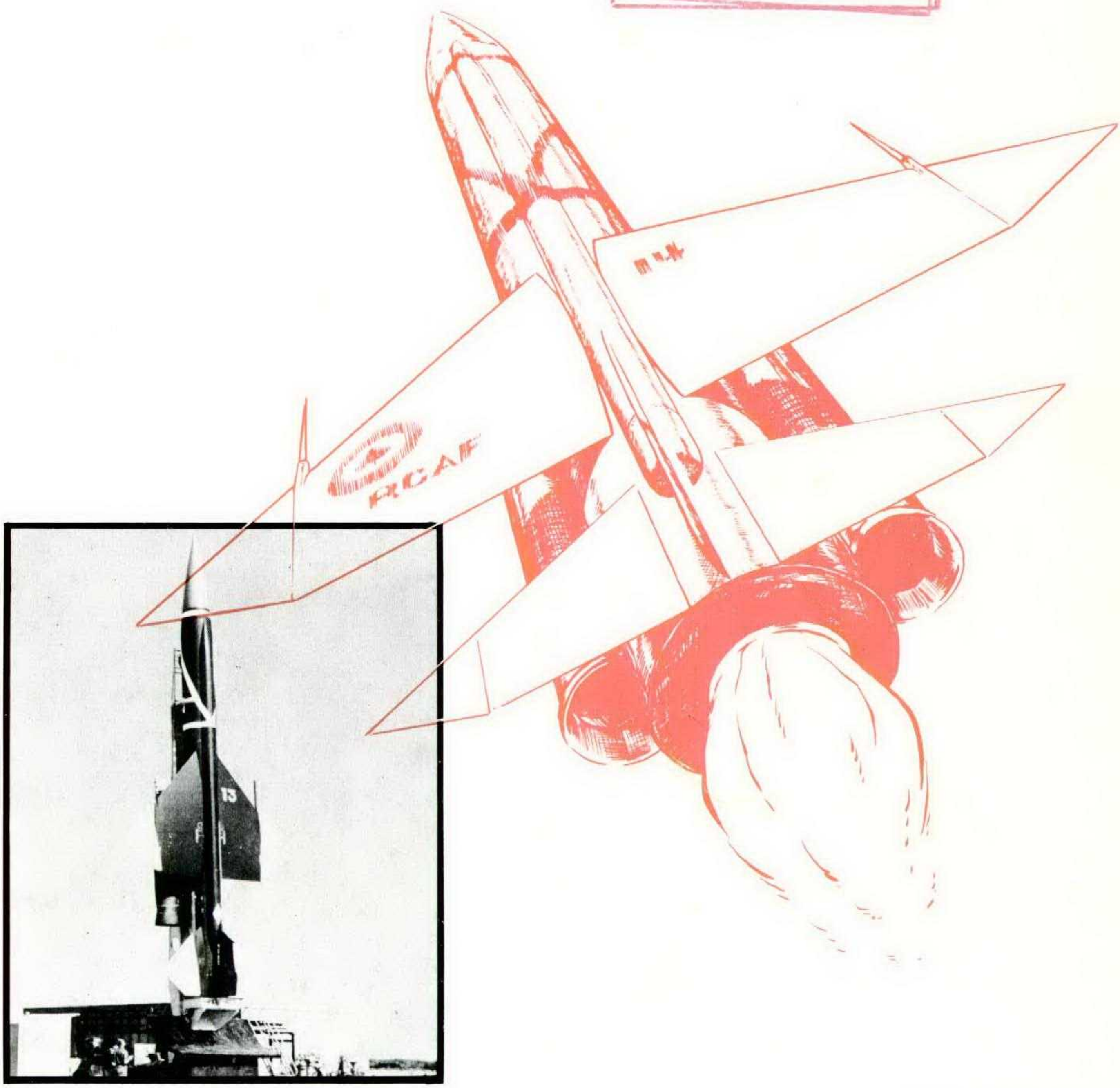
FLIGHT COMMENT

ROYAL CANADIAN AIR FORCE



BOMARC 12

MAY • JUNE • 1959

SAFETY

IS YOUR BUSINESS

Doctor, Lawyer, Indian Chief;

Air/P, OBS(Rad), AETECH;

Everyone has his specialty

But has anyone Safety as his trade? No.

