CRASH COMMENT

DFS

THIRD QUARTER, 1953

ISSUED BY
DIRECTORATE OF FLIGHT SAFETY
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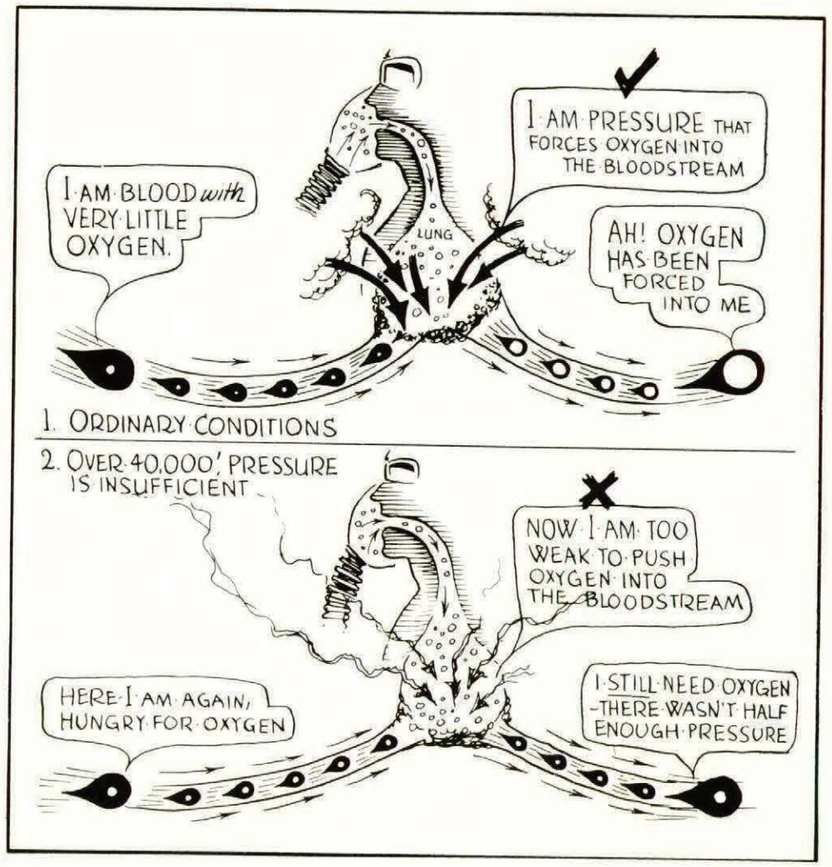
GOOD SHOW

One of the more enjoyable tasks that can fall to the lot of DFS is that of publishing the story of the fly-boy who has turned in an outstanding performance. It is emphasized that this section is distinct from that of "Commendatory Endorsements" which are covered in AFAO P9/14. In the past our access to information for Good Show write-ups has been limited to what can be found in certain accident reports. Without doubt incidents are in existence, other than the few that come to light through perusal of accident reports, which would make good reading and which might give other aircrew an aiming point for their own efforts. Squadron Commanders are, therefore, requested to submit, through normal channels, a detailed account of any case which they feel may merit inclusion in Crash Comment's "Good Show".

OXYGEN

In the article on the subject of Oxygen which appeared in our last issue certain questions were asked under the heading PHYSIOLOGICAL ASPECTS. Answers to these questions will be found in the present article and in one to be published in Fourth Quarter Crash Comment.



WHY YOU NEED EXTRA OXYGEN AT ALTITUDE

The oxygen in the air you breathe with your lungs wouldn't do you any good if it just stayed in the lungs. It has to get into your blood, which carries it all over your body.

Oxygen moves into the blood only because it is "pushed" in. It is under higher pressure in the lung air than in the lung blood - and you know that a gas will always go from a region of higher pressure to one of lower pressure. It is the oxygen pressure, then, that makes oxygen available to your blood, and so to all the distant parts of your body.

Oxygen pressure makes up the same proportion of atmospheric pressure as oxygen percentage does of air. Oxygen makes up about one-fifth (21 percent) of the air - at all altitudes, so it also makes up one-fifth of the air pressure - at all altitudes. Atmospheric pressure is 14.7 pounds per square inch (psi) at sea level. At sea level, then, the oxygen pressure is about 3 psi. This pressure is enough to push all the oxygen you need into your blood. At 18,000 feet, though, atmospheric pressure is 7.33 psi (only half of what it is at sea level) so the oxygen pressure is only 1.5 psi - not enough to push sufficient oxygen from the lung air into your blood. The higher you go and the less the atmospheric pressure, the less the oxygen pressure, and the less oxygen you actually get into your blood. That is why you need extra oxygen at altitude - because the oxygen pressure in the air is not enough.

If you were to breathe air that is more than one-fifth oxygen, say one-half oxygen, the oxygen pressure would be half the atmospheric pressure. At 18,000 feet with this arrangement the oxygen pressure would be half of 7.33 psi (atmospheric pressure) - ough to force plenty of oxygen into the blood. That is just the arrangement you have with your oxygen mask. It gives you a richer mixture of oxygen in the air you breathe and so you get a higher oxygen pressure.

The demand oxygen system automatically gives you as rich a mixture of oxygen with air as you need - at any altitude up to 40,000 feet. It increases the oxygen percentage enough to give it the necessary pressure. The higher you go, the richer the mixture, so the oxygen pressure stays the same as it would be on the ground. At 34,000 feet you need - and get - 100 percent oxygen, which keeps you at ground level conditions. You can go even higher than that with an oxygen mask, though, just as you can go to 10,000 feet without a mask. BUT THIS CAN'T GO ON. When you go above 40,000 feet, even 100 percent oxygen can't give you enough pressure for safety - because there is so little pressure in the atmosphere that even the total atmospheric pressure can't force enough oxygen into your blood! Does this stop you from going above 40,000 feet? Not if you can increase the pressure in some other way. You can do this - with a pressure cabin or a pressure mask.

While we're talking about oxygen, let's knock a few screwball ideas for a loop: Oxygen does not damage your lungs. Oxygen does not damage your teeth. Oxygen is not habit forming. The moon is not made of cheese.

WHY FASTER BREATHING DOESN'T HELP

Don't force your breathing!

A few people occasionally make the serious mistake of thinking that a quick way of getting more oxygen at high altitudes is to breathe faster. It is true that this will get more oxygen into the blood, but it will also knock you out if you keep it up. Curiously enough, this is due to the fact that carbon dioxide is eliminated too rapidly. You would think there was no harm in eliminating this gas, since it's a waste product. There isn't, unless you do it too fast.

HERE'S WHY

The rate of your breathing is regulated automatically by how much carbon dioxide is in your blood. The depth and speed of breathing increases as the blood's load of carbon dioxide increases, and decreases as the load decreases.

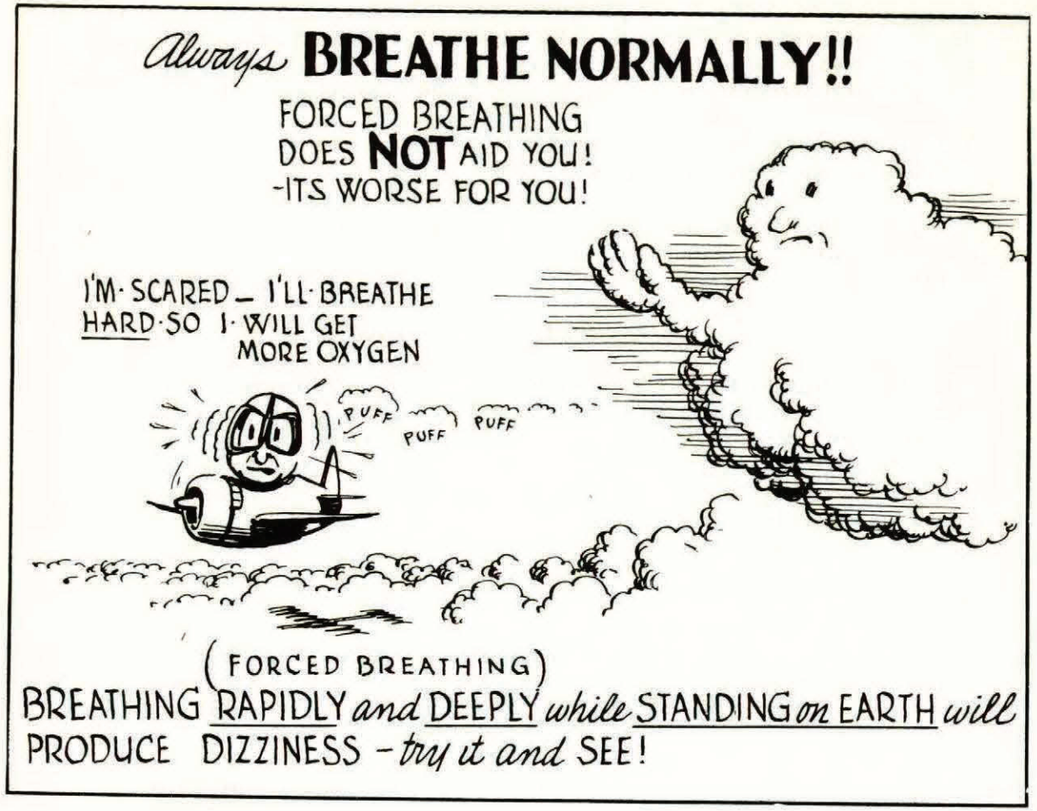
This is as it should be. When you're on the ground, your need for oxygen depends on how much work you're doing. When you run around the block, you breathe faster without thinking about it. The carbon dioxide which accumulates in your blood does your thinking for you.

It is the same at altitudes, because, wearing your oxygen mask, you are, as far as oxygen goes, still "on the ground." Therefore you never have to breathe faster unless extra work requires it - and under those circumstances, carbon dioxide regulates your breathing for you.

Don't overbreathe! If you do it long enough you will get rid of too much carbon dioxide. This will cause you to get dizzy and develop spots in front of your eyes; your fingers and toes will get numb and eventually they may get paralyzed.

You may tend to overbreathe especially when you are excited or scared. Watch your breathing at those times. Other than that, forget about your breathing - let carbon dioxide do your thinking for you!

DON'T DO FORCED BREATHING!



HOW TO RAISE YOUR CEILING

Earlier in this article you learned the importance of oxygen pressure. Oxygen pressure in the lungs is the thing that counts! You also learned that, even if you breathe 100 percent oxygen with regular demand oxygen equipment, you have two "oxygen ceilings":

1. 34,000 Feet: is the highest altitude to which you can go and still get as much oxygen into your blood as you have when you breathe air at ground level. This is the "oxygen ceiling for ground level conditions." Above 34,000 feet, the oxygen pressure in your lungs begins to fall, as it does when you go from sea level to 10,000 feet without an oxygen mask.

2. 40,000 Feet: is the highest altitude at which you can fly safely. This is the "oxygen ceiling for safety." In an emergency, you might go as high as 43,000 feet ("oxygen ceiling for emergency"), but it would be dangerous to stay there for even a few minutes. Just as 34,000 feet when you breathe 100 percent oxygen corresponds to ground level when you breathe air - so 40,000 feet when you breathe 100 percent oxygen corresponds to 10,000 feet when you breathe air.

YOU CAN RAISE YOUR "OXYGEN CEILINGS" in two ways: pressure breathing and pressure cabins.

Both methods increase the oxygen pressure in your lungs, the first by "pressurizing the lungs," the second by "pressurizing the cabin."

PRESSURE BREATHING

WHAT IS PRESSURE BREATHING? Pressure breathing is a method of raising your ceiling. Oxygen is delivered to your mask under a positive pressure, in order to raise the oxygen pressure in your lungs. You regulate the delivery pressure of oxygen according to how much you have to raise your lung oxygen pressure, and that depends on your altitude. The delivery pressure is measured in inches of water. Pressure breathing equipment allows you to use oxygen under a positive pressure of up to 12 inches, although we use only pressure of up to 8 inches, except in case of emergency.

