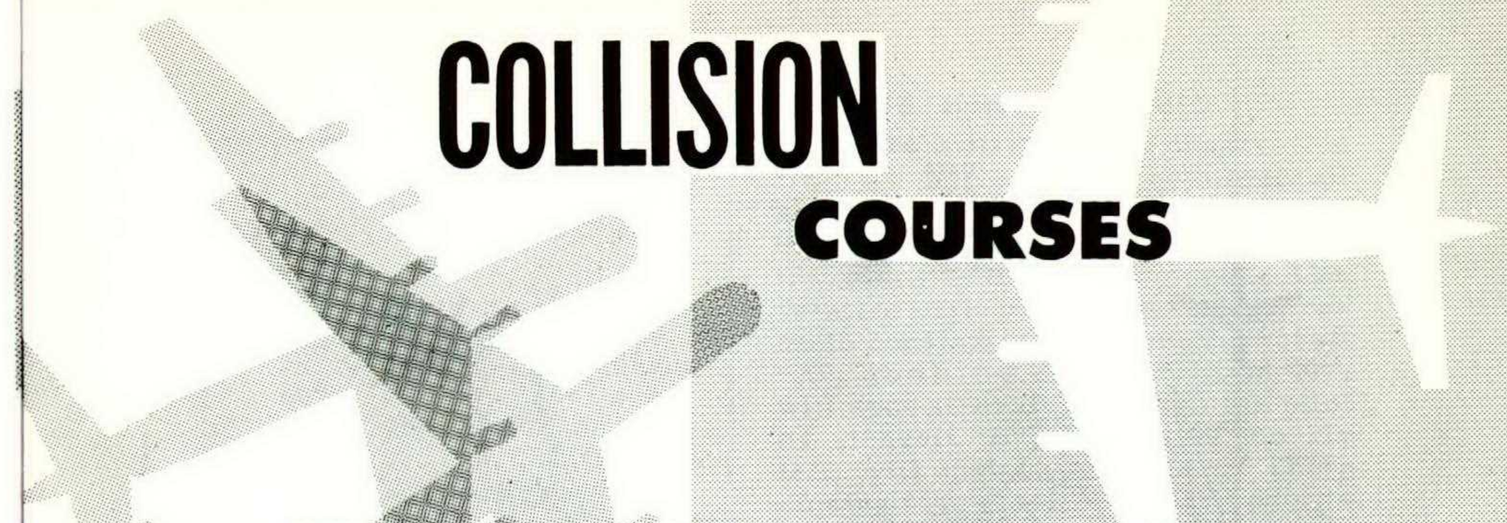
A LIMITED NUMBER of silver-lettered board covers for binding Flight Comment are available. Stations and units are invited to submit requests to Flight Comment, Directorate of Flight Safety, AFHQ, Ottawa.

FLIGHT SAFETY PRESENTS

TAXIING COLLISIONS
14C/1830

FUEL TANK SELECTIONS
14C/1828

THIS DOUBLE FEATURE HAS BEEN CHOSEN FROM A FILM SURVEY CONDUCTED BY TRAINING COMMAND. WATCH THIS SPACE FOR FUTURE BILLINGS. FILMS ARE LISTED IN CAP 428.



COLLISION COURSES

PEOPLE KEEP TALKING about collision in the air, but what are they doing about it? Readers likely know that the RCAF's whole aircraft control system is based on the need for safe separation—and under IFR conditions, that required separation has been provided. Under VFR conditions, however, our pilots are expected to ensure that adequate separation is maintained.

The collision hazard has not cost the RCAF many accidents. True, there have been a number of formation collisions; but these were not caused by an inability of the pilots to see, recognize and avoid other aircraft. Nevertheless the hazard of colliding with other aircraft is very real, particularly with the high performance aircraft now in use. Collisions are most likely to occur when IFR and VFR traffic are mixed on airways and in the terminal or control zone areas. American experience indicates that most of them take place in VFR weather.

What is the problem? Why, when we assume that pilots can see each other, is the collision hazard so great? One reason is the time one doesn't have nowadays between seeing another aircraft and having a collision. The other, of course, is the death and destruction usually caused by an air collision. Since the latter reason doesn't need much explanation, what do we know about the former?

An American airline pilot, H. William Atkins, has given considerable thought to air collision prevention, even to the extent of designing a collision danger warning light. In his study of the problem he has developed some interesting material, and FLIGHT COMMENT has received permission to use it to bring to the attention of our readers the time aspects of the collision hazard.

*

The accompanying charts show the relative closing times from the different angles around an aircraft. Figures 1 and 2 show two aircraft, both flying at 315 knots, observing each other at the 3-mile visibility range which is the VFR minimum standard. Notice that the closing time with the aircraft converging head-on (at zero degrees) is 15 seconds.

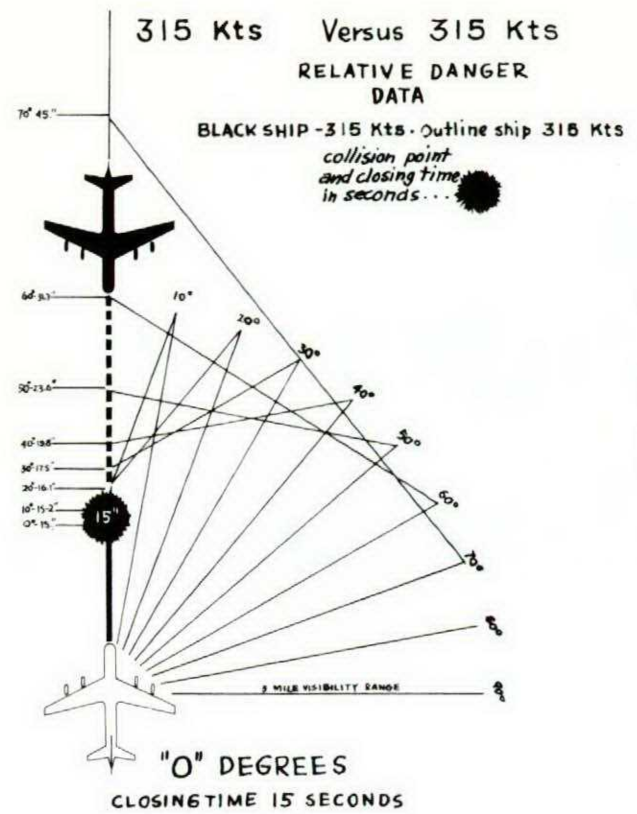


Fig 1.

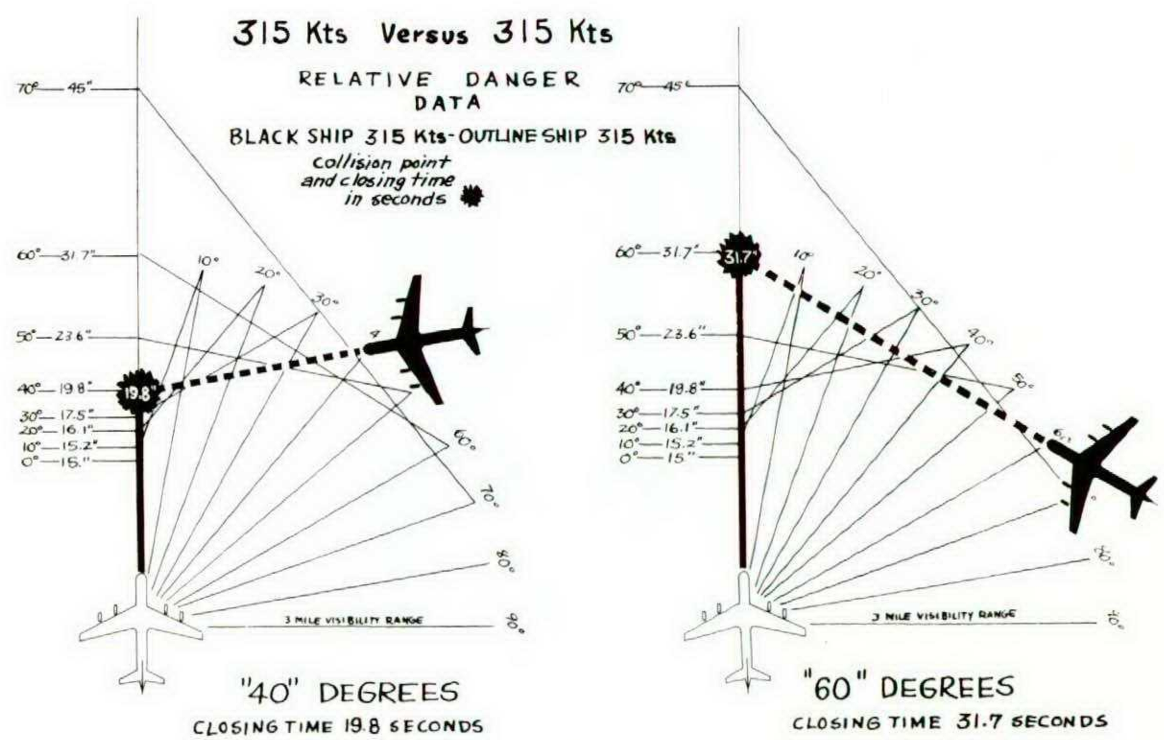


Fig 2.