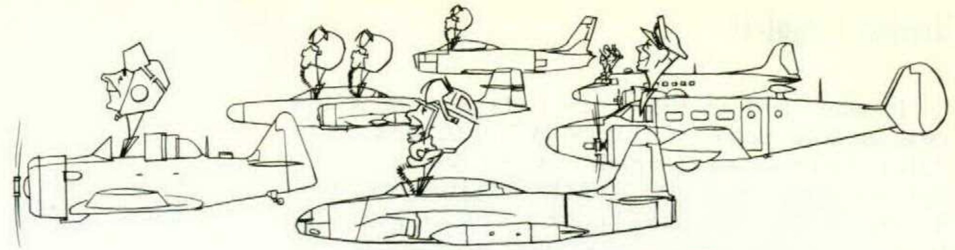
This is because safety is not a trade;

It is a result.

The result of each person,

Irrespective of trade or specialty,

Doing his job conscientiously and thoroughly.



HEADS-UP FLYING

Ruptured Cylinder Head

A ruptured cylinder head and good judgement

F/O B.J. Whitehead and F/C C.F. Windsor took off in a Harvard to carry out a navigational exercise. About 25 minutes after takeoff a very noticeable shock was felt and the aircraft started to judder. A FMS check was carried out with nil results. There was oil spraying the windshield and F/C Windsor advised the instructor that smoke was entering the front cockpit. F/O Whitehead advised the tower that he had blown a pot and would attempt to reach base.

Just after turning towards base there was a second jolt from the engine followed by a third. The engine was producing very little power, and realizing that the aircraft could not be returned to base F/O Whitehead decided to carry out an immediate forced landing. He notified the tower of his decision and gave them his position. A forced landing pattern was set up and a successful wheels-up landing carried out in a heavily wooded area. The field itself was completely surrounded by trees and it was evident that F/O Whitehead, despite the complete lack of forward visibility, used excellent judgement in completing the landing with a minimum of damage.

Investigation revealed that number 9 cylinder head had ruptured. It is probable that a crack developed initially over the crown of the cylinder head between the spark plugs, then extended around the circumference of the cylinder head. Complete failure of the cylinder head and valve assemblies followed. This was accompanied by a loss of oil and complete power failure.

The decisive action taken by F/O Whitehead and the method in which he handled a delicate situation is Heads-Up Flying indeed.

Mission Complete

It was one of those dull days with a low ceiling and poor visibility at North Bay. The "alert" crews were ready. When the scramble bell sounded F/O D. Strachan (pilot) and F/O S. MacLagan (observer), the crew scheduled to go first, got airborne for what seemed to be a simple mission: proceed to a point near Val D'or, intercept a civilian aircraft that was lost and low on fuel, and guide it to the nearest aerodrome.

The operation proved to be more difficult than the crew anticipated. Low cloud base made it necessary for the interceptor to do a letdown at Val D'or to get safely below the four hundred foot ceiling. From this point the controller at 34 AC&W directed the fighter fifty miles south of Val D'or where the lost aircraft, a Cessna, was intercepted and identified.

VHF contact was made with the civil aircraft with great difficulty because the Cessna pilot transmitted on one of the CF100's frequencies and received on another. This necessitated the interceptor pilot changing frequencies on each transmission. In addition the slow speed of the Cessna required the CF100 pilot to fly just above the stalling speed, circle the Cessna and attempt to maintain visual contact with it.

Under these adverse conditions the CF100 directed by the GCI controller guided the Cessna pilot to the nearest emergency strip at Lac Des Loups. On final approach the Cessna's engine quit for lack of fuel but the pilot made a safe landing.

The CF100 was also landed at Lac Des Loups because the time spent at low altitude where fuel consumption is high prevented the crew from proceeding to another base.

This is a fine example of how the efficiency and co-operation of air and ground staff can pull the fat out of the fire. Congratulations to all concerned.