HOW PRESSURE BREATHING CHANGES THE WAY YOU BREATHE. In normal breathing: breathing in requires effort. Breathing out doesn't. In pressure breathing: breathing in requires little or no effort. It becomes much easier to inhale, because the oxygen flows into your lungs "under its own power." With 4 or more inches of water pressure you "inhale" without any effort at all! Breathing out takes effort because you are exhaling against pressure. This feels a little odd at first, but you get used to it very quickly. You can breathe for several hours without any discomfort against 6 to 8 inches of water pressure. It becomes a little difficult at pressures much higher than this, though, and it requires special training to be able to breathe against 12 inches of water for even a short while. The important thing is that you get used very quickly to as much as 8 inches of pressure and can breathe against it for hours without difficulty.

ADVANTAGES OF PRESSURE BREATHING. Pressure-breathing demand oxygen equipment does four things for you that regular demand oxygen equipment does not do:

1. Pressure Breathing Gives You a Safety Factor Between 30,000 and 40,000 Feet. The use of a pressure of 2 inches between 30,000 and 40,000 feet is called "safety pressure." Breathing against this pressure at these altitudes gives you a safety factor in two ways: by

raising your "oxygen ceiling for ground level conditions" a few hundred feet; and, even more important, by guaranteeing that you breathe the 100 percent oxygen which your oxygen regulator is delivering to your mask. You get 100 percent oxygen at very high altitudes with regular demand oxygen equipment only if your mask fits perfectly. A small mask leak may not amount to much at the lower altitudes, but it grows much bigger at the higher altitudes and prevents you from actually getting 100 percent oxygen into your lungs.

Pressure breathing is extra insurance against this - it guarantees you 100 percent oxygen because it supplies it under pressure. It compensates for possible mask leaks.

2. Pressure Breathing Raises Your "Oxygen Ceiling For Safety" From 40,000 To 43,000 Feet. Breathing against pressure will raise your "oxygen ceiling for safety." Your "oxygen ceiling for safety" is

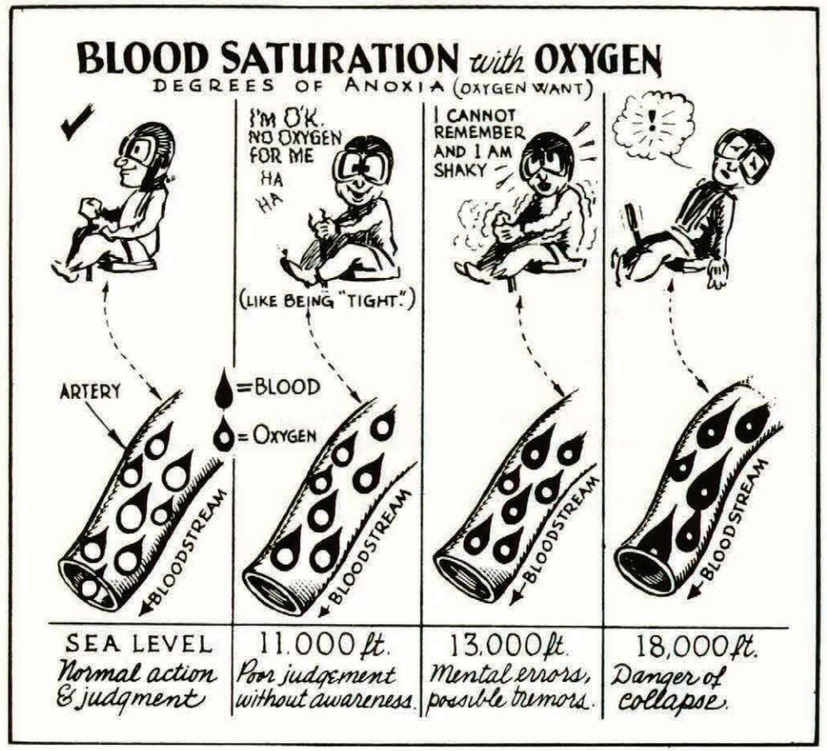
10,000 feet without oxygen equipment;
40,000 feet with regular demand oxygen equipment;

41,000 feet if you breathe against a pressure of 4 inches of water;

43,000 feet if you breathe against a pressure of 6 to 8 inches of water.

3. Pressure Breathing Raises Your "Oxygen Ceiling for Emergency" From 43,000 Feet to 47,000 Feet. In an extreme emergency you can go to 47,000 feet if you breathe against a pressure of 12 inches. It is dangerous to stay there, however, for even a few minutes - and remember that breathing against 12 inches of water pressure is difficult even with training.

4. Pressure breathing Protects You If Your Pressure Cabin Loses Its Pressure. Penetration of the pressurized cabin, or cockpit by gunfire causes a sudden loss of pressure which brings the flyer who occupies the cabin in contact with the low atmospheric pressure outside the aircraft. He might not have needed the oxygen before, but he needs it now - and in a hurry!



HOW OXYGEN LACK AFFECTS YOU

When the pressure is insufficient to force enough oxygen from your lungs into your blood, you develop symptoms of oxygen lack.

The higher the altitude,
The less the pressure,
The less the pressure,
The less oxygen in your blood.
The less oxygen in your blood,
The worse the effects on you.

And the longer the time over which this goes on, the more the effects of oxygen lack increase.

These effects are insidious, if you don't recognize them; for either they creep up on you without warning, or they begin by making you feel good - and that's even worse! A person suffering from oxygen lack may feel exhilarated (as though he's had a couple of highballs) at a time when his judgment, coordination, and memory are very faulty.

This combination of overconfidence and poor judgment - frequent with oxygen lack - is DYNAMITE. Any individual who feels too pleased with himself at altitude should think of the possibility that he is suffering from want of oxygen.

Although it varies somewhat with different individuals, the effects of oxygen lack may be summarized in general as follows:

At 8,000 to 10,000 feet (more than four hours):
fatigue, sluggishness

At 10,000 to 15,000 (two hours or less):
fatigue, drowsiness, headache, poor judgment

At 15,000 to 18,000 feet ($\frac{1}{2}$ hour or less):
false sense of well-being
overconfidence
poor judgment
narrowing of field of attention
unsteady muscle control
blurring of vision
poor memory
faulty reasoning
may pass out

Over 18,000 feet:

above symptoms come on faster
loss of muscle control
loss of judgment
loss of memory
loss of ability to think things out
no sense of time
purposeless movements, repeated again and again, emotional outbursts, like fits of laughing and crying

Loss of consciousness generally occurs:
at 26,000 feet in 4 - 6 minutes
at 28,000 feet in 2 - 4 minutes
at 30,000 feet in 1 - 2 minutes
at 35,000 feet in 50 seconds or less
at 38,000 feet in 30 seconds or less

Remember that these time figures vary with the individual and with the "work" he is doing. Death from oxygen lack has occurred in as little as 3 minutes at 23,000 feet in combat.

One of the most important effects of oxygen lack is the reduction it causes in night vision. Poor night vision is the first effect of want of oxygen. That is the reason oxygen must be used from the ground up on tactical and combat missions at night.

The importance of this subject can not be over-emphasized. With the development of high altitude high performance aircraft oxygen and oxygen equipment have assumed positions of major and ever increasing importance. Valuable insurance to you is your intimate knowledge of the equipment supplied for your use and your intelligent handling and use of that equipment.

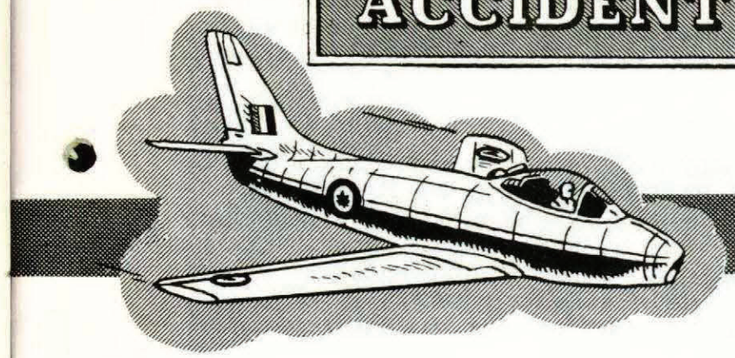
LIFE EFFICIENCY

O_2

BE OXYGEN SMART!

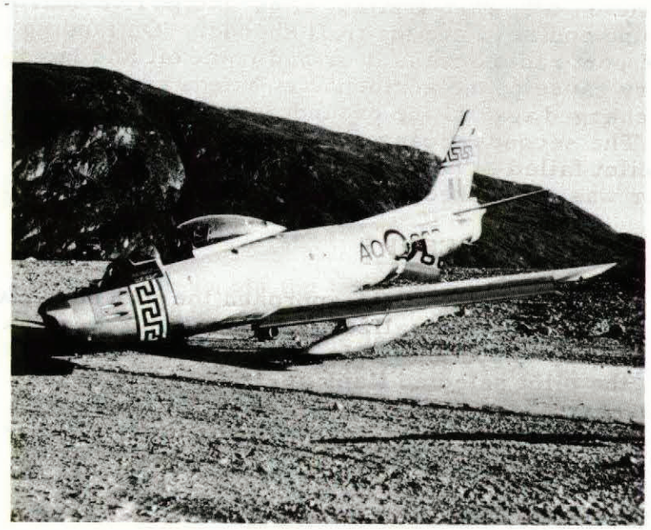
YOU'LL LIVE LONGER IF YOU ARE

ACCIDENT RESUMÉ



SABRE

1 -- FLAPS HAVE A PURPOSE



The pilot was flying as number four in a four plane Sabre formation ferry flight. Numbers three and four overshot on joining the circuit at a USAF base. On the second landing attempt number four landed with too much speed, failed to apply normal braking action and failed to lower his flaps. The inevitable resulted. The Sabre ran off the end of the runway and rolled to the bottom of a fifteen foot decline. The nosewheel collapsed during the drop and the Sabre suffered "B" category damage.

2 -- TARGET FIXATION?

On an air to air gunnery exercise the pilot pressed his attack too close. The Sabre's starboard wing struck the top end of the flag spreader bar. The starboard slat and leading edge had to be replaced.

3 -- NOTE THE DZUS

While in flight, the pilot was advised by his wingman that the starboard ammunition access door was missing. No damage was suffered by the aircraft other than the loss of the door. The primary cause of this accident has been assessed as "Maintenance" because the locks had not been properly fastened. The secondary cause has been assessed as "Pilot Error" because the pilot failed to ensure during his pre-flight external check that the door was securely fastened.

4 -- DZUS AGAIN

While on a routine training flight the pilot heard an unusual roaring sound and felt the aircraft shudder. On landing it was discovered the port radio access door had come off and damaged the fin. The primary cause of the accident has been assessed as "Maintenance" and charged against the groundcrew who failed to lock the dzus fasteners. The secondary cause has been assessed "Pilot Error" because the pilot failed to note on his pre-flight inspection that the access door was not locked.

5 -- OVERSHOOT PROCEDURE

On overshoot after a GCA approach the pilot neglected to raise the flaps. By the time he realized that the flaps were extended the speed had built up to 300 knots. In spite of his knowledge of the consequences, the pilot selected flaps up. He then returned to base and landed. Because of the "red line" speed with flaps having been exceeded the flaps were warped and when they were raised the wing trailing edge panel was buckled.

6 -- WRONG SELECTION

During the climb after take-off the pilot selected the undercarriage lever "Down" instead of the combat position. He immediately felt increased drag and heard a loud bumping sound. Airspeed was at once reduced from 310 knots to 165 and a circuit and landing carried out. The high speed lowering of the undercarriage resulted in damage to the nosewheel door and accessories.

7 -- COCKPIT CHECK INCOMPLETE

While taxiing towards the take-off point the pilot accomplished part of his cockpit check. He started the take-off run a few seconds behind his leader but aborted the take-off when unable to lift the nose-wheel off the runway. Because of its speed the aircraft could not be stopped before leaving the end of the runway and it was then damaged by rough ground. Technical investigation disclosed that trim was in the full forward position. Because of his inadequate cockpit check the pilot is charged with a "Pilot Error" assessment for the accident.