0^{o}	..........15.0 sec
10^{o}	..........15.2 sec
20^{o}	..........16.1 sec
30^{o}	..........17.5 sec
40^{o}	..........19.8 sec
50^{o}	..........23.6 sec
60^{o}	..........31.7 sec
70^{o}	..........45.0 sec
80^{o}	..........87.0 sec
90^{o}	........impossible

Figure 3 shows the observation from an angle of 40^{o}, both aircraft still flying at 315 knots. A point here is that, since both aircraft are travelling at the same speed, the relative angle between them will remain constant. The pilot of aircraft "A", looking out to his right 40^{o}, will spot aircraft "B"; and the pilot of aircraft "B", looking 40^{o} to his left, will spot aircraft "A". Their closing time will be 19.8 seconds for the three miles. In ten seconds aircraft "A" will move one mile up the line to the right, and aircraft "B" will move one mile down the line to the left. At that point, of course, the relative angle between the two aircraft is still 40^{o}—and the lines of sight of both pilots remain parallel until the moment of collision

To each pilot the other aircraft appears to be standing perfectly still on his windshield—nothing to get excited about. But, although there appears to be no relative movement, those two aircraft are on a collision course. If the pilot were to take a piece of chalk and draw a circle around the aircraft on his windshield, that aircraft would remain inside the circle until it came through it!

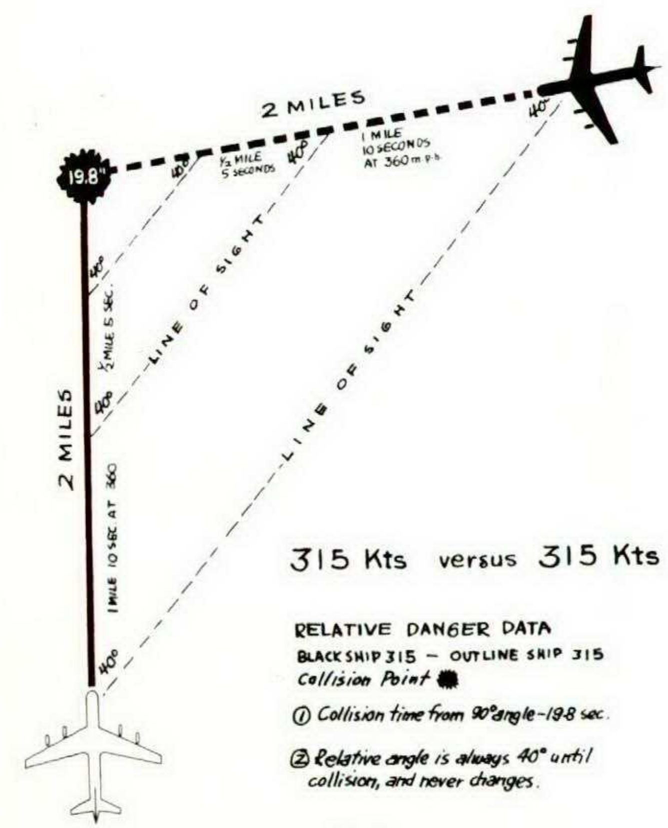


Fig 3.

Thus a collision course is one in which the relative angles between two converging aircraft remain the same until the aircraft collide. (Should there be any change in the relative angles, then the two aircraft are not on a collision course and will not collide.)

Figures 4 and 5 indicate the relative danger to two aircraft travelling collision courses at different speeds—aircraft "A" at 315 knots and aircraft "B" at 260 knots. In this case, the angles are subtended by an observer in aircraft "A". The closing time with these aircraft converging head-on (at zero degrees) is now 16.4 seconds.

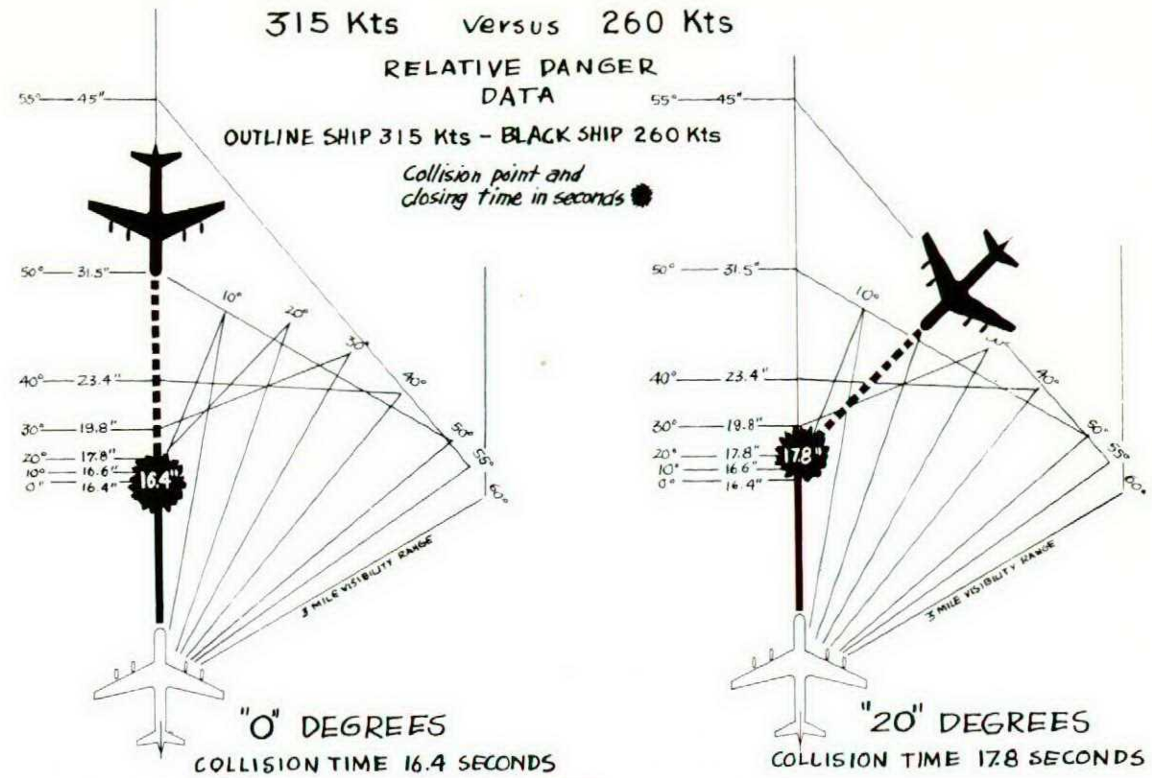


Fig 4.

0°	..........16.4 sec
10°	..........16.6 sec
20°	..........17.8 sec
30°	..........19.8 sec
40°	..........20.4 sec
50°	..........31.5 sec
55°	..........45.0 sec
60°	........impossible

Note in fig. 5 that the slower aircraft has a relative angle of 51° to the other aircraft and that the collision time is 23.4 seconds. More time is involved in this case because the slower aircraft must head out a little further in order to make the collision course. Aircraft "A" flies up the track one statute mile in ten seconds; in the same ten seconds aircraft "B" will have moved left across his course

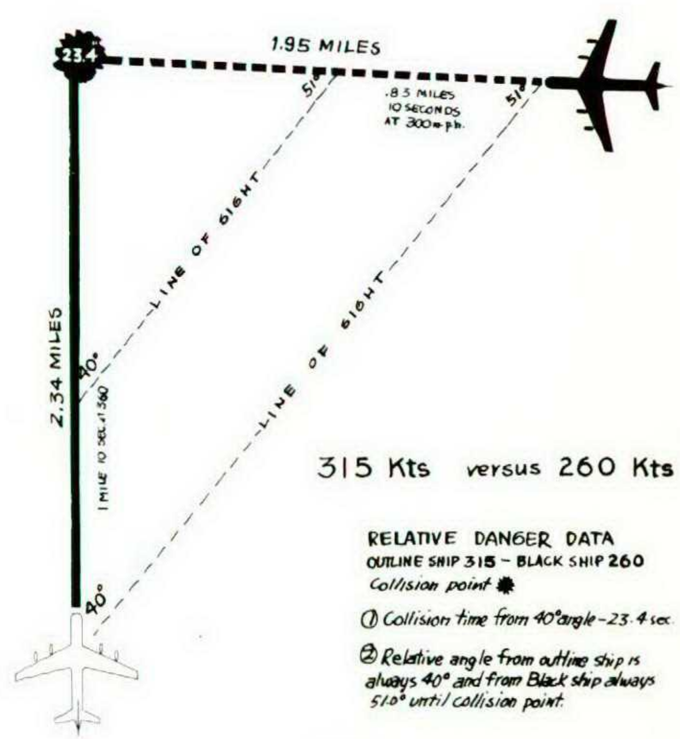


Fig 5.

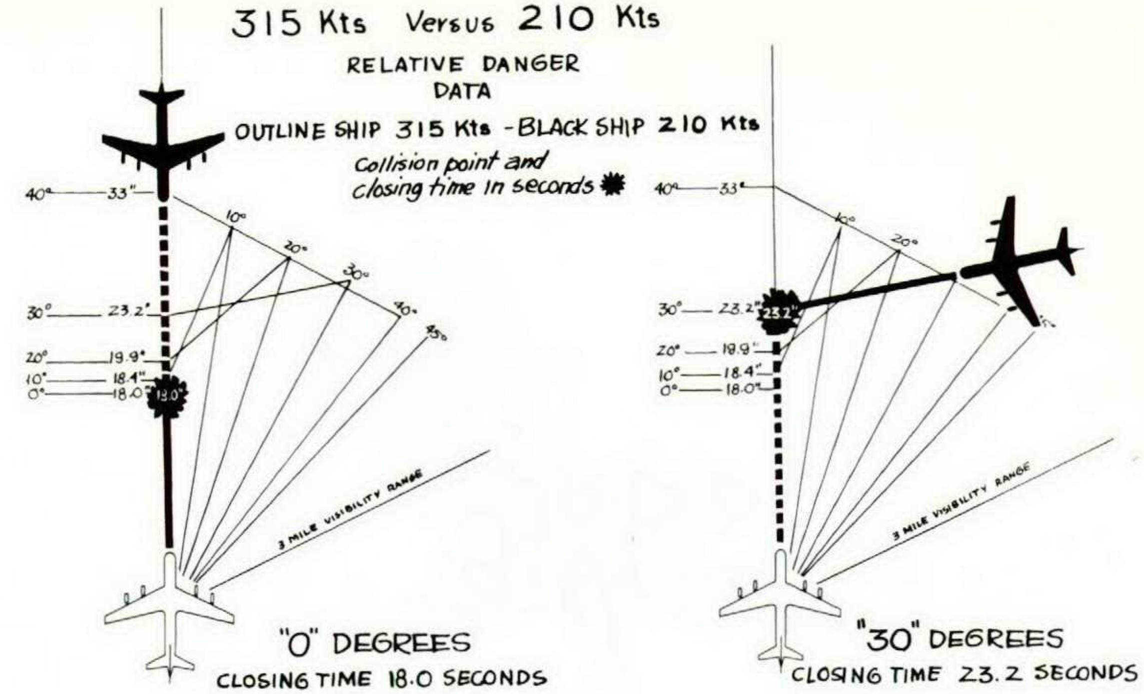


Fig 6.