Stuck With Too Much Power

While climbing through 35,000 feet, F/O Fenton, who was flying No.4 in a four-plane Sabre section experienced a throttle seizure at 94%. He informed No.3 of his difficulties and turned towards base. He alerted the tower, dropped the speed brakes, and started a descent towards base. He levelled off at 3000 feet and allowed the speed to stabilize. He then zoomed the aircraft and reduced speed to lower the undercarriage and flaps. The speed settled down at 220 knots at 10,000 feet so a controlled steep spiral descent was carried out to 2000 feet. RPM had settled at 92% and straight and level speed was 210 knots.

The aircraft was positioned over the airfield and the engine flamed out by cutting the master switch. A successful landing was made. F/O Fenton is commended for his cool and rational thinking during this emergency.

Investigation revealed that the ball bearing, reference EO15-15KD-2, page 100, figure 9-4, item 70, part No. 11135 of the transfer lever had seized, limiting movement of the throttle to between 94% and 98%.

A Little Less Power

In a similar situation, F/O Dixon, an OTU student, started a letdown in a Sabre. When he retarded the throttle the RPM did not fall below 87%. He selected speed brakes out and continued letting down to 4000 feet, maintaining a position close enough to base to carry out a force landing in the event of a flameout. The throttle had full travel but only varied the RPM between 87% and 94%. The tower was notified of the predicament. An instructor, F/L Kerr, joined up with F/O Dixon and a forced landing pattern was set up. The nose of the aircraft was raised to decrease the airspeed and the undercarriage was selected down. On final the flaps were lowered and when the aircraft was lined up on the runway the engine was flamed out. The landing was completed successfully. The team work of F/O Dixon, F/L Kerr, and flying control resulted in a 'Heads-Up' flying.

The high idle condition of the engine was traced to a fuel leakage across the port pump servo orifice seat.

Heads-Up All Around

LCDR K.S. Nicolson took off in a Sabre as No.3 in a four plane formation. After takeoff, the leader informed him that his nosewheel was partially down and cocked, and that the main wheel doors were hanging open. A gear down selection was made and the wheels locked down safely. A low pass by the tower confirmed the undercart down, and that the nosewheel was cocked at the 90° angle.

The control tower had the fire fighting personnel lay a foam strip down the runway then cleared LCDR Nicolson for landing. He made the approach at 160 knots and touched down at 135 knots. The nosewheel was held off until it was over the foam strip, and when it dropped direction was maintained by brakes. Inspection revealed that the nosewheel landing gear rotating mechanism was sheared. Reference EO 05-5E-J page 440 Fig 86 item 2.

This is the second cocked nosewheel which occurred at Chatham in the last ten months. In both cases the control tower and crash personnel were "on the ball", and the pilots made excellent landings, preventing what could have been bad accidents. All concerned are given a "Heads-Up" for their professional approach.

Crash Position Indicator

The Crash Position Indicator can, without human assistance, escape from doomed aircraft and guide search aircraft to the crash scene.

"A new, light, simple and inexpensive radio distress beacon has been developed to survive aeroplane crashes. A special long life pulsed transmitter with trickle-charged batteries and an internal capacitor antenna is potted in shock-absorbing foam. . . and formed to a high lift wing section.

"The device is held on the tail of the aircraft and released automatically upon detection of any structural deformation. It tumbles away from the aircraft in time to clear the danger zone, slows down to a safe landing and transmits a distress signal from any position, under wide environmental conditions and over any terrain."