8 -- AIR FIRING

During an air gunnery exercise the pilot had noticed an abnormal condition of the drogue which he assumed to be a length of rope or "a bit of the flag unravelled". After several successful attacks on the drogue one was made from a disadvantageous position. The attack, instead of being broken above the drogue, was broken behind and slightly below. The pilot felt a heavy jar on the aircraft and tail vibration developed. The drogue flag was torn from the towing aircraft and the Sabre pilot assumed that he had struck the streamer

behind the drogue. This streamer turned out to be a tow cable which had been snagged by the drogue on take-off. Damage to the aircraft included rips to the wing, flap and vertical stabilizer inflicted by the cable. The primary cause of the accident was the pilot's breaking the attack to the rear instead of above the drogue in contravention of existing orders. The secondary cause is charged to ground for lack of warning of an obviously hazardous condition.

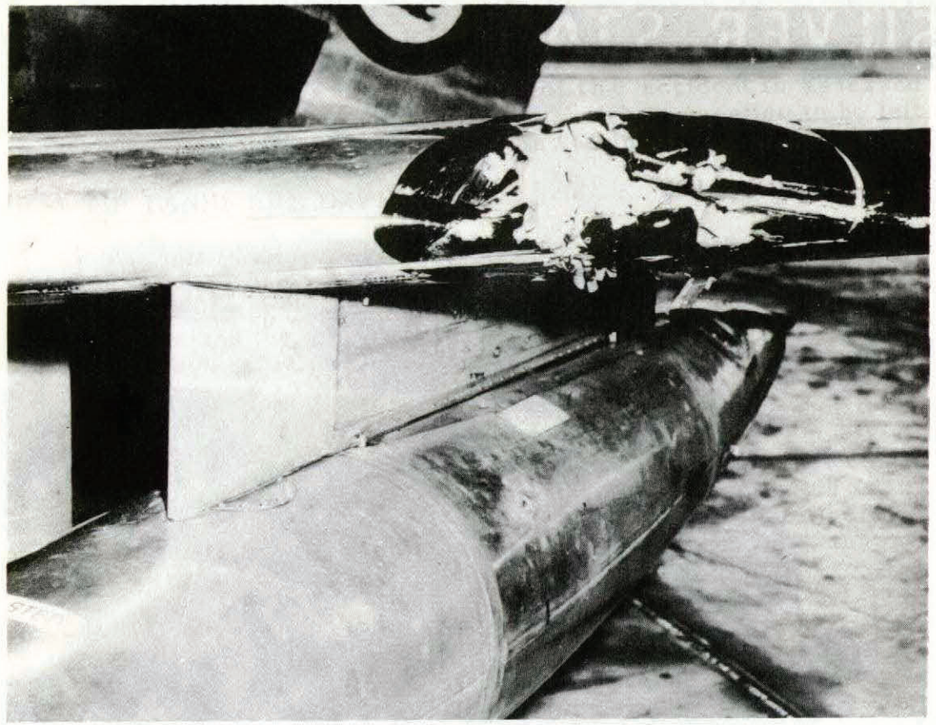
9 -- "A LITTLE KNOWLEDGE ....."

The pilot became lost after practicing high speed manoeuvres. His attempts to orientate himself and find his way back to base disclosed lack of adequate knowledge of some of the aircraft instruments. He first tried homing on the radio compass and then requested homing courses to steer. He did not understand or realize the necessity for resetting the C-2 compass after high speed manoeuvres. Too much time had elapsed before this instrument was cross-checked with the magnetic compass when a difference of 70 degrees was noted between the two compasses. The pilot did not declare an emergency nor did he report the compass discrepancy during his radio calls and eventually he had to abandon the aircraft when fuel was exhausted.

10 -- KNOW THOSE EMERGENCY PROCEDURES

The pilot of a Sabre experienced a failure of the utility hydraulic system. His operation of the emergency system was only partially complete since only the main wheels lowered and locked. In error the Gear Down Emergency Selector was not moved to nosewheel with the result that the hand pump was immovable. The aircraft was landed on the main wheels and nose. The accident is assessed as "Pilot Error". Knowledge of correct Emergency Procedures is good insurance.

11 -- LOW LOW LEVEL ATTACK

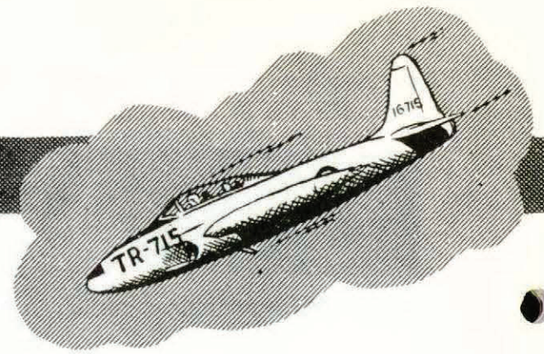


During a low level formation strafing attack the pilot chose a second target and continued the attack. In breaking off the attack and while looking around for other aircraft he lost more altitude to the point where he was unable to recover from the shallow dive soon enough to avoid striking an aerial on the roof of a GCA vehicle. The Sabre sustained damage to the port wing leading edge, slat, and port drop tank. During the briefing before the exercise the pilot was told that the minimum altitude over targets was to be 250 feet. The accident has been assessed as "Pilot Error".

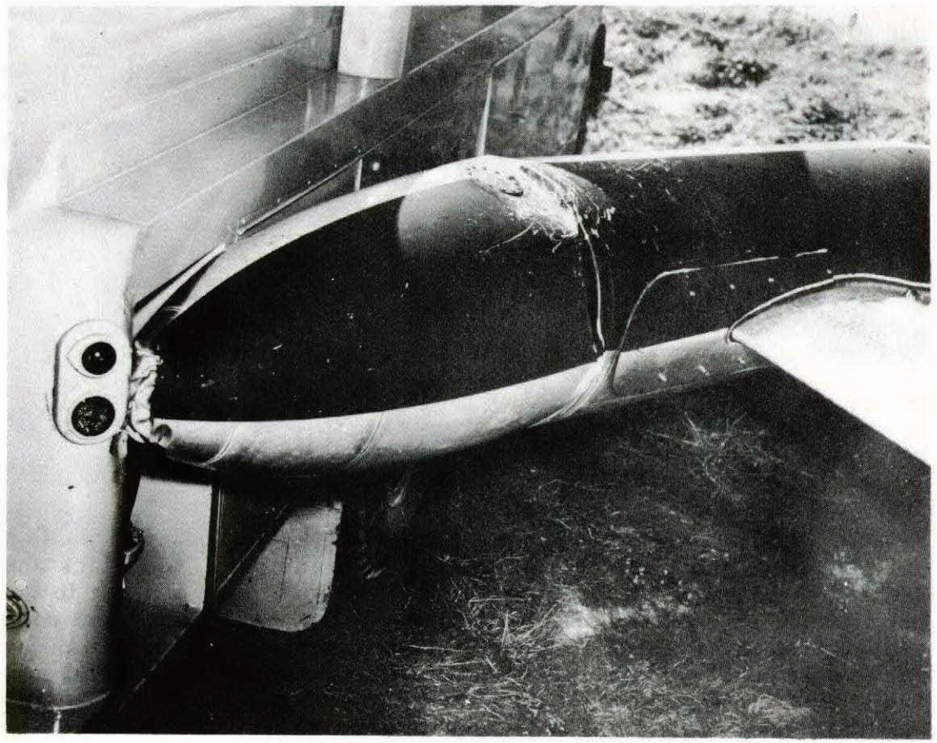
12 -- STRUCK THE DROGUE

The pilot was authorized to practice cine gun attacks on the drogue. An attack was made from a disadvantageous position and on break away the port wing of the aircraft struck the drogue. An assessment of the cine film revealed that a small angle of attack and a too close break-off range caused the accident. Pilots have been cautioned and re-briefed and advised to abort an attack if proper positioning has not been attained prior to the commencement of an attack.

SILVER STAR



13 -- REMOVE IT!



The pilot was parking a Silver Star on a dispersal under the guidance of a marshaller. The marshaller was giving directions from the port side of the aircraft. The starboard tip tank struck a refuelling tender, which was parked on the grass close to the dispersal. The cause of this accident has been assessed as "Pilot Error", because the pilot did not maintain an adequate lookout while parking his aircraft. Despite frequent repetition this fact is apparently still not generally understood - the pilot is solely responsible for the safety of his aircraft whether he is being assisted by a marshaller or not.

14 -- FUEL MIS-HANDLING

Having expended the fuel in the tip tanks the pilot turned the tip tank transfer switch off. During a rapid descent from high altitude the starboard tip tank collapsed. The tank collapsed because of vacuum induced by the transfer switch being in the off position and malfunction of a valve. The primary cause of the accident is assessed as "Pilot Error" because POI require the switch in question to be left on. The secondary cause is assessed as "Maintenance".

15 -- TIP TANKS ARE EXPENSIVE

The pilot was authorized to perform spin trials. After the pilot was seated in the front cockpit the groundcrew checked to ensure all switches were properly positioned. While in flight the pilot inadvertently pressed the drop tank release button causing both wing tip tanks to jettison. The port wing tip and the port aileron were damaged in the release. The cause of this accident has been assessed as "Pilot Error". The pilot issued inadequate or ambiguous instructions to the groundcrew who set the armament switches. The pilot instructed the groundcrew to ensure that all armament switches in the rear cockpit were "on". As the drop tank release switch is included in the armament switches this was also selected to the "on" or "ready" position. The pilot neglected to check personally that all switches were in the correct position.

16 -- HARD ON THE DIVE BRAKES

The pilot approached too fast and porpoised on touchdown. He decided to overshoot. As soon as the aircraft was airborne the pilot raised the undercarriage. The Silver Star sank back damaging the dive brakes, segment doors and tip tanks. The pilot completed the circuit and landed. This accident was caused by "Pilot Error". The instruction to be fully airborne before raising the undercarriage has been stated in writing and in words so many times there can be no excuse for such an accident as this.

17 -- LOUD SCRAPING NOISE

During landing the pilot heard a "loud scraping noise". He applied full power and went around again. Upon finally getting the undercarriage down and locked another approach was made in cross-wind conditions and porpoising took place. On the first attempt to land damage was caused to dive flaps, wing flaps and port tip tank. Porpoising, on the next attempt, accounted for additional damage to starboard undercarriage, leg fairing doors, and nosewheel. The accident resulted from the Pilot's failure to lower the undercarriage and is assessed as "Pilot Error".

18 -- UNDERSHOOT

During the round-out for landing the pilot of the Silver Star felt the aircraft shudder just before touchdown. Technical investigation revealed that the starboard wheel assembly had been damaged as a result of striking an obstruction in the "undershoot area". The accident is assessed as "Pilot Error" because the aircraft was flown too low on the approach and round-out.

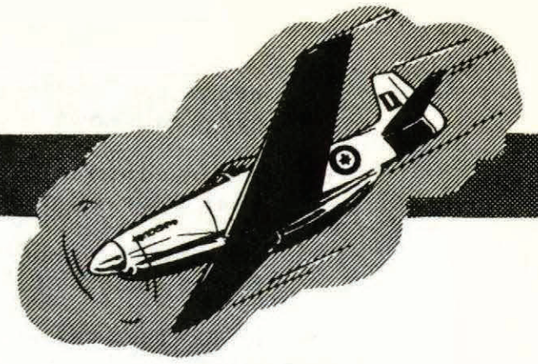
19 -- LOOK MA - NO CANOPY!

The captain and his mutual partner were practicing local night flying. Soon after take-off the captain noticed the canopy was partially open. The pilot in the rear cockpit decreased airspeed and the captain tried in vain to close the canopy. The canopy plus the pilots' crash helmets were torn away by the airstream. The pilots were not injured but the top of the fuselage was torn. The captain was charged with "Pilot Error" because he failed to make a thorough cockpit check and take-off check.