0.83 statute miles. The relative angles are still 51° and 40°, and to each pilot the other aircraft appears to be stationary. The aircraft that moves across your windshield and appears to be dangerous will actually do you no harm. THE ONE THAT IS STATIONARY AND APPEARS SAFE IS DANGEROUS.

Fig 6 shows the closure time involved when one aircraft is travelling at 315 knots and the other at 210 knots. With the two converging head-on (at 0°) the collision will occur in 18 seconds.

0°	..........18.0 sec
10°	..........18.4 sec
20°	..........19.9 sec
30°	..........23.2 sec
40°	..........33.0 sec
45°	........impossible

Similar diagrams have been worked out for pairs of aircraft flying collision courses at a variety of speeds—including an example at 315 knots and 155 knots—and for all 360 degrees around each aircraft. From these diagrams valuable analyses can be made.

Fig. 7 shows the average length of time that will elapse before aircraft from each of the different sectors will be involved in a collision. In each case an observer is stationed in the black aircraft which

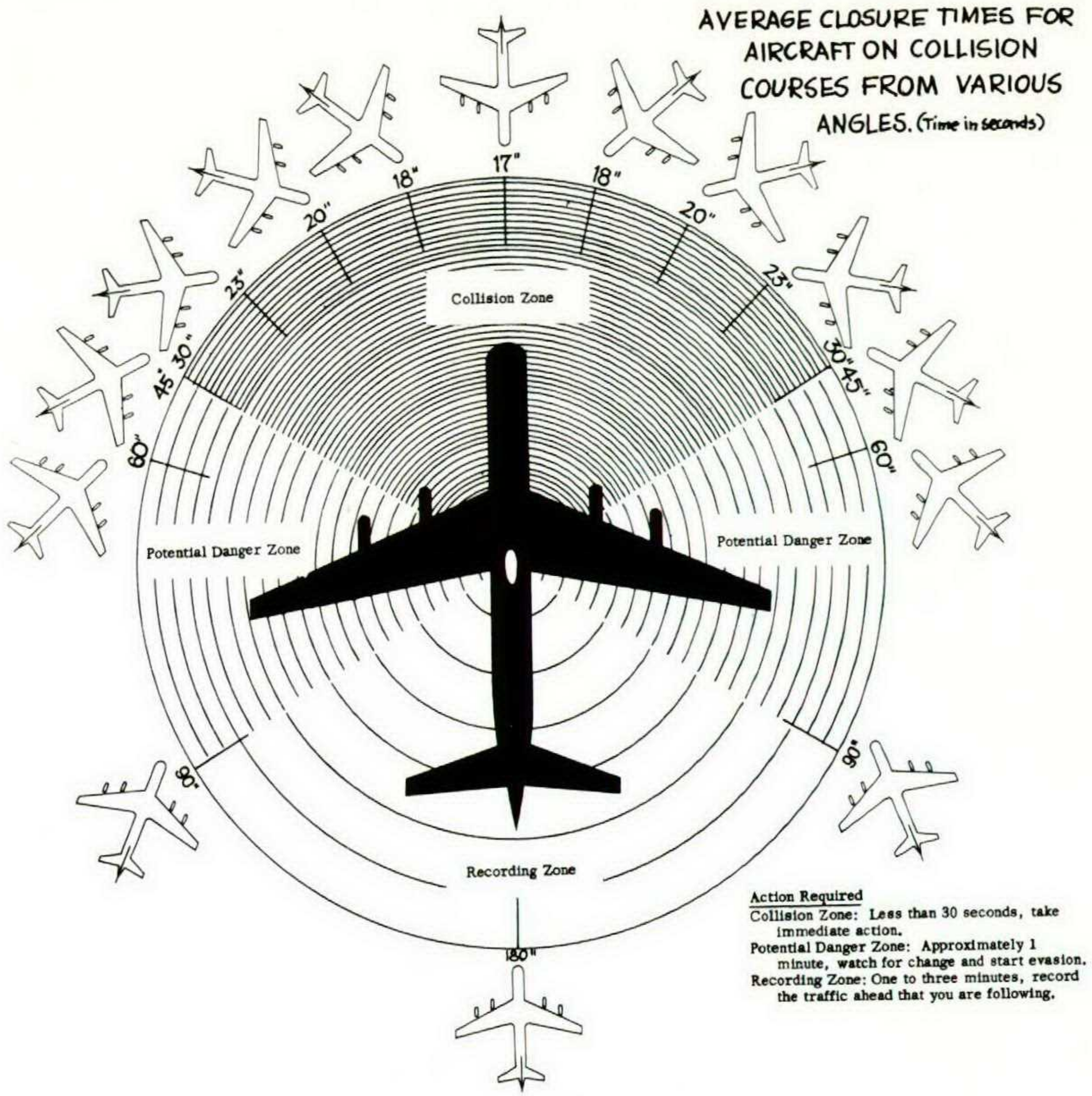


Fig 7.

travels at a constant 315 knots, and the approaching aircraft travels at speeds of from 155 knots to 315 knots. From dead-ahead, the average time will be around 17 seconds (varying between 15 and 18 seconds), depending upon the speed of the aircraft. At about 45° the time lengthens to only 20 seconds.

Possibly it will be interesting to recall here that it takes approximately 15 seconds for a pilot to decide on his next move, to operate the controls, and for the aircraft—particularly of the large transport type—to respond and change its direction. Within the zero-to-45-degree sector, the pilot has a bare two to five seconds to recognize that he is flying a collision course.

Continuing on around the aircraft in Fig. 7, the closure time at 45° is 20 seconds; at 50° it goes to about 30 seconds; and at 60° it jumps sharply to 45 seconds. From 60° to 120° the time will run from 45 seconds to a minute and a half; and from 120° to 180°, anywhere between one and three minutes depending upon the differential speed of the overtaking aircraft.

0 - 60°	Collision........	15 to 30 seconds
60 - 120°	Danger	30 to 90 seconds
120 - 180°	Recording...	1-1/2 to 3 or 4 minutes

The closure times and angles appearing on the diagrams accompanying this article are applicable to the performance of relatively high speed transport aircraft. Fighter aircraft will have relatively less time to avoid a collision because of their higher speeds; trainers and communication aircraft will have a little more time. However, the methods used to calculate this information are the same for all types of aircraft.

There are four ways to avoid a collision. Every pilot knows them. (Whether every pilot observes them or not we can't say for sure.) Here it is again—a four-point program designed to keep pilots flying a long long time:

- Keep a sharp lookout
- Fly the correct quadrantal heading
- On airways, fly the correct altitude
- Suspect any aircraft you see.

priceless prose

A Pilot Reports on the D 14:

I climbed to 5200 feet and did a normal ejection.
The rest of the trip was uneventful.

...... And on the D 6:

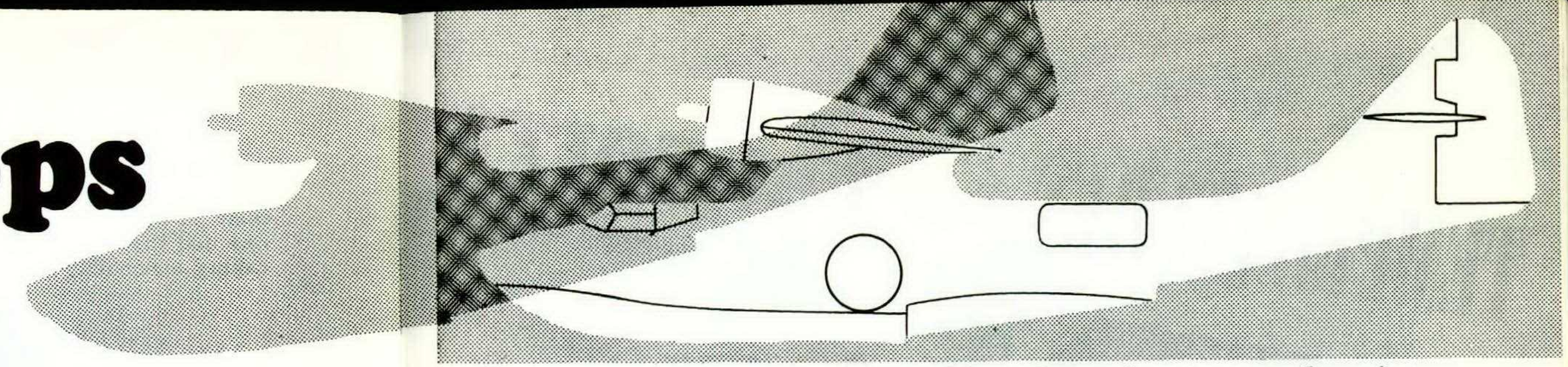
On ejection I tumbled in the seat in cloud
and experienced a normal letdown and landing.

(So the nylon elevator is now considered to be
an alternate, routine method for getting on the ground! — **ED**)

AFHQ Message on Arrangements for Flight Safety Officers' Course:

.....officers will be required to love out at Toronto.....