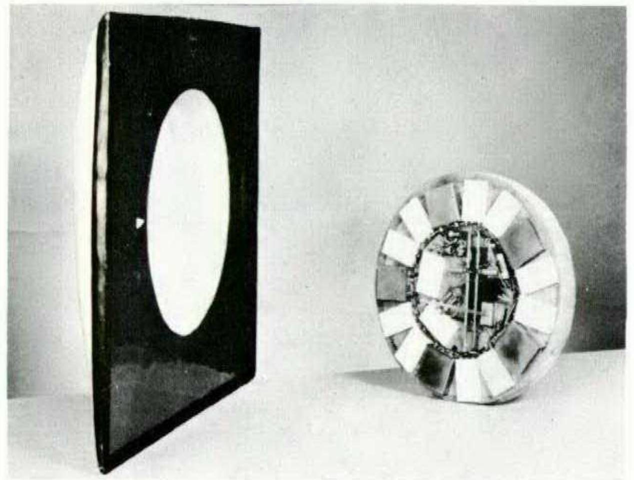
This was how the report on the Crash Position Indicator (CPI) was summarized for the eleventh annual International Air Safety Seminar.

The Transmitter

The transmitter is an ingenious arrangement of components, 14 inches in diameter and 2 inches thick set on a polyurethane base. Power is supplied at 20 volts from nickle cadmium batteries placed around the circumference. The transmitter is transistorized, except for two rugged sub miniature tubes, and broadcasts pulsed signals on a frequency of 243 mcs. The antenna is formed by sandwiching the 'plastic' base between two sheets of aluminum foil. By trickle charging the batteries from the aircraft's electrical system, once installed, the unit should last the life of the aircraft without further attention. It has a range of from 5 to 35 miles and a tested service life ranging between 125 hours at 70° F to 106 hours at -40° F.

The Package

The transmitter must be delivered to the earth undamaged and free of the crash scene. To accomplish this the transmitter is potted in shock absorbing plastic foam and formed into a high-lift aerofoil section two feet square and five inches thick. On release from the aircraft



Beacon ready to install in the tumbling aerofoil

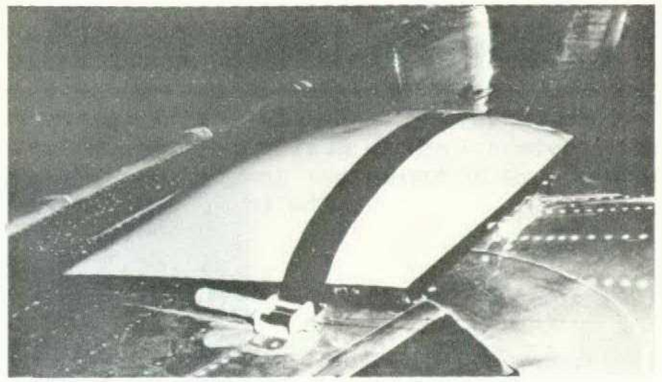
the CPI "lifts" itself away in an arc and, because it is unstable, it tumbles about dissipating its speed through lift and drag forces. This reduces its speed by one half for every 35 feet of travel until it reaches its terminal velocity of 20 to 25 mph. The CPI weighs about ten pounds, is waterproof, floats 85 per cent above water, and acts as its own snow-shoe. (It is estimated that it could land undamaged at 100 mph in a few feet of light snow.)

The Release System

The CPI is designed (experimental models) to ride on or near the tail of subsonic aircraft. It sits with its trailing edge to the rear, held by two brackets. The leading edge is set on an elliptical spring and, by means of a thin metal ribbon, is winched down and held in place. The metal ribbon is passed through spring-loaded knives. From these knives stainless steel "sensing wires" run to any station of the airframe structure. When the structure is deformed in any manner the sensing wires release the knives, the ribbon is cut, the CPI thrown clear by the elliptical spring and the transmitter turned on. This whole sequence is almost instantaneous. It is estimated that when an aircraft 100 feet long strikes a mountain at 500 mph the CPI would be released by the time the first five feet of the fuselage was destroyed.

Tests

In static tests the CPI's electronic components have withstood shocks of 700 Gs. It has been fired on a rocket sled at the side of a quarry at speeds of 120 and 230 mph, lifted itself clear of the wreckage and escaped with minor bruises. It has been test dropped from heights up to 5000 feet and at speeds to 227 knots, and functioned perfectly. In actual search operations it was dropped in very rugged country and the search aircraft, which was given an area 7500 square miles to search and flown at 9000 feet, never took longer than 2-1/2 hours to pinpoint the transmitter.