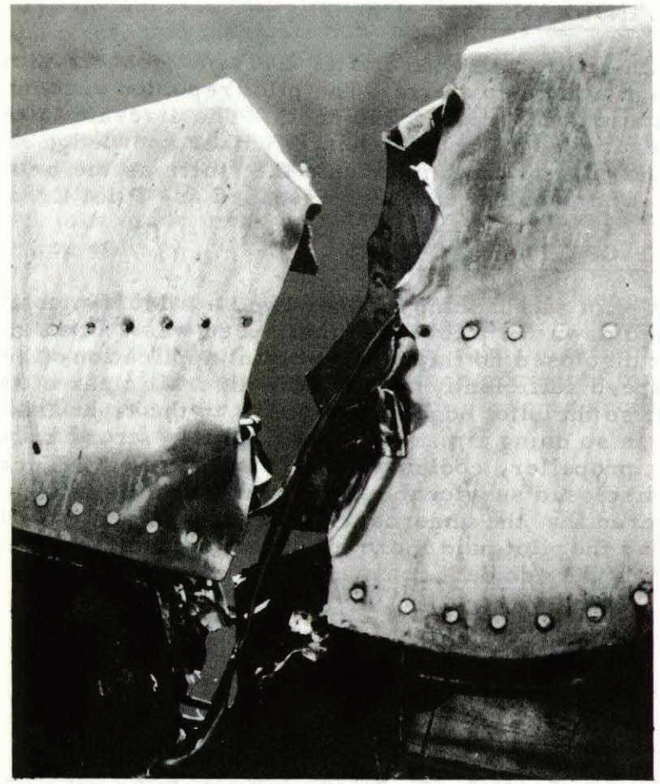
Let's join together and direct our attention to safer flying through

ACCIDENT PREVENTION

MUSTANG



20 -- UNDERSTAND AND OBEY INSTRUCTIONS



During an air to air firing exercise the pilot continued an attack to within 50 yards of the target at an angle-off of 5 degrees. In attempting to avoid a collision with the flag target he broke below instead of above the target. The starboard wing of the Mustang struck the target damaging the leading edge and the starboard flap. The pilot made the following errors:

(a) continued attack to 50 yards when the normal break-off range laid down is 200 yards;

(b) continued attack until angle-off was reduced to 5 degrees when angle-off minimum is laid down as 15 degrees;

(c) attempted to break the attack below instead of above the flag as instructed during briefing.

The pilot has been charged with "Pilot Error" because he disobeyed instructions and an accident resulted.

21 -- HAIL INSURANCE

While returning to base after a flight test the Mustang was flown through a thunder storm. The pilot reported encountering hail while maintaining a speed of 250 knots. The aircraft suffered denting on all leading edges and spinner. Weather knowledge should have prompted the pilot to circumnavigate the storm as the best form of insurance. The accident has been assessed as "Pilot Error".

22 -- DRILL OF VITAL ACTIONS

The pilot was landing number two in a Mustang. As the aircraft touched down the pilot noted that speed was excessive and a quick check disclosed no flap! Intermittent application of brake failed to reduce speed sufficiently to keep the aircraft clear of the formation leader, so the pilot edged his aircraft to the right and over on to the grass. In so doing a marker light cone was struck causing damage to the propeller, coolant radiator and air-duct. Technical examination disclosed serviceable flaps and hydraulic system. It was also discovered that the undercarriage lever was not in the fully down position. Had the pilot paid more attention to his drill of vital actions before landing the accident could have been prevented.

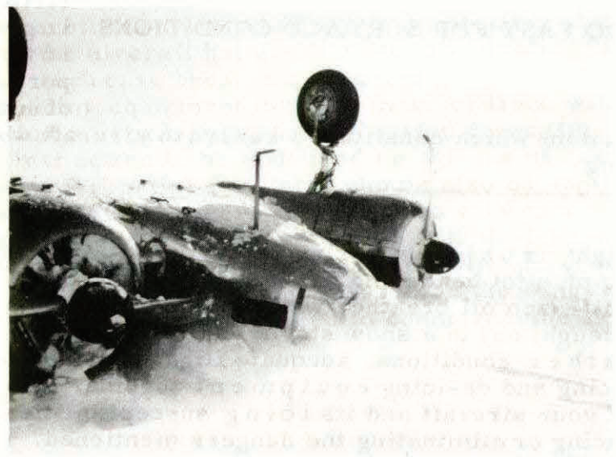
EXPERIENCE IS THE BEST TEACHER —
IF THE LESSONS LEARNED ARE APPLIED

WINTER WISDOM

With the rapid approach of winter weather the time has come for all good pilots to start reviewing the procedures which experience has shown will help them to avoid becoming victims of winter flying hazards. The fact that flying in winter is more hazardous than in any other season of the year is very apparent when it is considered that all the usual pitfalls are still around - plus those of snow, ice, sleet, and just plain cold weather. It cannot be denied that special techniques are necessary, that flight planning must be more thorough, and that each pilot, and indeed, each member of aircrew, must exercise even greater caution and alertness during this season.

From the maintenance standpoint, groundcrew personnel also have special problems which must be met. These problems concern such matters as care of aircraft, both undercover and in the open, winterization of aircraft, outdoor repairs and inspections, refuelling, and the many jobs made more hazardous and difficult by the plain fact of extreme cold.

Accidents caused or contributed to by such things as snow, ice, slush, and frost have plagued us in the past, but the knowledge gained can and must be used for prevention now and in the future. The following pages tell the story of our winter accidents for last year. It is possible to reduce the number of these seasonal accidents by the exercise of care and good sense.



WATCH FOR DEEP SNOW AND DRIFTS

SNOW

Of the 33 accidents attributable to winter conditions during the 1952-1953 season, 13 were the result of such phenomena as misplaced snow banks (i.e., set too close to runways, taxi strips, and parking areas), combinations of fast taxiing and icy runways, snow and ice resulting in poor braking action and one case of a nose-up because of a pool of water from melted snow. Such accidents are preventable by the application of good common sense. Slow and careful taxiing will eliminate much of the trouble, while adequate marshalling and care in the parking of aircraft are musts when new-fallen snow may hide obstructions. Airfield snow clearance should be done in such a way as to keep drifts and snow piles clear of runways, taxi strips and parking areas. Pilots should report any cases of snow banks or other obstructions which constitute a hazard to aircraft whether taxiing or parking.

TAXIING TOO FAST FOR SURFACE CONDITIONS

ICE

In-flight problems during winter operations can take many forms. Icing of pitot heads and carburettors has caused trouble and one case of a frozen oil breather was reported. In another instance a pilot was caught out in a snow storm and ran short of fuel. Knowledge of weather conditions, adequate flight planning, and correct use of anti-icing and de-icing equipment together with a thorough knowledge of your aircraft and its icing susceptibilities will go far towards reducing or eliminating the dangers mentioned. Your Pilot's Operating Instructions and POI - Aircraft General, list specific procedures which need not be enumerated in an article such as this but which should be known and followed.

HINTS ON ICING

* Icing is likely to occur below temperature inversions, along fronts, and over mountains. Temperature inversions, typical along a polar front, are caused by a relatively warm air mass rising above sub-freezing polar air. Moisture falling from the upper warm air through the lower cold air cools to sleet, freezing rain, or snow, and usually forms clear ice.

* Climb in all types of icing except sleet. The climb will be either to colder air where the rate of ice accretion will be slower, or, in the case of freezing rain, it will be a climb to warmer air above. Continue the climb as long as the temperature continues to rise.

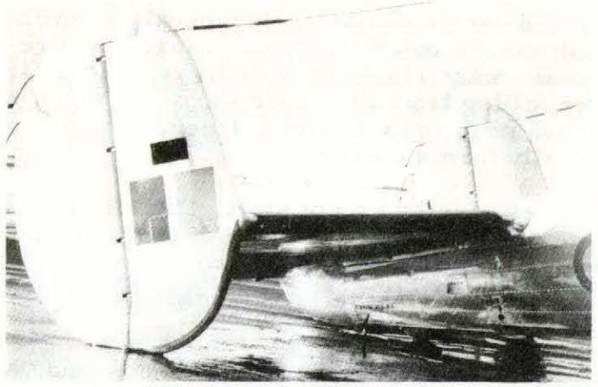
* When sleet is encountered, hold altitude or descend. A descent should never be made unless warmer temperatures are known to exist below and ceiling and terrain are such that the descent may be made safely.

* Airspeed should be lowered during flight in icing conditions. Do not fly at speeds lower than normal traffic pattern airspeed, however, as this may cause ice on the lower side of the wings where de-icer boots have no effect.

* When climbing or descending through icing conditions, use normal airspeeds with the highest rates of climb or descent practicable.

Ice accretion on wings and fuselage not only reduces the flying efficiency of the aircraft but also induces an additional hazard during landing. One such case became a reported accident. The use of anti-icing and de-icing equipment must be in accordance with the specific orders for that aircraft, but it can be stated generally, that prevention is the first action to be instituted in the use of carburettor heat and pitot heat. Propeller anti-icing should also be applied before ice is encountered. Wing de-icers must be used with care to avoid build-up of ice around the boots. Do not land with de-icer boots in operation because they act as "spoilers" and will increase the stalling speed. If a landing must be made with ice on the wings remember to maintain a sufficiently high airspeed to counteract the increased stalling speed caused by that ice.

SLUSH



Accidents were caused by the freezing of slush on undercarriage mechanism after take-off. If such a condition exists or is suspected a few up and down selections should be made immediately after take-off in order to clear the mechanism of moisture before freezing can cause trouble.

FROZEN SLUSH CAUSED THIS TAILWHEEL FAILURE

FROST

HOAR FROST PREVENTED THIS TAKE-OFF

The presence of hoar frost or snow on wings and control surfaces constitutes a take-off hazard which should be well known. It is significant, however, that two such accidents marred our flying program for last year. Frost is made up of individual crystals of ice which adhere readily to the skin of the aircraft. It forms when the air next to the surfaces of the aircraft becomes supersaturated with water vapour at or below freezing. The vapour then turns to ice without passing through the liquid state. Frost usually forms in clear air, and cannot always be foreseen. A heavy accumulation of frost may gather on the wings of an aircraft parked overnight in the open. When this happens, don't try a take-off until all frost is removed - you may not get off the ground.

LOST HORIZON

Whiteout is a condition in which the natural horizon is obscured. It can occur in a variety of ways, the most common being a combination of low ceiling and snow showers with snow covering the ground. Such conditions may result in a loss of natural horizon which means that the pilot must then control his aircraft with reference to the aircraft instruments. Failure to "go on instruments" can result in trouble as is shown by "whiteout" causing three accidents, during the 1952 - 1953 season, two of which were fatal. Under conditions of low ceiling and visibility, whether snow showers are present or not, it is a good safety rule to avoid violent manoeuvres such as steep turns.