Waterloops



A number of articles on this subject were reviewed for inclusion in Flight Comment. The material as it is presented here was set in its final form by the Directorate of Aircraft Engineering. — **ED**

"Waterloop a Canso? Impossible! Who ever heard of an old maid doing a back-flip!"

This is likely the response of pilots generally to anyone who would dare propose such a topic for conversation. Yet even Canso pilots themselves have had to experience a waterloop—or at least a "near miss" in that direction—to believe that this outwardly sedate and venerable aircraft is capable of such behaviour.

A waterloop will result if the Canso's nose "digs in" while the aircraft is drifting sideways at the moment of landing. "Digging-in" the nose is the first stage of a waterloop and it usually occurs during a landing if the C of G is at or near its forward limit. This tendency to "dig in" is particularly noticeable as power is taken off and it should be delayed by holding back on the control column until flying control is lost and the aircraft falls off the step.

In a correctly executed Canso water landing—one in which drift has been eliminated at the moment of landing—the longitudinal axis of the aircraft is in line with the direction of travel of the aircraft, and contact is first made with the water by that part of the hull behind the vertical axis through the C of G position and in front of the step (see Fig. 1). When this procedure is followed there is no tendency for the Canso to swing because the force due to the momentum M of the aircraft and the retarding force R both act through a common axis. The retarding force acting behind the C of G also has a stabilizing effect.

When drift is present at the time of landing, and the major portion of the Canso's contact with the water is made ahead of the C of G vertical axis, the tendency to swing is introduced. The swing commences when the turning effect caused by the retarding force R (acting at an area ahead and to one side of the C of G) exceeds the stabilizing effects of any opposing forces such as rudder and engine thrust. As long as the effect of force R remains stronger, the swing will tend to increase rapidly to a maximum (see Fig. 3). While the Canso is swinging, it has a tendency to nose in and also to heel over towards the outside of the swing because the C of G is well above the water line. Thus the retarding force grows progressively worse until the waterloop becomes uncontrollable.

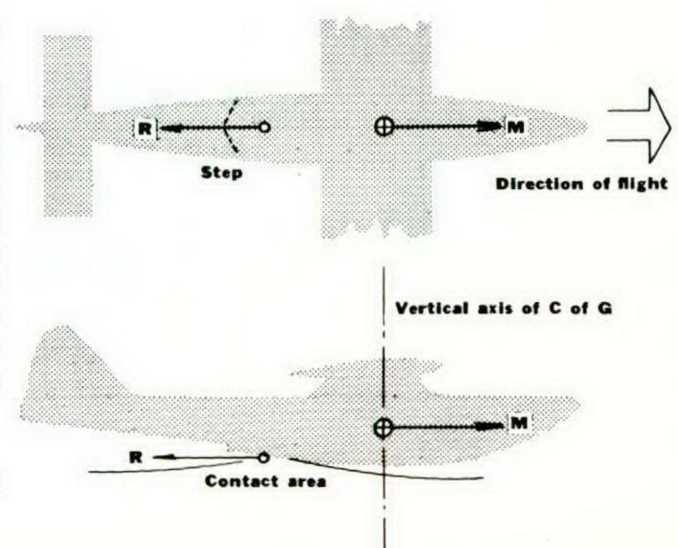


Fig 1. Normal touchdown

During the waterloop, great water pressure is exerted against all surfaces in contact with the water on the outside of the turn. The wing tip float may be forced deep into the water, and in most cases its supporting struts collapse inwards allowing the wing tip to strike the water. Structural failure usually does occur at this stage of the loop.

It seems that the waterloop phase of the Canso story is not generally known even among boat pilots. For some obscure reason the information has been kept by a few—like a shady incident in the personal affairs of a close relative. If pilots keep in mind the factors which could cause a waterloop, it should not be necessary for them to learn the hard way that beneath the Canso's external appearance of genteel docility lurks the desire to kick up its heels.

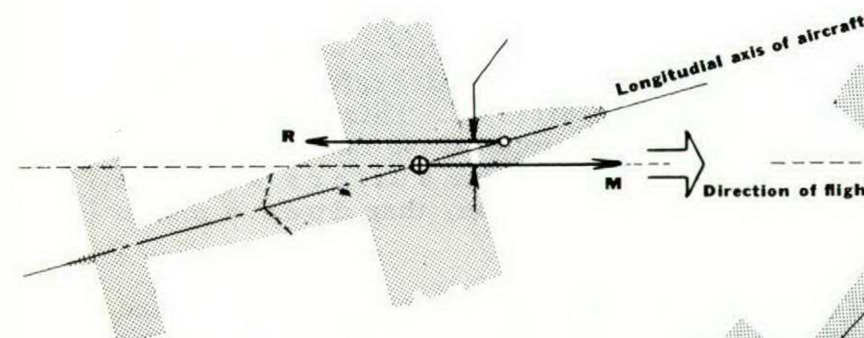


Fig 2. Touchdown with drift

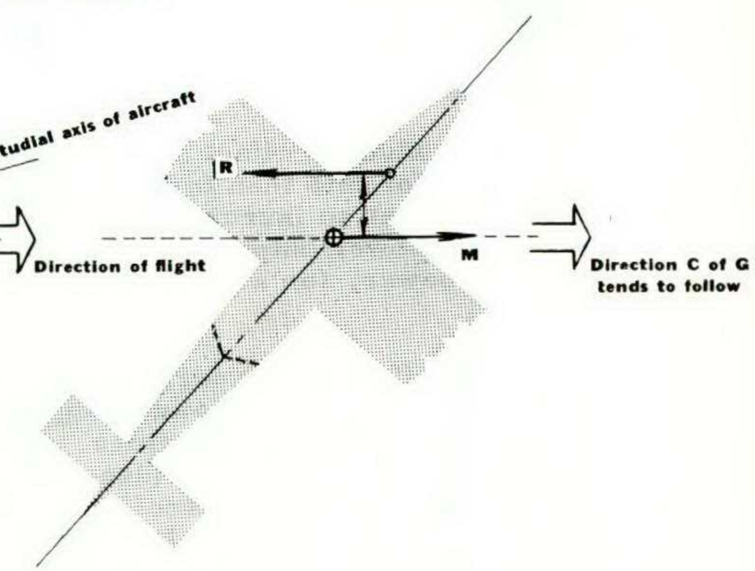


Fig 3. Progress of the waterloop

TEMPERATURES and TAKEOFFS

By J. A. LENAHAN

Senior Meteorological Officer
RCAF Station Uplands

Those 90s

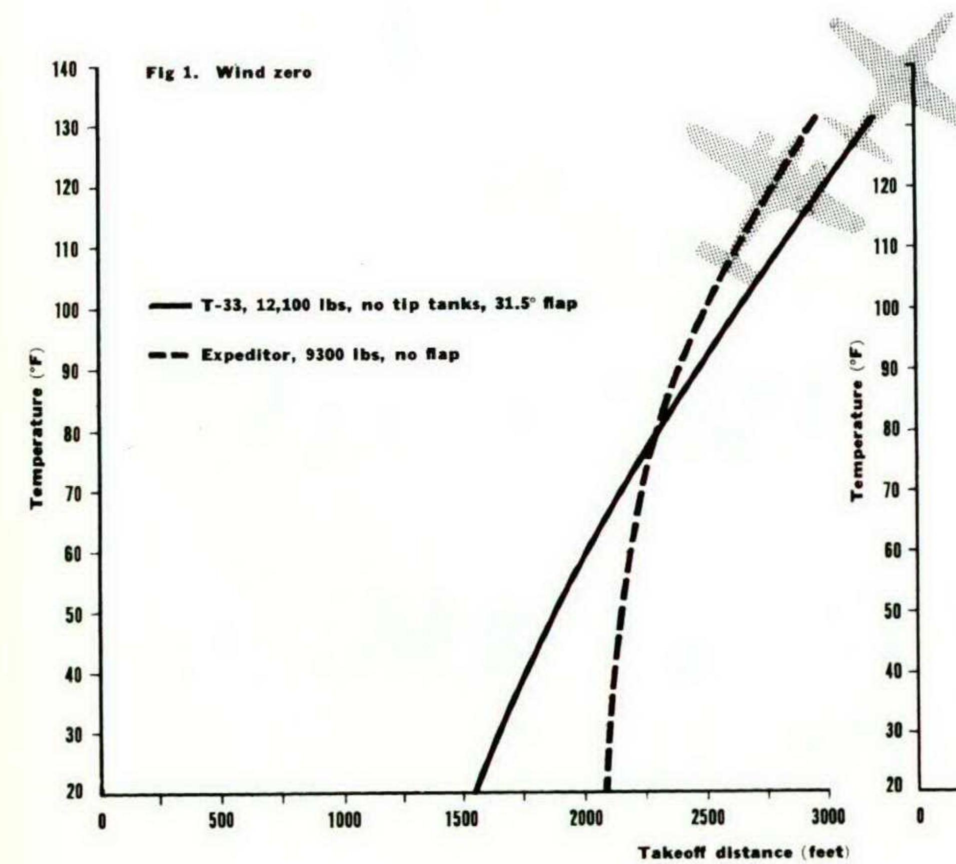
HIDDEN AMONG the many pleasant aspects of summer are a few discomforts which can make the season a little unpopular. One of these is high temperatures. Very much desired when not too high, they become almost unbearable when they reach the 90s and remain there for a stretch. To people in the flying business, however, it's more than a matter of mere comfort, for high temperatures mean longer takeoff runs.

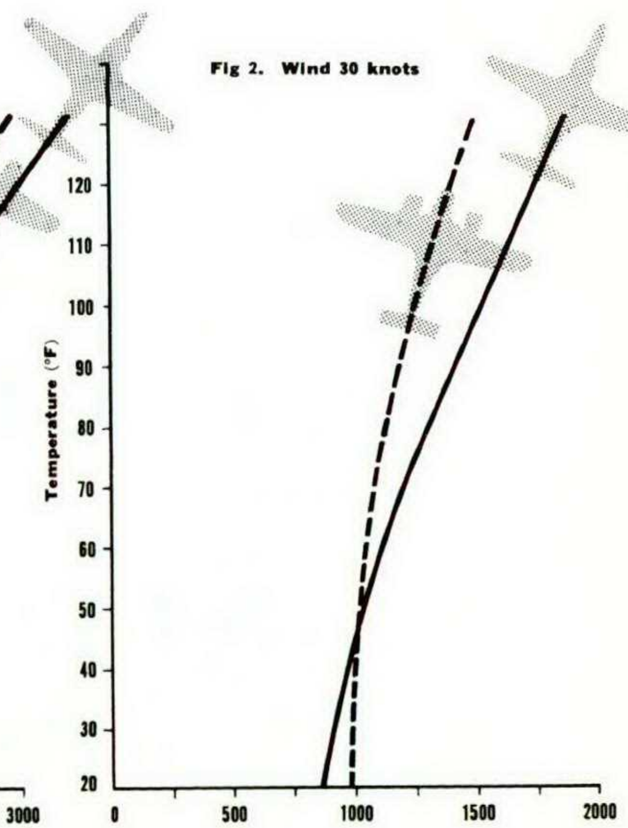
Partly because our summers never get really broiling, and partly because we have a lot of good drivers, the RCAF has had no fatal accidents resulting directly from this cause. But since it has been mentioned as a contributing factor, we offer you here an "ounce of prevention", just in case.

Jet vs Prop

The adverse effect of high temperatures on aircraft performance is greater for jets than for propeller-type aircraft. This is mainly due to the fact that an increase in ambient air temperature causes a reduction in the power output of an engine. A jet engine suffers a greater loss of power, for a given temperature variation, than does a piston engine.

The effect of temperature on the takeoff performance of T-33 and Expeditor aircraft is shown in figures 1 and 2 where takeoff distances are plotted against temperature. Each one-degree rise in temperature can add from 3 to 24 feet (depending upon an aircraft's all-up weight and configuration) to a takeoff run. Because of temperature difference alone, there can well be—between the cold days of winter and the hot days of summer—a 50% increase in the takeoff run of an Expeditor and a 100% increase in that of a T-33.





Sunny side up

Eggs for Dinner

Just how high can temperatures go in the summertime? Well, ground temperatures of 160°F have been recorded, and on some southern exposures temperatures as high as 175°F have been observed. An interesting experiment anyone can perform is the cooking of an egg by insolation alone. A raw egg with its shell blackened is placed in a well-insulated box whose sides are also blackened. The box is then covered with a pane of clear glass and exposed to the sun. In a short time the temperature of the egg will soar to 250°F, sufficient heat to cook it and some to spare!

What Temperature?

Enough of the domestic side. Back to aviation where extreme temperatures can be destructive if not fully respected. Figures 1 and 2 show that the T-33 requires twice as much runway at 130°F as it does at 30°F. The effect Old Sol has on takeoff distance is thus equivalent to shrinking the runway to half its normal length! Little wonder that surface temperatures should be carefully checked before takeoffs during the summer. Whenever surface temperatures are involved, a question must be asked: How accurately do the reported surface temperatures represent the actual temperatures over the runway?

It is common knowledge that on a hot summer day the air over asphalt is much hotter than the air over an adjoining grass surface. Figure 3, showing the vertical temperature distributions over a grass area and over a paved area, illustrates the difference that can exist. At ground level the air over the pavement is 27 degrees warmer. Between four and seven feet above ground—the average height of the intake duct of the jet engines—the difference is 15 degrees. Admittedly this is an extreme case, but it is the extreme or unusual condition that generally causes accidents and therefore it must be considered and diligently guarded against at all times. Is this temperature difference of 15°

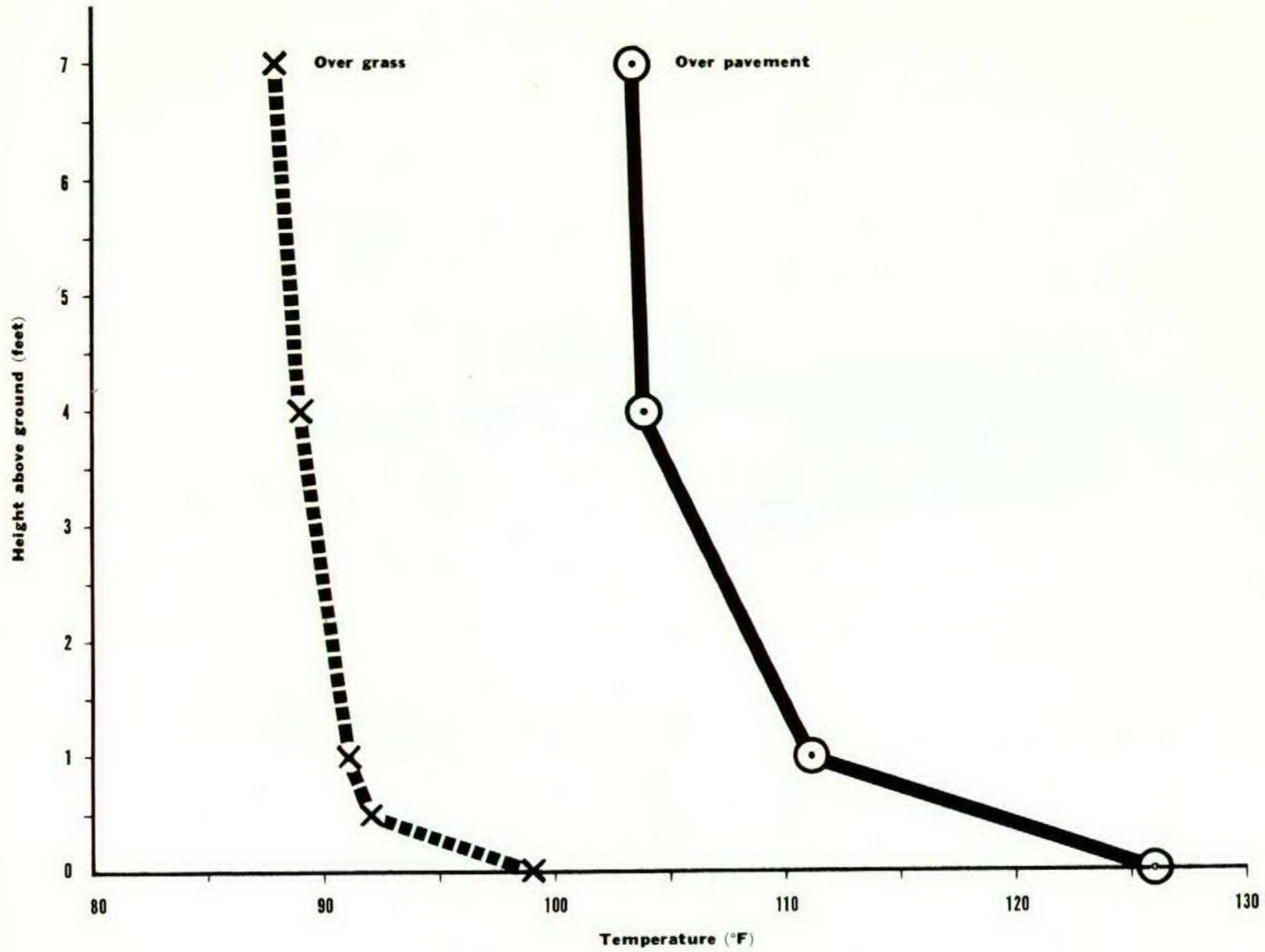


Fig 3. Vertical temperature distribution

important? It is enough to increase the takeoff roll of a CF-100 (maximum all-up weight, temperature 90°F) by about 750 feet at sea level and 900 feet at 2000 feet above sea level.

Case Histories

Two incidents involving high temperatures are worth citing because they illustrate the proportions to which the problem grows in some of the really hot areas of the world.

A T-33 pilot took off from a field that was at a higher altitude than his home base. The temperature on the field was 95°F. The temperature over the runway was anybody's guess. After using all of the 8000 feet of runway the pilot, in desperation, pulled the aircraft off

Probably higher than those recorded

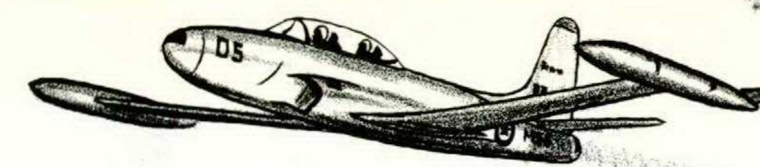
and staggered aloft—only to settle onto the overrun, a hundred feet from the end of the pavement. He again became airborne long enough to pick up a few yards of power line. This lucky pilot managed to get back to base with no damage to himself, but with a badly crippled aircraft.

The second case, that of an XF-90 penetration jet fighter, had a happier, Hollywood ending. This time the "screen" temperature was a mere 115°F. However, the runway was long—12 miles of dry lake bed. At 5000 feet (the normal takeoff distance) the aircraft was doing only 60 mph. Eventually, at 15,000 feet, it struggled off, remaining only two feet above the lake bed until the gear was raised. Even with gear up the aircraft had to fly 25 miles before reaching its best climbing speed. Little imagination is required to visualize the consequences had this been tried at a regular airport.