WHITEOUT PUT THIS ONE ON ICE

FLYING GEAR

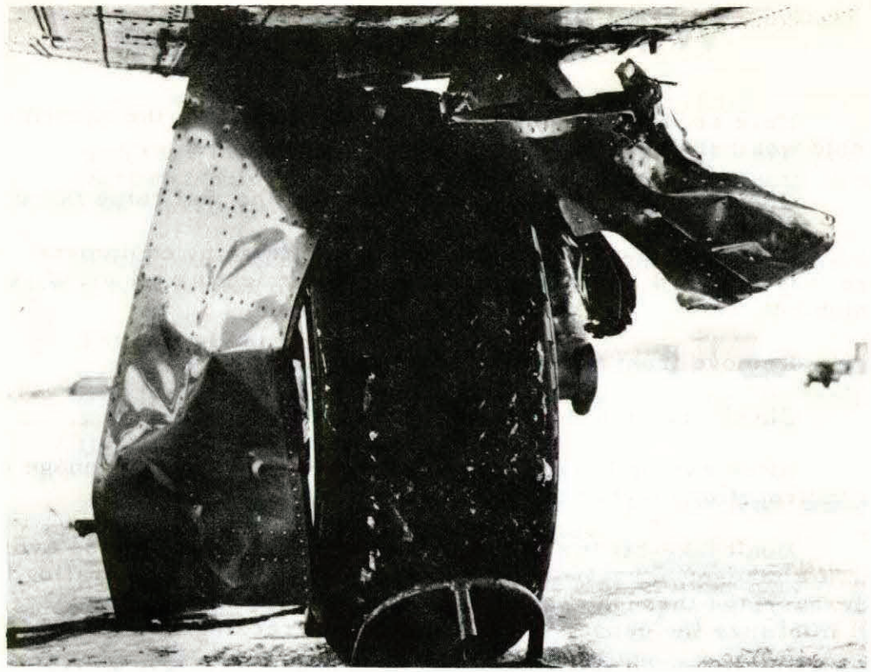
Clothing, strangely enough, was a factor in two reported accidents. In these cases, rudder pedals were jammed by flying boots which were too large for the wearers. Sloppy and ill-fitting clothing on the ground may expose the wearer to nothing worse than low-comedy remarks by his friends or a less-than-pleasant session with his CO. In the air, however, your personal flying gear, its fit and condition, can become vital. Its design is such as to afford maximum protection, comfort, and safety while flying, and constant efforts are being made to improve that design as well as to develop better materials and methods of manufacture. In the event of a winter forced landing, whether near civilization or in a remote area, your flying clothing can go beyond mere considerations of personal comfort and become a matter of life and death. It is to your own interest to ensure that you are correctly fitted - then wear the equipment and see to it that your crew and/or passengers are properly outfitted.

Loose or ill-fitting sleeve cuffs of flying suits are known to have caused inadvertent movement of switches and levers in jet aircraft. Remedial action is the responsibility of each individual pilot. Again, see to it that your equipment is correct and a good fit.

A tendency exists, among pilots, to fly wearing low oxford shoes. The dangers inherent in this practice should be obvious in the event of a forced landing or an ejection. Even in so-called civilized areas a walk of many miles in snow and low temperatures could be involved. On the other hand, if you are down and must stay with your aircraft until rescued, your heavy flying boots are of no help to you if they are reposing in your locker. Remember, frost-bite can be crippling.

POL

Winter accidents, from the maintenance standpoint, were caused in two instances by the use of the wrong grade of grease on undercarriage doors and locks. The heavy grease solidified in low temperatures rendering the mechanism inoperative. Maintenance orders specify the correct grades of lubricants for the conditions under which aircraft must operate. It is essential that these orders be followed for the protection of aircraft and crews.



RESULT OF USING WRONG GRADE OF GREASE

DILUTION

Oil dilution, the process of mixing gasoline with the engine oil in order to provide fluid oil for the next start, is particularly necessary in winter weather. One accident, the result of faulty oil dilution, was reported. Unless the procedure is carried out correctly the danger exists of incomplete dilution causing local congealing and a stoppage in oil flow on the next start resulting in either damage to the engine or at least a delay while the stoppage is cleared.

At the other end of the scale, a failure can be induced by having too much gasoline in the oil. Over dilution can be caused by too frequent operation of the dilution system if engine running times are too short to evaporate the diluent, or by exceeding the dilution time for temperature as required by your Operating Instructions. Frothing of over-diluted oil may then result in loss of oil, drop in pressure and the necessity for feathering the engine. Orders for your particular aircraft detail the correct procedures and times for varying temperatures. Do ensure that you know and employ the correct oil dilution procedure for your aircraft. This applies to aircrew as well as groundcrew.

WINTER CHECK LIST

Here is a winter check list that will help take the hazard out of cold weather flying:

✔ Check weather carefully. Ask the pilot who just came through.

✔ Before take-off check anti-icing and de-icing equipment. Be sure it is in good operating condition. You might need all of your equipment.

✔ Remove frost and snow before take-off.

✔ Check controls for restrictions of movement.

✔ After run-up in fog or rain, check wing and empennage for ice in propeller blast area.

✔ Don't take-off in slush or wet snow if it can possibly be avoided. If a take-off must be made under such conditions operating the undercarriage through two or three complete cycles after take-off will minimize the danger of failure through freezing.

✔ Use pitot heater when flying in rain, snow or clouds, as well as known icing zones.

✔ Remember when ice forms you will use more fuel to get to destination.

✔ Ice on the aeroplane causes increased drag, and all types of ice prevention measures take work away from the aeroplane that would normally go into the cruise range of the aeroplane, whether it be heat or boots. Therefore, if icing conditions are anticipated, a more conservative cruise control also must be anticipated.

✔ If flying in wet snow or freezing rain, change altitude if possible. Glaze ice is common in CU clouds. Choose an altitude of least icing.

✔ Use propeller de-icers just before getting into ice.

✔ Use full carburettor heat to clear ice. (Use carburettor preheat for prevention. Don't wait to cure). Watch your carburettor air temperature, especially between -5° and 10°C (23°and 50°F).

✔ Watch your airspeed - stalling speed increases with ice. Don't climb at a low airspeed.

✔ Check wing de-icers - Use them properly. Do not land or take-off with de-icers on. They act as spoilers.

✔ If you have a load of ice, don't make steep turns.

✔ Don't try three point landing if iced up. Fly in with power. Before starting landing approach, move throttle back and forth slowly to make sure carburettor butterfly is free of ice.

✔ If icing conditions exist use full carburettor heat on Initial but ensure it is returned to full cold for Final.

✔ Taxi slowly and carefully.

✔ Call for a tug if you believe conditions are not safe for taxiing.

✔ Use brakes with caution.

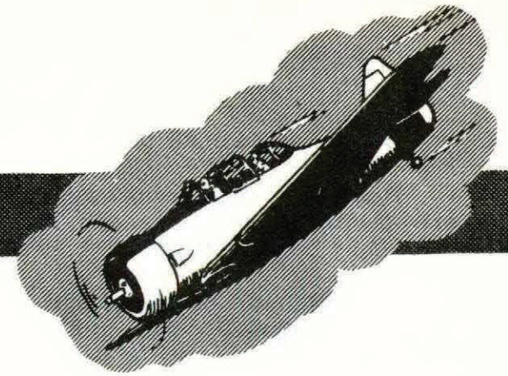
✔ Watch for snowbanks during landings, take-offs and taxiing. Report instances of inadequate snow removal.

✔ Request bright runway lights for landings in ice fog or snow flurries.

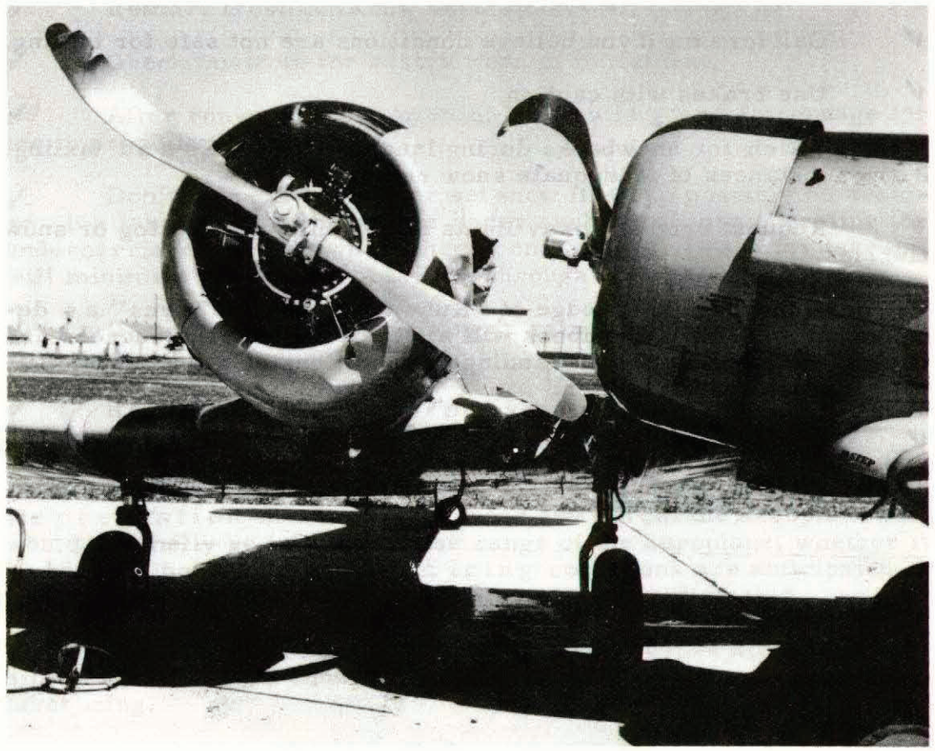
✔ A thorough knowledge of "Runway Procedure Turns" as detailed in your Pilot's Handbook will aid materially in the success and ease of an approach and landing in conditions of reduced visibility often encountered in winter.

✔ Be careful.

HARVARD



23 -- TAXI TANGLE



The pilot was taxiing to the parking area at the conclusion of a routine flight. There was ample room on the wide taxi way but the pilot, noting an aircraft ahead and to his left, took wide evasive action with the result pictured. Two aircraft sustained considerable damage because of the pilot's inadequate look-out.

24 -- DON'T TRY TO WEAN IT

The pilot was letting down into the landing circuit when he noticed the fuel pressure light come on. Instead of ascertaining the reason for lack of fuel pressure he operated the hand wobble pump. After the wheels up forced landing, examination revealed that the pilot had run the starboard tank dry and had made no attempt to change the fuel selector to a tank containing fuel. The port tank had 30 gallons remaining. The aircraft sustained major damage and the accident has been assessed as "Pilot Error".

25 -- WRONG TECHNIQUE

The student pilot attempted a three-point no-flap landing in conditions of strong, gusty winds. The Harvard tended to swing to the left as the port wing was raised by a gust. Corrective action was taken too late to prevent damage to the starboard wing which struck the ground.

26 -- BIG BOUNCE

While practicing circuits and landings the student pilot made a normal approach but on touching down the Harvard bounced badly. His corrective action consisted of the application of power and another landing attempt. On the second touchdown the aircraft swung sharply to the left and a groundloop resulted. Brake and rudder failed to correct. Instead of trying to salvage a bad landing the student should have "gone around again" after the bad bounce. A damaged aircraft was the result of this mistake.

27 -- IN THE ROUGH

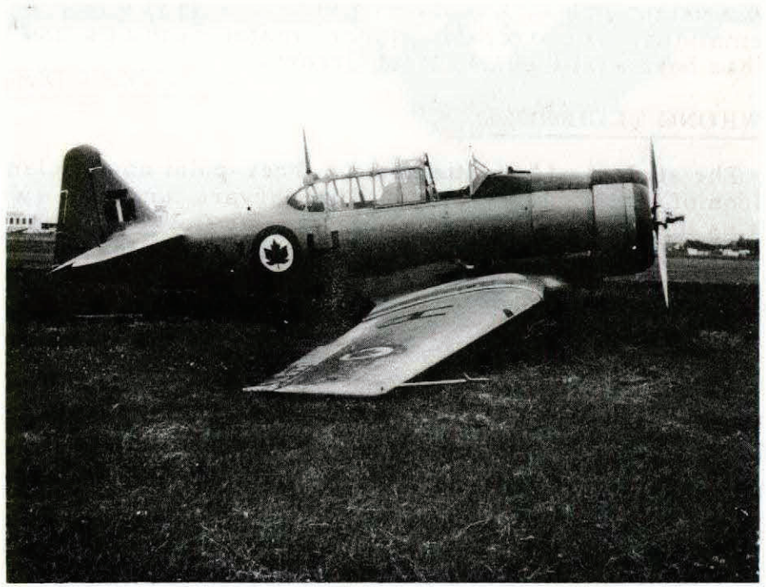
During the student pilot's second hour of solo flying a swing to port was experienced shortly after touchdown. The change of direction took the Harvard off the runway to the left and, as the swing was stopped, the student decided to overshoot. Just after power was applied a rut swung the aircraft to starboard and headed it back towards the runway. Hard contact with the edge of the runway snapped off the port oleo and the aircraft came to rest on the right-hand side of the runway. Damage to the aircraft was extensive. The accident is assessed as "Pilot Error".