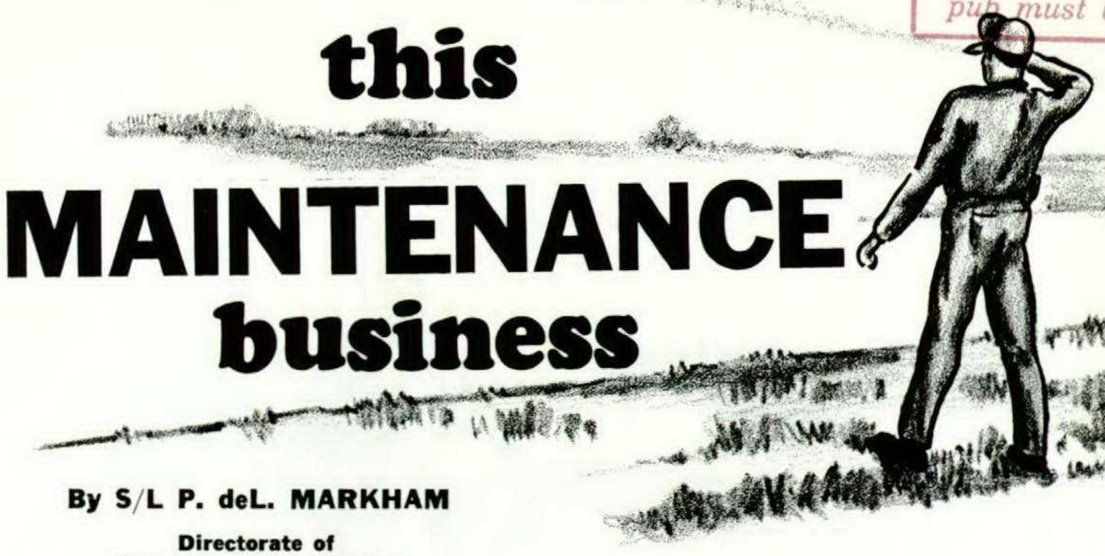
The ideal solution to the temperature problem would be to make weather observations at the ends of runways. Such a procedure is in effect at some fields but it is by no means a general practice yet. Until it becomes so there are a number of precautionary steps which pilots can take:

- Consider surface runway temperatures, if recorded
- Obtain the latest readings from the weather office
- Be prepared for runway temperatures 17° higher than those recorded near the weather office
- Compute takeoff run from the relevant chart in POIs.

HIGH TEMPERATURES MEAN LONGER TAKEOFFS



this MAINTENANCE business



By S/L P. deL. MARKHAM
Directorate of
Maintenance Engineering

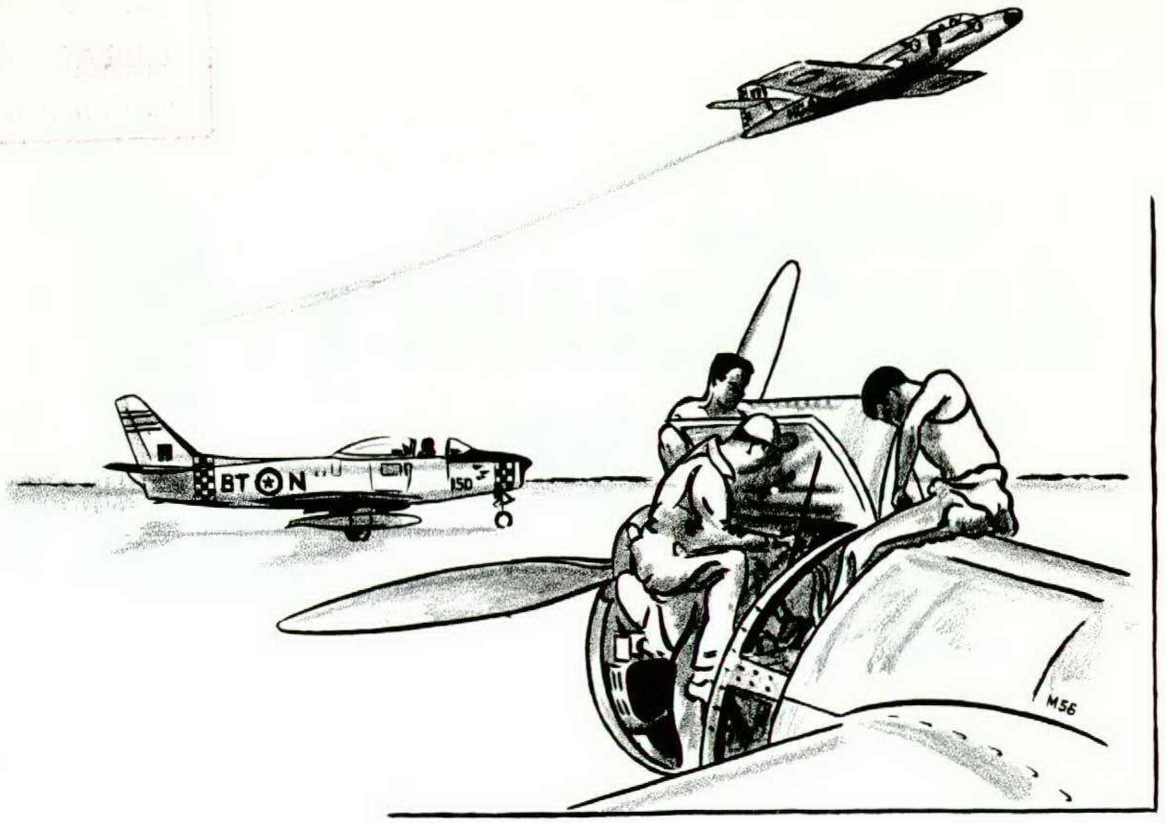
MOST PEOPLE BUMP into maintenance at a comparatively tender age. Not long after obtaining a bicycle they become familiar with servicing, minor repairs and modifications. Graduation to an automobile usually develops a further degree of skill in fault-finding and an ability to do certain basic jobs in order to keep down the operating cost.

Although there comes a time when other things become more important, the familiarity gained by puttering brings with it the realization that mechanical contrivances will not run indefinitely without attention and that routine checking can save time, money and inconvenience. Also, there arises a healthy scepticism of the blandishments of automobile salesmen and of the boasting of the chap whose car did "100,000 miles without so much as a plug change"!

True Craftsmen

Mechanical failures can be so final in aircraft that nobody would fly in one that was maintained like the average car. Every precaution must be taken to ensure that there is integrity in every component affecting flight safety. Carelessness, slipshod workmanship and inadequate knowledge are inexcusable.

Since "the man who maintains seldom flies", it is essential that those involved in maintaining aircraft remain continually aware of their great responsibility toward those who do fly them. A little thought on these lines occasionally is well worth while to the maintenance man—especially when he is working under stress—because he must never forget that the safety of human lives is dependent upon the skill and integrity which he brings to his work.



Aiding Designers

Aircraft maintenance in the RCAF is a vital part of operational flying because the potential to strike depends on serviceability—and a satisfactory standard of reliability cannot be built into an aircraft. This is not necessarily the fault of designers. We must remember that the business of defence is to keep one jump ahead of the threat. Consequently designers are involved in a race which seldom allows adequate time for testing and proving before aircraft come into service use. Decisions have to be made at an early stage, ease of maintenance must be weighed against performance—and past experience is not always applicable.

In the field there is a tendency for us to blame the designer without knowing his problems, and without recognizing that our own personnel are a part of what is necessary to get the most out of a weapon. Experience always leads to development and improvement and this experience is supplied to a large extent by the field. Operators in civil aviation do not get involved in these problems to quite the same extent because, at worst, it is probably possible either to purchase the same equipment as the competition or to steal his key personnel. But the Service operator is on the spot, so it is up to maintenance to make up for the deficiencies in serviceability and reliability which are inherent in the designer's problem.

Challenge to Maintenance

The modern operational aeroplane is an extremely complex mechanism embodying the latest advances in technology. Electronic and mechanical devices are incorporated in bewildering patterns, and the probability of unserviceability after flight has reached a high level. Obviously the influence of maintenance has greater significance than ever before, so only by observing top standards of workmanship can an attempt be made to achieve, with present aircraft, the utilizations which have been possible with similar aircraft in the past. The achievement of the necessary high standard is essentially the product of three factors: training, experience and ethics—and it is probably true to say that good ethics are the product of an environment in which the training and experience are the best obtainable.

Those who are reading this article are probably involved in our defence effort either as operators or maintainers. As an operator, you should realize that you are the first link in the maintenance chain because the information you provide is the starting point for rectification. Also, the speed with which an aircraft becomes serviceable again depends a great deal on the adequacy and accuracy of information. As a maintainer you should remember that you are the first link in the operational chain since it is your responsibility to provide the serviceable weapon with which an operation is to be conducted.

RCAF maintenance requires an extremely high standard of work among our personnel if the desired results are to be attained; and such a standard stems mainly from the proper motivation of personnel. The Service supplies training, tools and equipment—all of which can be rendered useless if keenness, enthusiasm and an awareness of the importance of the job being undertaken are absent in those who are doing the work. There is a lot of responsibility in this maintenance business. It is a full-time job for conscientious personnel.

THE AUTHOR

S/L P. deL. Markham was serving his engineering apprenticeship at Airspeed Limited, a subsidiary of DeHavilland, at the outbreak of World War II. Enlisting with the RAF, he flew on active duty in the UK from 1940-42, and in Southeast Asia from 1942-45. In 1947 he returned to Airspeed Limited where he eventually took charge of the service department. At that time he was also a member of the RAF auxiliary.

S/L Markham joined the RCAF in England in 1949. After a short spell with the Canadian Joint Staff, London, he came to AFHQ/AMTS on instrument and electrical development. From there he went to the Wright-Patterson Air Force Base at Dayton, Ohio, for a course at the USAF's Institute of Technology—which was followed by a posting to 3 AW(F) OTU at North Bay. S/L Markham is now back at AFHQ with the Directorate of Maintenance Engineering.

near miss

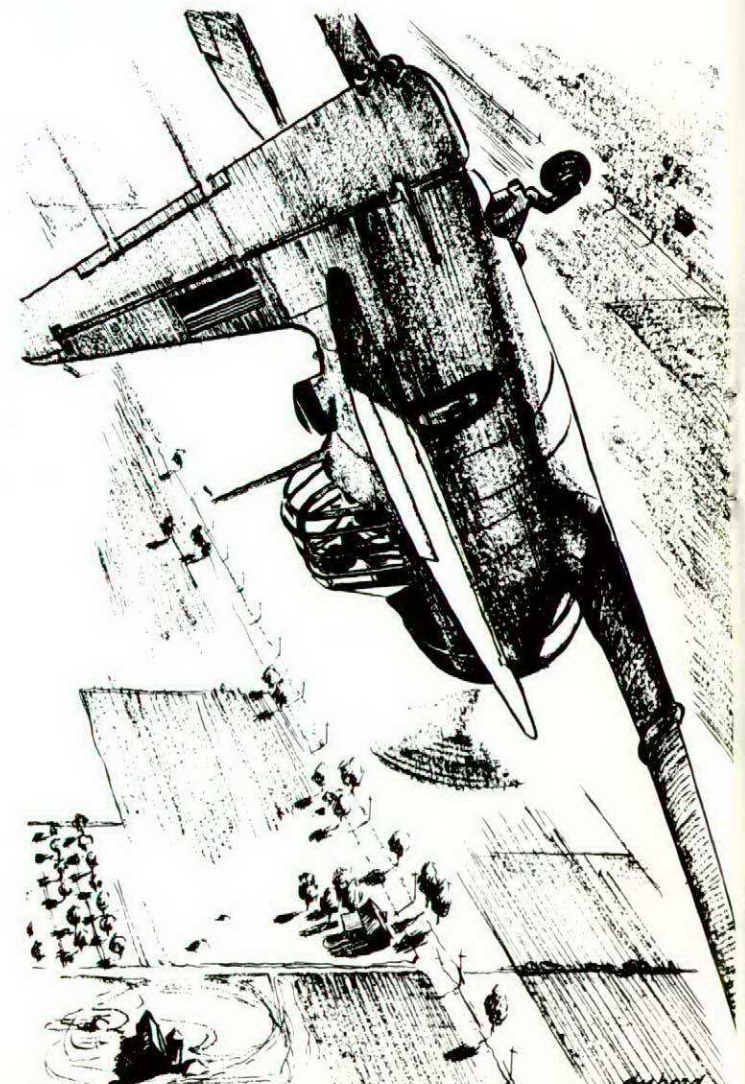
Advice from a Trainee

PERHAPS MY NEAR MISS will help to prevent some of those unexplained Harvard prangs at FTS. There are plenty of near misses, close shaves, and "whoops" at any FTS in the RCAF. We're like young birds stumbling toward independence; and like them we sometimes fall —or become too confident too soon, before our feathers grow. FLIGHT COMMENT's main objective should be to keep the old and wise pilots older and wiser, and to keep reminding us young'uns just how young we are.

My Near Miss occurred last summer at an FTS during my second solo hour away from the circuit's sweat. I was authorized to practise spins, stalls, and the one aerobatic manoeuvre I had been taught: loops.

After completing nearly thirty minutes of "clean" and 'down stalls, during which I managed four or five good spins in both directions, I began what were very wobbly loops. One-fifty-five, pull, ball in the centre—oh I was an expert after three or four of them, and cockiness blurred my commonsense. The old story came true when I decided to do some rolls.

Airspeed? Say about 130. Attitude? Probably doesn't matter for a roll. RPM and manifold? Likely what I would use for straight and level flight. What a snap this



Pure sweat and prayer

was going to be! I checked the vicinity, did my aerobatic checks, and (it turned out to be a fortunate move) climbed to a better altitude. I applied right aileron smoothly. When inverted, I returned the stick to its central position, believing the plane would continue rolling.

The man in the cockpit was wrong again. From 9000 indicated until I was straight and level once more, it was pure sweat and prayer. During my pull-through, the airspeed read 200 knots—and the altimeter needle spun to 1000 feet above hard ground!

My subsequent circuit was sloppy and my landing rough. If another emergency had occurred then, after what I had just gone through, I might not have reacted in time. Fortunately I returned to the ramp without further incident.

Fellows, don't ever think you are old enough to forget. We trainees learn something new every moment, and so must you. You older types are paving the air for us fledglings, so make it solid! I believe I learned a great deal from my mistake, and perhaps others can from this report. Insufficient knowledge in precise manoeuvres, over-confidence, and unauthorized flying—they almost resulted in a telegram to my folks. To alter a familiar quotation,

> Trust not the seat of thy pants nor the devil in thy soul, but follow thine instructions.

Reverse Trim

Following an elevator change a Dakota was scheduled for an air test. The pilots found nothing wrong during their external and internal checks so the engines were started and the aircraft was taxied out to the runway.

Takeoff power of 48 inches was applied and at approximately 40 knots the tail came up. By the time speed had been increased to 75 knots, elevator control felt heavy and the aircraft showed no tendency to come unstuck. The pilot tried to trim the tail down and at the same time applied heavy back pressure on the control column. At 90-100 knots the Dakota became airborne for a short distance but settled back to the runway as soon as the back pressure on the control column was relaxed. Again the pilot applied heavy back pressure on the control column and tried once more to trim the tail down; but each attempt served only to add to the weight on the control column. The Dakota once more became airborne momentarily—and then touched down again.

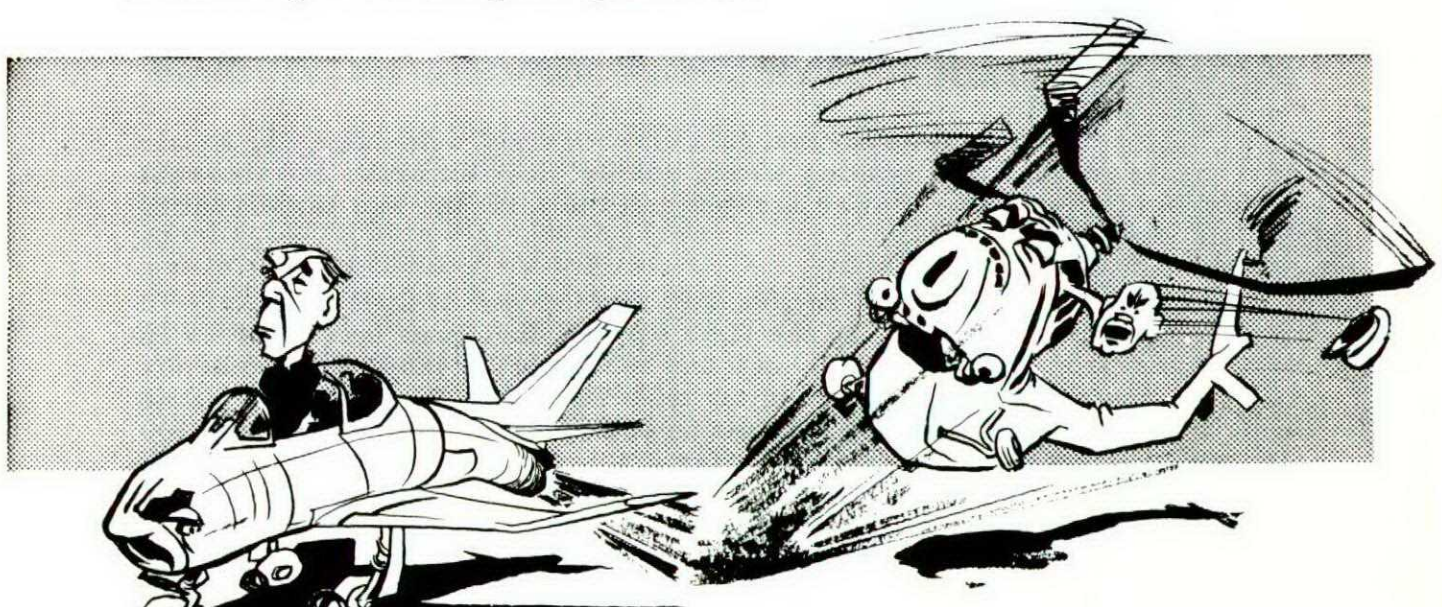
Since these manoeuvres had used half the runway, the pilot decided that he must abort the takeoff. The aircraft was stopped, undamaged, 200 feet in the overrun.

Investigation revealed that the elevator trim tabs had been incorrectly installed, causing trim to be reversed when a selection was made. F.S. Memo, Volume 2 Number 3, should serve as a reminder to air- and ground crews to take a second careful look—particularly after maintenance work on control surfaces.

Jet Blast vs Helicopters

A helicopter had returned from a local flight and the pilot was preparing to land at his usual location. He had checked the area and was cleared by the tower when unexpectedly a run-up was started on a nearby Sabre whose jet blast was directed towards the landing aircraft. Feeling the edge of the jet blast, the pilot moved his helicopter to the right to clear the clouds of dust and made another circuit. Had the helicopter been caught in the full jet blast of the Sabre it is doubtful if a serious accident could have been avoided. Aside from the accident hazard, dust and dirt blown at helicopters by jets running up will produce a maintenance problem.

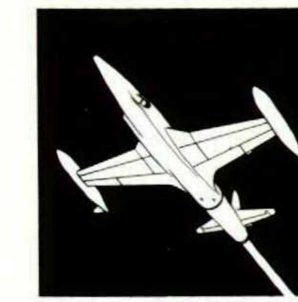
Instructions have been issued which call for a designated helicopter area on airfields. However, if a separate area is not possible, parking must be so arranged as to prevent jet or propeller wash from interfering with helicopter operations.