28 -- UNDER THE HOOD

During an instrument take-off the student pilot opened the throttle rapidly causing a swing to port. He overcorrected and a swing to starboard occurred. A series of swings became progressively greater until a vicious swing to starboard developed and the instructor attempted to correct. Because of his stature he was unable to accomplish sufficient rudder travel and brake application to prevent

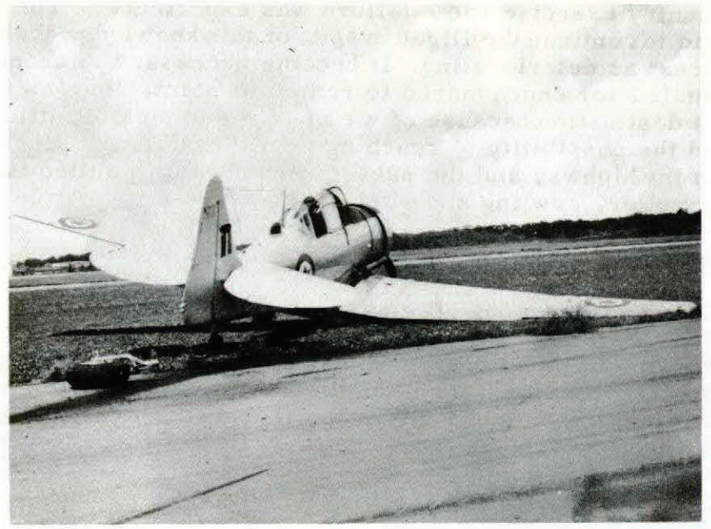
the groundloop; The undercarriage collapsed. The accident is assessed as "Pilot Error" because the instructor should have taken control soon enough to correct for the swing.

29 -- THERE IS A DIFFERENCE



The Harvard MK2 tended to swing to the left on landing. The student pilot attempted to correct using right rudder instead of brake but was unable to maintain control and the aircraft groundlooped to port. The starboard undercarriage was snapped off and the starboard wing, aileron and flap were damaged. The primary cause of the accident was "Pilot Error". The secondary cause was assessed as "Briefing" because the student had been given insufficient dual instruction on the MK2 Harvard when converting from the MK4.

30 -- LOOPS - GROUND VARIETY



On approach the student used full flap and a glide approach in variable crosswind conditions. The Harvard touched down in a three-point attitude, skipped, and then began to swing to port. Right rudder and brake were not applied soon enough and the well-known groundloop developed. A damaged starboard undercarriage and wing, and a bent "fan" are the result of this "Pilot Error" incident. Are you satisfied with your "Crosswind" technique?

THE SCORE FOR JUL-SEP 53

HARVARD GROUNDLOOPS

CAUSED BY PILOT ERROR

31 -- REGARDLESS!

This is another case of "Pressing On". During a navigational cross-country exercise radio failure was experienced. The instructor elected to continue the flight in spite of this knowledge that weather was forecast as deteriorating. It became necessary to abandon VFR and the instructor endeavoured to remain contact. He was unable to get to his destination because of weather and lack of sufficient fuel precluded the possibility of reaching an alternate. The Harvard was landed on the highway and the subsequent nose-up resulted in damage to the propeller, cowling and pitot head.

32 -- WHICH RUNWAY -- OR WHERE'S THAT WIND?

On receipt of take-off clearance the student pilot lined up his Harvard on the runway. Shortly after the commencement of the take-off run a swing to port occurred. Instead of holding straight and continuing the take-off the student applied harsh right brake and closed the throttle. In the violent swing to starboard which ensued the instructor's head struck the canopy with sufficient force to prevent his taking control.

FACTS

(a) The student had lined up on the wrong runway - 110 degrees out of wind;

(b) the instructor had failed to realize the student pilot's mistake;

(c) the measures taken by the student pilot to counteract one swing were so harsh as to induce a more violent swing in the opposite direction;

(d) the instructor's head injury prevented his taking control at a critical moment.

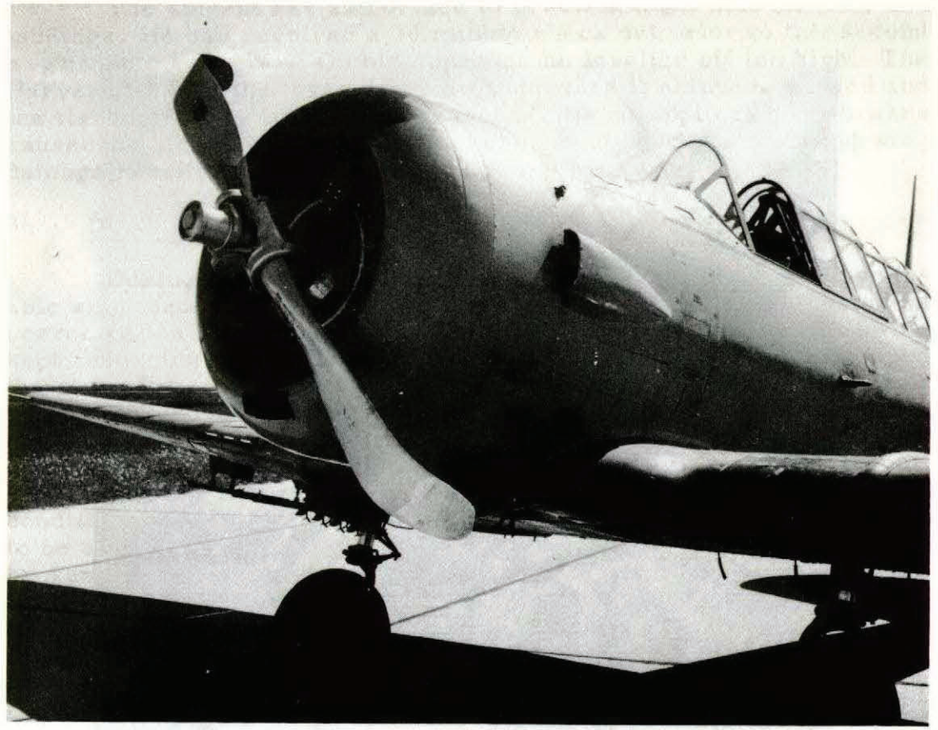
COMMENT

The instructor's basic error was in his failure to notice the mistake in runway.

RESULT

One damaged aircraft and another "Pilot Error" assessment.

33 -- TOO CLOSE FOR SAFETY



The pilot was taxiing a Harvard, behind three others, to the parking ramp at the conclusion of an air to air firing exercise. When number three Harvard was brought to a full stop to await marshalling signals the pilot in number four Harvard applied full brake to avoid a collision. Brake application was sufficiently harsh to tip the aircraft up on its nose. The damaged propeller had to be replaced. The cause of the accident - "Pilot Error".

FROM JUL - SEP 53 THERE WERE 14 HARVARD NOSE-UP ACCIDENTS CAUSED BY PILOT ERROR

These accidents were the result of misuse of brakes while taxiing or during landing swings: See statistics pages 23 & 31.

34 -- OSTRICH - OR HERE WE GO AGAIN

The student was taxiing a Harvard along a 75 foot wide strip intent on keeping clear of a Dakota which was parked to his left with just the mainwheels on the strip. He failed to see a surveyor's pole on the opposite side of the strip until he was very close. Harsh brake application stood the Harvard on its nose. The accident has been assessed as "Pilot Error" because of inadequate look-out. It is, of course, conceded that the surveyor's pole should not have been left near the taxi strip.

35 -- NIGHT LANDING

The student was authorized to practice night solo circuits and landings. He had received a 30 minute check out prior to this second night solo exercise. On his approach he levelled off too high. The Harvard was in the three-point attitude when it skipped, stalled and the starboard wing tip struck the ground. Harsh application of brakes caused the aircraft to stand on its nose. Bent propeller tips and wing damage resulted from this "Pilot Error" accident.

36 -- DUAL CONTROL?

During dual instruction a normal landing was made in favourable wind conditions. The Harvard commenced to swing left - student corrected - a swing right started - student corrected. The right swing kept recurring so the instructor applied full left brake which stopped the swing but port brake had to be maintained to hold the aircraft straight. Suddenly the aircraft stood on its nose. Investigation revealed that the student habitually lands with his feet high on the pedals and that he believed he had both brakes on at the time of the accident. Examination of tire marks on the runway appeared to confirm this condition. The instructor's additional brake application was enough to be too much! Damage to the aircraft included a bent propeller, broken engine cowl and bracket, and the accident has been assessed as "Pilot Error". Again it is necessary to point out the importance of the student understanding clearly when the instructor takes control.

37 -- CLEAR THAT ENGINE

Just before touchdown, after a long glide approach, the pilot decided to overshoot. The engine failed to respond to the throttle so the pilot raised the wheels and made a forced landing. Propeller, air scoop and flaps had to be replaced. The cause of the accident was the pilot's misuse of throttle and engine during a long glide approach. A cleared engine will respond to the throttle.

38 -- HOW'S YOUR TECHNIQUE?

The student pilot made a powered approach using 25° flap with a crosswind gusting 16 to 22 knots. In spite of his knowledge of the "wing down" method in use at the school, the student elected to attempt a "crabbing" approach. He had received no instruction in the latter. The drift was not entirely eliminated before touchdown and the Harvard groundlooped. Harsh brake application in an effort to straighten the swing put the nose down sufficiently to damage the propeller. Use of wrong technique resulted in a "Pilot Error" assessment being made.

39 -- BUILT-IN GROUNDLOOP?

The Harvard had settled on the runway in a three-point attitude. The student pilot then permitted the speed to decrease by taxiing with no throttle. A swing to the right was corrected by the use of left brake and the aircraft remained straight for another 50 yards. The next swing to the right did not respond to corrective attempts. The groundloop resulted in a bent port wing tip, aileron and oleo leg. Technical examination revealed that the tailwheel was out of alignment by 15 degrees. This built-in swing tendency, however, should have been controllable by the student.

40 -- ENOUGH AND IN TIME

The Harvard was landed in the three-point attitude on a night landing demonstration. During the landing run a slow steady swing to starboard developed into the well-known groundloop. The port oleo collapsed and damage was caused to the port wing tip, flap and aileron. Examination of tire marks on the runway indicated that insufficient brake was applied until the tailwheel had swung out past the left main wheel arc. The brakes were fully serviceable so that had sufficient brake been applied soon enough the accident could have been prevented.

41 -- INEXPERIENCE + OVERCORRECTION = GROUNDLOOP

The pilot started his round out at a height of approximately 10 feet above the runway. As the aircraft began to sink the port wing dropped and the port wheel contacted the runway. A swing to port was corrected for by the application of starboard brake and rudder. This correction became overcorrection when it induced a more severe swing to starboard. The port tire blew out during the swing at which time the port wing tip dug in and the Harvard groundlooped to port.

42 -- FLAPS, GUSTS AND CROSSWINDS

At the conclusion of a familiarization flight the instructor selected 30 degrees of flap. The wind was variable and gusting up to 25 MPH and a three-point landing was carried out. The Harvard travelled along the runway on three points for a short distance, when the port wing lifted causing the starboard wing to scrape the runway. Corrective action prevented further damage to the aircraft. The accident has been assessed as "Pilot Error" in that he used the wrong technique for landing in gusty crosswind conditions.

43 -- PRECAUTION IN PRECAUTIONARIES

The instructor was demonstrating a precautionary landing to a student when he allowed the aircraft to land short of the runway. The tailwheel hit the ground first causing the aircraft to rock forward onto the starboard wheel and wing tip. The recovery action taken was insufficient to prevent damage to the starboard wing, aileron, and oleo leg. This accident points the need for care in precautionary practice.