The full blast may cause a serious accident

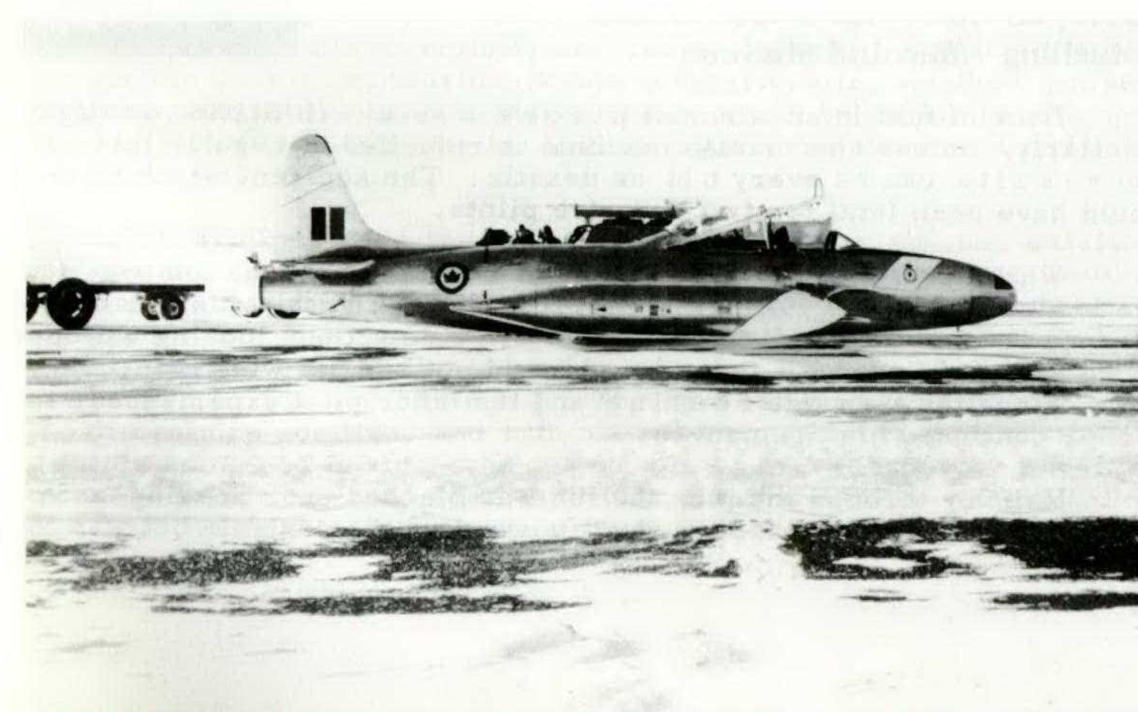
Accident Resumé

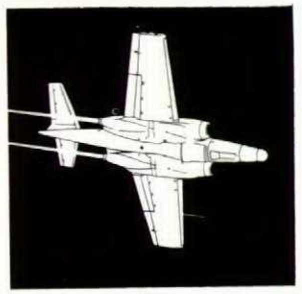
T-33



Get Cher Gear Down! —Don't Be a "Bird"

The T-33 was being flown on a unit check-out for a squadron pilot doing touch-and-go landings. On the fifth circuit he failed to do a full downwind check and entered the approach with his wheels up. The captain in the rear cockpit was watching for other traffic and also neglected to check the gear. When power was reduced the horn sounded, and at the same time the tower operator warned that the gear was up. Power was applied at once, but a combination of low airspeed and heavy load were too much and the aircraft bellied in. Complete checks will prevent that sinking feeling.



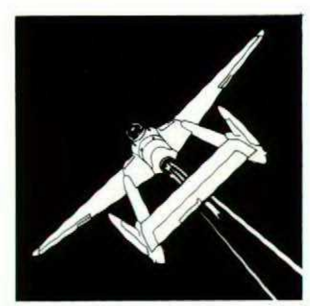


CANUCK

Dragging Brake

The pilot undertook his flight knowing that the starboard brake was sticking. Later, as he was landing at his home base, the aircraft veered off the runway to the right, damaging its airframe. The centre position of the runway on which the Canuck landed was clear and bare, with good braking. The pilot attempted to hold the aircraft straight with port rudder only and did not apply port brake until the aircraft had veered so far to the right that both wheels were on ice where braking effectiveness was nil. Early corrective action in the application of port brake would have held the Canuck straight. Knowing that his starboard brake was sticking, the pilot should have been prepared for a swing and ready with corrective port brake as soon as the wheels touched the runway.

VAMPIRE



Refuelling—Man and Machine

Lack of fuel in an aircraft places a severe limitation on flight. Similarly, unless the human machine is refuelled at regular intervals the results can be every bit as drastic. The accident which follows could have been fatal for two Vampire pilots.

While leading a two-plane element in battle formation practice, the leader called a 90-degree port turn towards his wing man. He glanced into the cockpit to check the turn rate. Upon looking out once more he was blinded by the sun and could not see his wing man. However, since the turn was routine and the other pilot experienced, the leader continued his manoeuvre.

Halfway through the turn the sun was blacked out. Sensing an imminent collision, the leader pushed forward on the controls but was too

late to do more than minimize the damage which occurred when the wingtips struck. The wing man had failed to step down sufficiently to maintain vertical separation during the turn. Furthermore, when he lost sight of the leader, he should have broken off the turn and advised of loss of contact.

Both pilots stall checked their aircraft and then returned to base. The fact that they landed their damaged aircraft safely is a tribute to their coolness and skill. Later investigation revealed that the wing man had not eaten for 14 or 15 hours before the flight, so it was felt that his mental alertness may have been affected. Without adequate nourishment pilots can be a menace to themselves and others.

CANSO

The Hard Way

The Canso was carrying 13 passengers on a flight from Tofino to Port Hardy. The aircraft was not equipped with sufficient seat belts to permit all passengers to be strapped in, and some who had seat belts available did not use them. Also, there were insufficient life jackets aboard. To cap this potentially hazardous neglect, the pilot, in trying to maintain VFR over Johnstone Strait in deteriorating weather, pressed on to the point where he considered that it would be unsafe to attempt a return. His alternative was to land straight ahead downwind and await clearing weather.

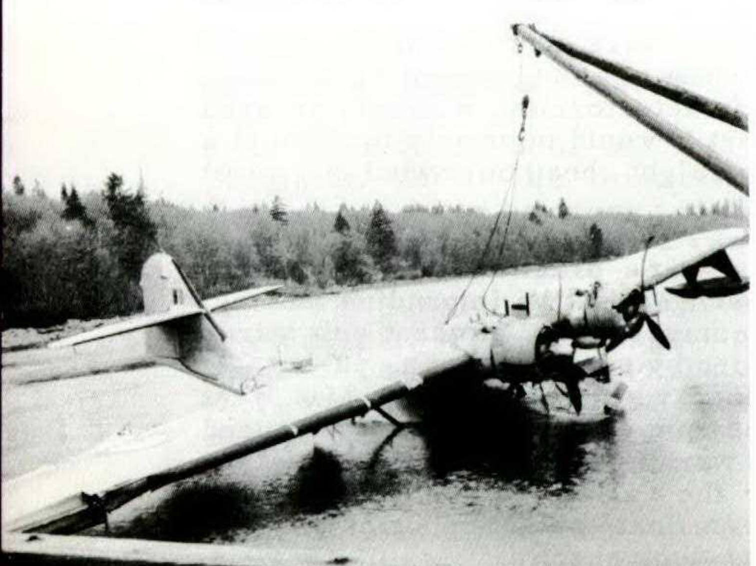
Preparations for a water landing were practically non-existent. The captain did not warn crew or passengers of the impending landing, so the navigator remained in the nose compartment. No seat belt warning was given. Life jackets were worn by some personnel but—to repeat—there were too few aboard, and even the co-pilot's Mae West was packed in his parachute bag. The rpm settings were not advanced from cruising position, and with no warning to the engineer, mixture controls remained in auto-lean. For the same reason, no wheelwell checks were done; and when the "down float" selection was signalled, there was no time to do a positive down-lock check.

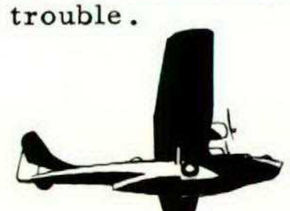
The approach was made in a 10-knot tailwind at a higher-than-normal airspeed and the aircraft touched the water in a flat attitude with a small amount of starboard drift. The nose at once began to dig in and the Canso went into a vicious waterloop to port. The nose section broke up, trapping the navigator, and two other occupants of the aircraft were also lost. The rest of the crew and passengers evacuated the sinking aircraft and were subsequently picked up by a ship. While awaiting rescue the crew demonstrated inadequate knowledge of emergency equipment in that they were unable to get the dinghy inflated.

By continuing the flight into increasingly bad weather the pilot placed himself in the position of having to do things too quickly. As a result he failed to complete the very necessary checks always associated with a successful water landing whether downwind or into wind:

- Life jackets must always be worn.
- Passengers and crew must be strapped in and be occupying proper locations. (Nose compartment vacant.)
- All personnel must be advised.

With these items taken care of, the pilot's mind is free to concentrate on the job in hand—that of getting the aircraft down in one piece. Captain, co-pilot and engineer must work in close cooperation. On signal from the captain, the engineer selects rich mixture on his controls. Propellers can then be set to high rpm. The engineer must see to wheel-well checks and the pilot must signal "floats down" in sufficient time to permit them to be checked down and locked. The co-pilot's job is to scan the alighting area for snags or deadheads and to check the airspeed. When these preparations are complete, the captain must concentrate his attention on maintaining a proper approach speed, eliminating drift, and holding off (probably with power on) until the correct landing attitude is attained. Under these conditions, landings will be successful. The water loop is discussed in an article on page 24 in the hope that the additional information will be instrumental in keeping you out of trouble.





GRUBLESS BELLY-RUMBLER

Gets up too late to catch the early worm and is in such a hurry to get airborne that he takes off without "grub". Has been seen stumbling about the sky in a weakened and not very alert condition—a menace to himself and others. The bird has no call but loud belly rumblings often herald its approach.

BIRD WATCHERS' CORNER

DFS