44 -- "I HAVE CONTROL"

On round out for landing the Harvard ballooned, stalled and the port wing dropped. The instructor applied full power in an effort to regain control. Corrective action was too late, however, and the port wing scraped the ground. When the main wheels made contact with the runway a violent skid to the right was experienced - the starboard oleo leg broke, the starboard wing dug into the ground and the Harvard finished up on its nose. Investigation revealed the fact that the student had not fully understood the instructor when he took control. In consequence the student also was trying to apply corrective measures. The accident is assessed as "Pilot Error" because the instructor did not take control soon enough. It is clear that, when an instructor takes control, there should be no doubt on the part of the student as to who has control.

45 -- "HE MOVED THE WRONG LEVER"

Two instructors, on a routine flight, were preparing to land. The Harvard was being flown from the rear seat and during the turn to final the pilot in the front seat thought he heard the rear seat pilot request more flap. In his attempt to "assist by lowering flap" the pilot in the front seat selected the undercarriage up. In this condition the landing was completed, neither pilot noting anything wrong until "arrival". Divided attention, divided control, and inadequate cockpit checks resulted in a "B" crash.

46 -- LEARNING THE PAINFUL WAY

Three student pilots were authorized to practice solo sequences for one hour and thirty minutes. In defiance of existing orders the three arranged themselves in a loose formation and departed the local flying area. The formation then broke up and some aerobatic manoeuvres were executed over a town. At this point one of the students noticed his friend flying low over a lake and saw him commence a roll. This manoeuvre was never completed as the aircraft was seen to dive in and hit the ground inverted. As a result of flagrant disregard for flying orders and discipline one student was dismissed from the service, one had his wallet lightened 75 dollars worth and suffered a reprimand - but the student who crashed is in hospital with serious injuries.

47 -- MARSHAL-LESS

The instructor was taxiing the Harvard into the marshalling area for the purpose of letting one student out and emplaning another. An airman marshaller indicated a parking space, but the instructor not intending to shut-down, dispensed with his services by a wave-off. A fire extinguisher, wrongly deposited in the taxi-way, was struck by the propeller. In addition to damage to the propeller blade, one piece of the extinguisher pierced the rudder of a parked aircraft and another piece flew into a hangar. The cause of the accident is to be found in the pilot's failure to maintain a sharp look-out and to use the services of a marshaller.

48 -- "A TERRIFIC JOLT"

The pilot was flying number two in a four plane Harvard formation training exercise. The formation leader ordered a 90 degree turn to the left. The number two pilot began his cross-under and attempted to slip into line astern behind his leader. Part way around the turn number two pilot realized he was directly under his leader. He then lost sight of the leader's aircraft and in attempting to locate him number two pulled up into the belly of the lead aircraft. The pilot states he felt a "terrific jolt"!! The VHF antenna of number two's Harvard punctured the bottom centre section of number one and the fin and rudder were bent to the right as they gashed the right side of number one's fuselage. Fortunately, both aircraft returned safely to base. The cause of the accident has been assessed as "Pilot Error", and charged against the number two pilot.

LOOK AND LIVE—

BE A SWIVEL NECK

49 -- WILL WE EVER LEARN?

An instructor and his student pilot were parked near the button completing their pre-take-off check. They were practising night take-offs and landings. A student pilot practising solo take-offs and landings taxied into the parked Harvard. The instructor in the rear cockpit was seriously injured as the propeller cut through the left wing and into the rear cockpit. The parked aircraft was a "write-off". The cause of this accident was "Pilot Error" charged against the pilot of the ramming aircraft. The pilot was taxiing at night at an excessive speed and he was not maintaining an adequate look-out.

IN THE THIRD QUARTER 1953 THERE WERE

TAXI ACCIDENTS IN THE RCAF
CAUSED BY PILOT ERROR

50 -- FATAL OVERCONTROL

The student pilot was authorized to practise aerobatic manoeuvres. He was seen by ground witnesses to execute a loop. In the recovery from the loop the pilot pulled the nose up steeply and the Harvard stalled and spun. The student pilot recovered from the spin only a few feet above the ground. In attempting to avoid trees situated on higher ground directly ahead of him the pilot pulled the nose up sharply. The aircraft stalled and crashed. The student pilot was killed instantly. The cause of the fatal accident was "Pilot Error". Overcontrol in the recovery from the loop and from the resultant spin caused this loss of life and aircraft. A timely reminder to all pilots - when weather permits always practise aerobatic exercises well above the minimum limit.

THE PRICE OF SAFETY

WE CAN ALL BUY SAFETY

BUT

WE MUST PAY THE PRICE

VERTIGO

A recent study reported in the U.S. Navy "Aviation Medical Safety Bulletin", revealed that during 1951 and 1952, a number of accidents occurred in which vertigo was deemed the most probable cause.

In the section of the study devoted to "Vertigo Cases By Flight Condition and Injury", statistics showed that 70% of the vertigo accidents involved the weather factor while only 38% involved darkness. It was interesting to find one case which occurred under daylight VFR conditions. (See Case 5).

The study also tabulated these accidents by type of operation into formation and individual flights under the heading "Vertigo Cases By Type of Operation and Condition", from which it was noted that more than half the cases involved formation flights. Each of these cases involved weather, i.e., disorientation occurred as a result of reduced visibility. There were no accidents attributed to vertigo during the hours of darkness under VFR conditions.

Vertigo accidents which involved non-formation flying would appear to be more likely to occur at night. Of the cases under consideration 60% occurred during the hours of darkness, but under VFR conditions.

TYPICAL VERTIGO CASES

Case 1. A flight of Skyraiders was on a VFR cross country hop. Thunderstorm activity was encountered. A wingman's statement best describes what happened. "I was flying section lead on "X" who was the division leader. Everything was normal until I saw bad weather ahead. As a precautionary measure I tightened my safety belt and harness, turned on instrument lights, turned on pitot heat, and used alternate air. Soon after this we entered an area of low visibility and rain. Up to this time we had been flying contact on the other division. They now turned to port and we remained straight and level. We entered an area of heavy rain and extreme turbulence. The division leader's wingman broke off at this time, leaving I thought, the division leader, myself and my wingman. My wingman later stated that he had also broken off about this time. I had a great deal of difficulty flying wing because of the low visibility and turbulence, but thought that it would be better to stay together rather than have so many aircraft milling around in the storm. About 30 seconds after we entered the roughest part of the storm we started a turn to port,

letting down as we did so. I'd estimate after turning about 90 degrees my leader made a short turn to the starboard still letting down. I strained to keep from losing sight of him, but since I had no forward visibility with the heavy rain, I had to push over and really wrap it up to try to keep with him. It was at this time that I realized we were really in trouble. I was in a steep bank pulling several "G's" and the altimeter was spinning down. I immediately went on instruments, losing sight of my leader, levelled wings and started pulling. I had about 1500 feet of altitude at this time with the gyros tumbled and an airspeed somewhere about 300 knots. I must have pulled too hard because I hit a high speed stall and I felt as though I went into a $\frac{1}{2}$ or 1/4 turn to the left. I automatically recovered and my last look at the instrument panel indicated I had about 500 feet left to go with the altimeter needle still going down. I continued to pull out, hoping I would not lose the wings. Later I noticed I had 9 positive "G's" on the accelerometer."

The pilot of the lead aircraft failed to recover.

Case 2. Two Panthers filed IFR were on a radio range climb-out. The wingman's statement again covers the events: "A few moments later the leader began to make slight turns to the left and to the right of the beam heading. There was rain and sleet in the overcast and the precipitation static was so bad that a clear signal could not be heard on the low frequency receiver. His turning became more erratic and it was increasingly difficult to manoeuver and maintain a good wing position. I could feel the effect of vertigo and considered breaking away and going on instruments. The leader asked me what my heading was, and I told him what it was, but we were in a turn at that time. A moment later I decided to pull away to the right. We were then in a steep turn which I was later able to determine was a diving spiral to the left. I straightened my wings and at that moment could see the ground through the bottom of the overcast. I was in an almost vertical dive and encountered high speed stalling when I attempted to pull out. I finally became straight and level when only a few feet above the ground."

Case 3. Two Skyraiders were on a VFR cross country hop and encountered low visibility. The leader decided to return to base and informed his wingman of his decision. The lead pilot's statement continues: "I began a gentle descent and at 2500 feet was still in an area of low visibility but in visual contact with lights on the ground. I informed my wingman I was making a 180 degree turn and returning to base. He acknowledged and requested a turn to the left. All during the flight he had maintained a close position on my starboard wing but before I commenced a standard rate turn to the left he was approximately 150 to 200 feet distant. Upon completion of the turn I was in a

bi-signal area and horizontal visibility was 8 to 10 miles. Within a minute after rolling out of my turn I was on the beam outbound. At approximately the 90 degree position of my reversal the wingman called and said repeatedly in an excited voice to climb. During the last 90 degrees of my turn I climbed 500 feet. At this position I was in an area of fair visibility but with little horizon. He called again in an excited voice and asked repeatedly to roll out of my turn. I informed him I had been flying straight and level at 3000 feet on a heading of 240 degrees and was on the beam. He then stated he must have been looking at light objects on the ground and that he had lost me. He then stated that he would assume an altitude of 2500 feet and a course parallel to mine." The wingman hit the ground at about a 25 degree angle 14 minutes after the lead pilot had started his initial turn to return to base.

Case 4. Two T33s filed an IFR flight plan for a cross country flight. The ATC clearance was received and acknowledged and a section take-off made. The weather at this time was about 1000 feet overcast with visibility about 2 miles. Wingman's statement: "I caught up with him and assumed a fairly tight wing position since the clouds were getting thick. He was flying rather erratically at the time, that is to say his wings were rocking a good bit but I stayed with him. The next thing he said was "I'm going to do a right turn and return over the radio station." At about the time he got settled in that bank he reversed sharply. I said "Take it easy". About that time I glanced at the gyro and we were past 60 degrees of bank and I knew we were getting in pretty bad shape. Next he reversed his bank again and I couldn't follow that time because it was so extreme, beyond a 90 degree bank, so I went on my own instruments. We were roughly at 5000 feet at that time. I endeavoured to correct for the unusual position we were in as a result of the lead, but got a false indication on the gyro. It seemed to me that we were in an Immelman, on our back, because we went from 5000 to 9000 feet almost instantly. At this time I went on the rate group instruments. I finally got control of the aircraft and continued my climbout. Just about then (passenger in the lead TV) said something like, "How long are you going to stay in this turn?" and then "Look out." Then nothing more. The radio was very garbled." The plane was observed to crash. The lead pilot had accumulated over 3000 hours, had almost 50 hours in this type aircraft and held a valid special instrument rating. The wingman continued climbing and cleared the overcast at 33,000 feet.

Case 5. The pilot of a Skyraider was last man in a flight of 7 aircraft. The weather was CAVU. The time was 1106. Shortly after applying power, the aircraft swerved about 20 degrees to the left. The aircraft continued turning and ran off the runway out of control.

The pilot stated during the following medical examination that he experienced vertigo and that while he realized that he was turning he did not know in which direction he was turning.

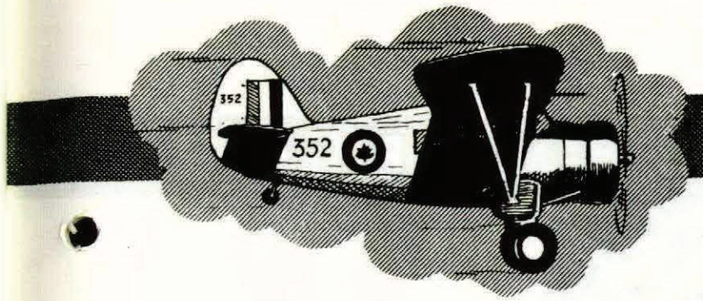
The study concluded that the big factors in vertigo were:

1. The inability or hesitancy on the part of pilots to shift to instruments when the conditions requiring this were suddenly imposed and unplanned.

2. The attempts by pilots to fly half instruments and half contact in marginal IFR weather.

3. The failure of some pilots to at least refer to their instruments under night VFR weather.

The eyes are the only sensory organ which can relay sufficient information in flying to avoid vertigo whether it be by using the horizon or scanning the instrument panel.

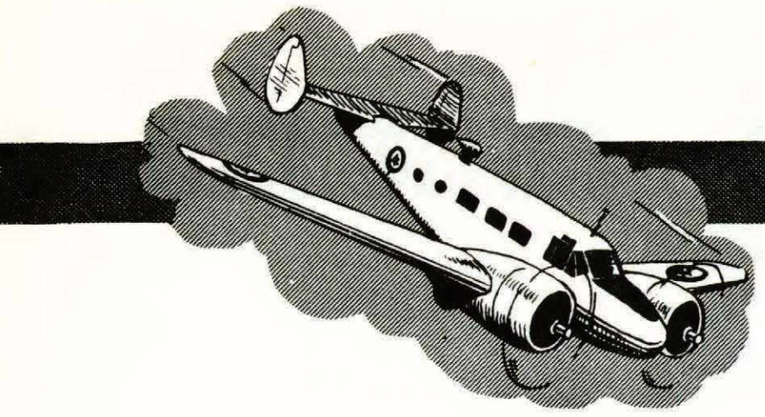


51 -- HIGHWINDS - ROUGH WATER

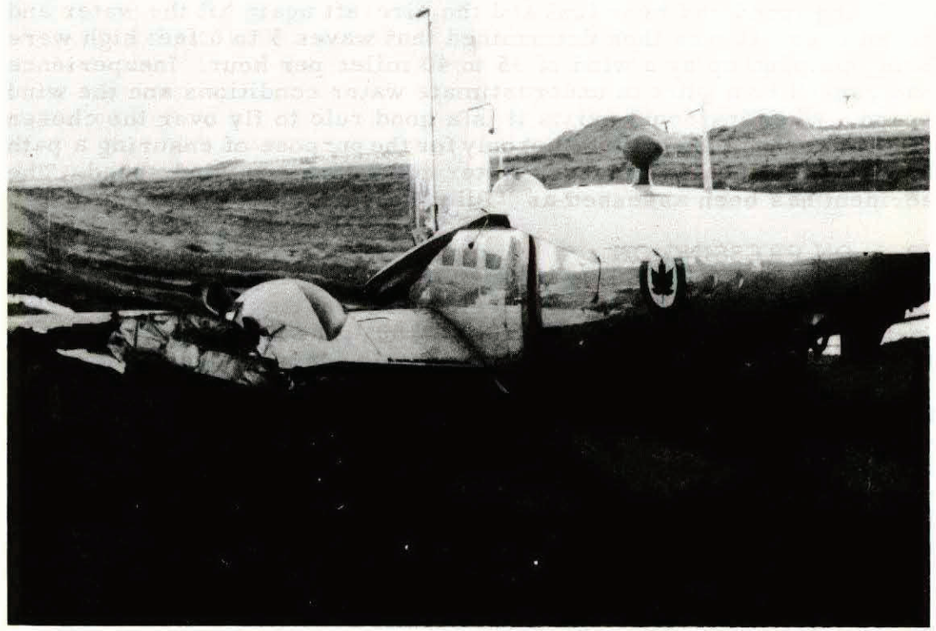
The pilot had prepared to land on a lake other than at his home base and was unable to establish any radio contact. He estimated the wind speed to be 15 to 20 miles per hour and wave height to be approximately three feet. After touchdown the aircraft skipped over the tops of the waves for a short distance before being thrown into the air by a large swell. Power was applied in an attempt to go around again but flying speed had been lost and the aircraft again hit the water and nosed over. It was then determined that waves 5 to 6 feet high were being whipped up by a wind of 35 to 40 miles per hour. Inexperience had caused the pilot to underestimate water conditions and the wind speed. When any doubt exists it is a good rule to fly over the chosen alighting area at low altitude not only for the purpose of ensuring a path free of snags but also to assess water conditions and wind speed. The accident has been assessed as "Pilot Error".

52 -- ON PRESSING ON

During a ferry flight, deteriorating weather was encountered. Instead of executing the well known "180", the pilot decided to continue because of forecast good conditions at his destination. The weather, contrary to expectations, did not improve. Shortage of fuel influenced the pilot in his decision to land on the first available runway - downwind. A partial flap failure contributed to the overshoot in which the Norseman came to rest on its back off the end of the runway. Damage to the aircraft was extensive. The primary cause of the accident is assessed as "Pilot Error" because the pilot continued the flight in violation of VFR. The secondary cause is assessed as "Briefing" because the weather forecast proved to be inaccurate.



53 -- TARDY CORRECTIVE ACTION

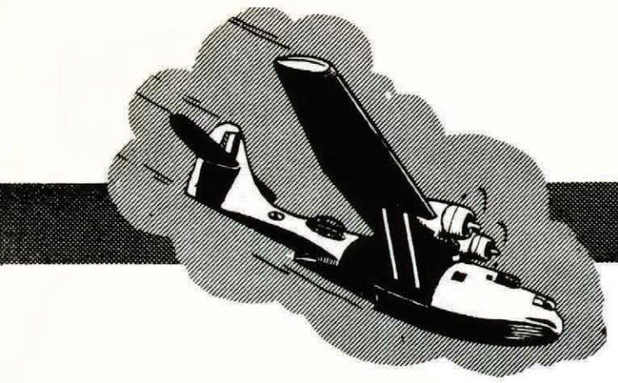


In conditions of crosswind 20 to 25 degrees off the port side the pilot selected 30 degrees of flap for landing. The aircraft had slowed during the landing run when a gust of wind swung the machine to port and lifted the port wheel from the runway. Starboard rudder

and brake were applied but the swing continued and the pilot opened up the port engine. The swing then straightened but by this time the port wheel was off the runway and running in the rough sand and gravel at the side. Corrective action was continued but was insufficient to bring the port wheel back to the runway. The wheel then hit a hole, swung the aircraft completely off the runway and into an excavation where it came to rest 180 degrees from the direction of landing. Use of excessive flap in crosswind conditions combined with late corrective action have cost another aircraft.

"The doorstep to the temple of wisdom, is a knowledge of our own ignorance."

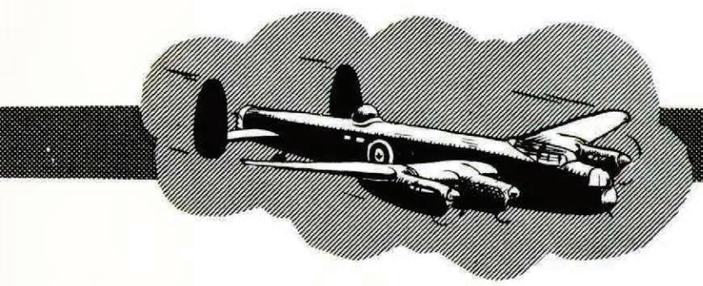
Spurgeon



CANSO

54 -- TIRES vs SKIS!

A Canso was used for water operations during which period some person other than the pilot had locked the parking brake. During preparation to land on a runway the pilot did not test the brake pedals but depended on a visual inspection of the parking-brake lock. The pilot recognized the trouble as soon as the aircraft touched the runway and at once released the brakes. Badly worn tires and rubber deposited on the runway were mute evidence of an inadequate landing check on the part of the pilot.



LANCASTER

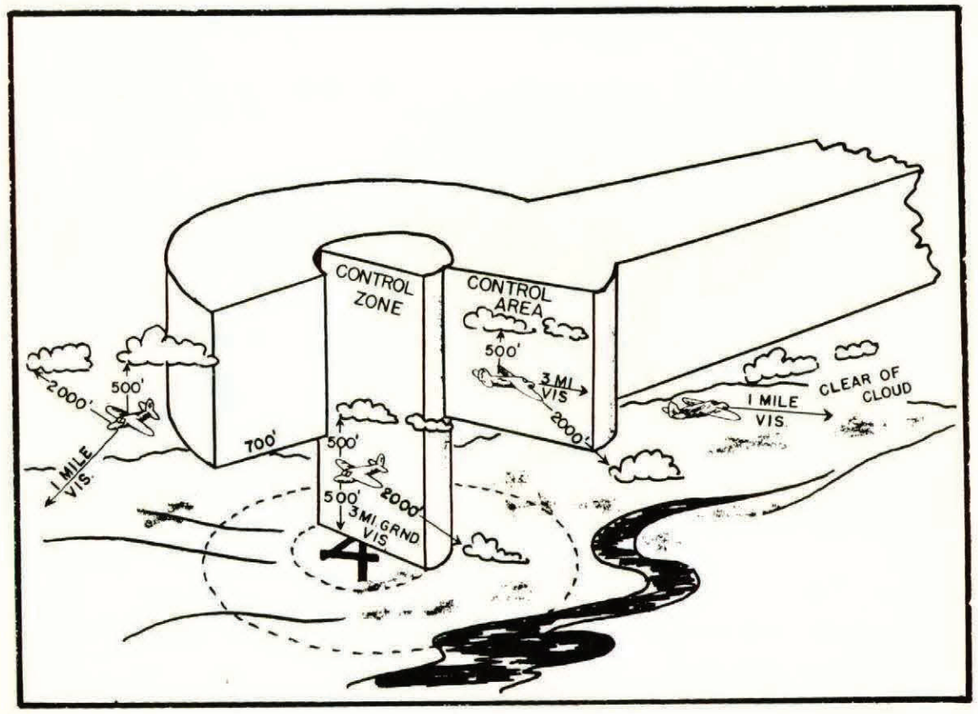
55 -- SNOW TROUBLE

The Lancaster had been refuelled at a Northern base. While taxiing the aircraft out of the confined space, with refuelling equipment in the area, the pilot attempted to turn and the tail struck a snow bank. The accident has been assessed as "Pilot Error". Extreme care and alertness is necessary if similiar accidents are to be prevented during the coming winter months.

.180 CAN SPELL *Safety*

The prevalence of accidents in which the pilot found himself in difficulties through flying into deteriorating weather necessitates a word of warning. If you have filed a flight-plan under Visual Flight Rules those rules limit your operation to certain conditions of weather and fuel-state, with weather, from the standpoint of ceiling and visibility, being the principal limiting factor.

VFR LIMITS WITHIN: CONTROL ZONES,
CONTROL AREAS and
ELSEWHERE.



The accompanying sketch details the visibility distances and intervals which, based on Canadian flying experience over many years, are necessary to ensure safe flight under visual flight rules. These regulations, proven by years of experience, are published for YOUR SAFETY.

Fuel requirements are briefly stated. Under Visual Flight Rules the fuel requirement for propeller driven aircraft consists of sufficient to reach destination plus 45 minutes at normal cruising consumption, and for jet aircraft sufficient to reach destination plus 15 minutes at normal cruising consumption.

YOUR CHANCES of completing a flight safely are reduced sharply if YOU violate VFR. ACCIDENT STATISTICS PROVE THIS POINT. In other words, pilots are still tending to press on into deteriorating weather in violation of VFR, and, in some cases, becoming "statistics" by running out of fuel or ceiling. Particular attention must be accorded this subject during the winter when weather conditions can generally be expected to be worse than in the summer, and when, consequently, the necessity for deciding "go on" or "turn around" arises more frequently.

There are certain factors which are worth consideration if, at any time, you are contemplating stretching VFR. The danger of encountering ice in deteriorating weather conditions is ever present. The use of de-icing and anti-icing equipment will result in reduced performance and increased fuel consumption which may not have been considered in your flight plan and which could become critical.

Attempts to remain in contact with the ground in conditions of reduced visibility and with snow on the ground are invitations to "whiteout". This subject is discussed elsewhere in this publication but the danger of losing the horizon is very real.

Don't become a "statistic".

Do try the well-known, but not always practiced, "180" when you encounter deteriorating weather while on a VFR Flight Plan.

CAP 100 supplies full information. Why not study it and conform?