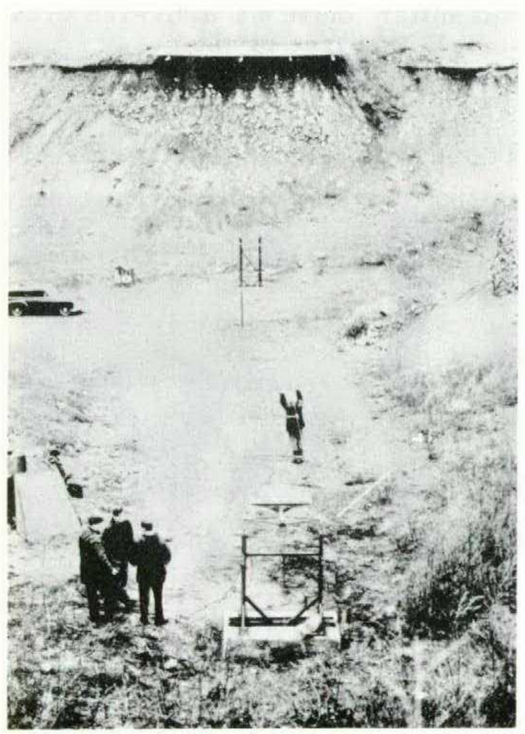


CPI release ribbon, winch and trigger wire

Future Development

The present model has been developed to the point where manufacturing rights have been let by the National Research Council to a private firm. The fact that it is completely independent of man and that the search equipment required is the same as for the SARAH already in existence makes the present CPI a practical system for subsonic aircraft. Development will continue to adapt this system to all types of aircraft.

Based on a Report by
H. T. Stevinson and D. Makow
National Research Council



50-foot sled ready for 230 mph firing

Composite picture of rocket sled and CPI during 230 mph crash simulation

TWO EYES IN VISION

The concept of see-and-be-seen gives at least partial protection against mid-air collision at cruising altitudes of civil aviation. Until ways and means are found to assure positive separation and to warn pilots automatically of the proximity of other aircraft, the burden of safety and security in flight must be borne by the human eye—preferably several pairs. But the head must be moved for optimum protection.

While the closure speeds of present-day aircraft do much to render the see-and-be-seen principle inadequate, there are several other conditions which further add to inadequacy. These are:

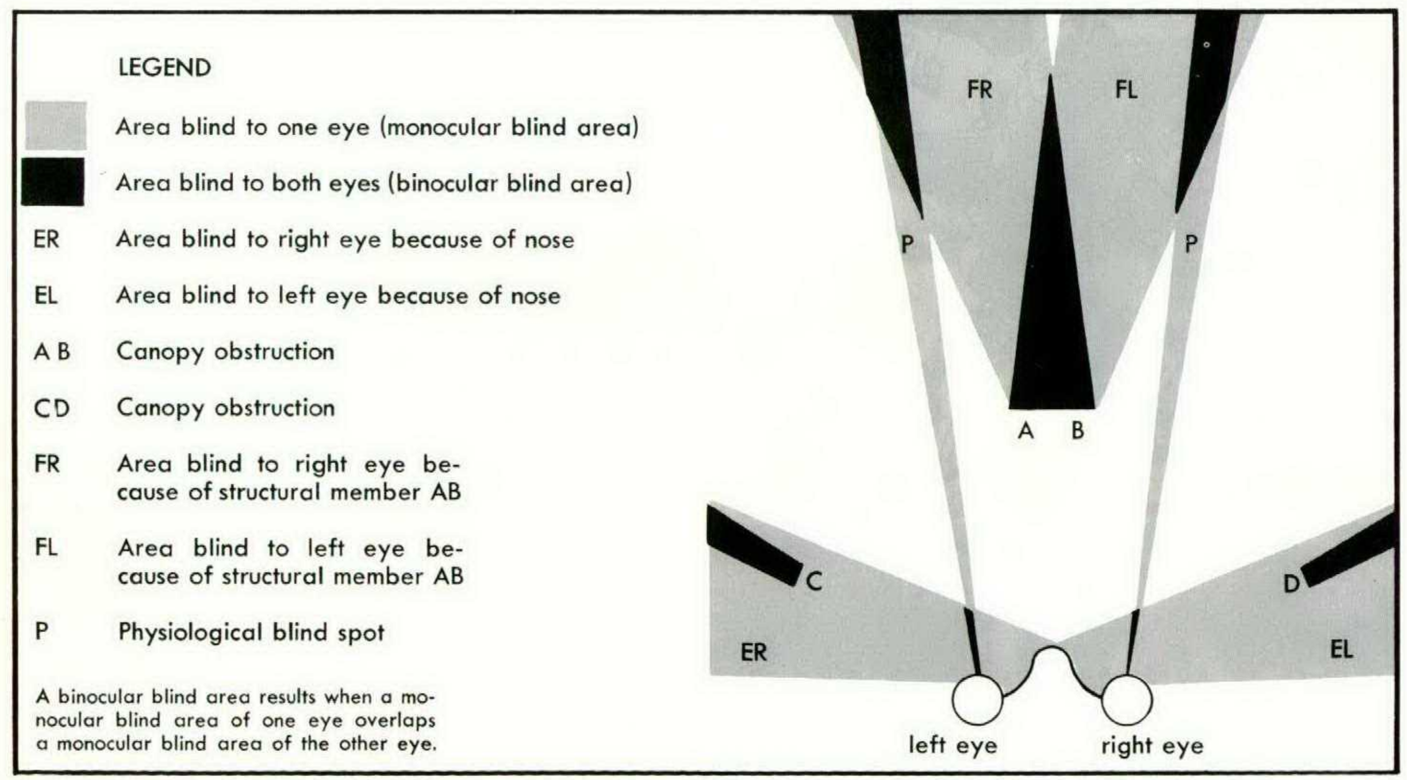
- Poor brightness contrast between an aircraft and its background
- Lack of relative movement of the aircraft in relation to its background
- Periphery of the retina of the eye cannot detect targets that are small (because of the angle and distance they are away from you) at a distance sufficient for detection and successful evasion
- Combination of physiologically and structurally produced monocular blind areas which result in binocular blind areas in the search field.

That fourth point is interesting. The monocular blind area is a small area roughly 15 degrees from the center of the retina, where the visual nerves enter the eye. This area has no photo-sensitive cells and is therefore blind and insensitive to light. The blind spot is about 5-1/2 degrees wide and 7-1/2 degrees in height and can hide a fighter aircraft, for example, until it is just a fraction of a second away at head-on, fighter-transport closure rates. The overlap of the monocular blind area of one eye, in conjunction with a structural member of the aircraft and with the monocular blind area of the other eye, can produce an area not seen by either eye!

This fact was brought out by the Wright Air Development Center's aeromedical laboratory in a study titled "Inadequacy of Visual Search in Avoiding Mid-Air Collisions." It advised that "Visual search should be performed almost continuously in approximately the first 30 degrees to each side, with occasional glances to 90 degrees."

In short, don't just look—move your head and see. And remember: your eyes should pause briefly at each look.

Flight Safety Foundation



HAIL

by Mr. W. E. H. Cooper
Directorate of Air Services

Twenty-one reported cases of hail damage in three years. Twenty-one aircraft off the flight line for inspection and, in some cases, expensive repairs.

Comes June, July, August, and September a few RCAF aircraft will be encountering damaging hail in flight. Hail is an increasing hazard: with the emphasis on all-weather operations, aircraft are flying through thunderstorms more frequently; with the great increase in airspeeds hail strikes, even with comparatively small hail, are damaging. You still have odds of 600 to 1 against you being one of the unlucky this season and by taking a few precautions you can increase these odds.

First off, don't let the non-mention of hail in the pireps or aviation weather reports mislead you into thinking that hail is not around. Actually there is evidence to support the idea that hail can be found somewhere in some stage of every thunderstorm. That pireps infrequently mention hail reflects pilots' respect for old cumulonimbus and the fact that frequently, from the cockpit, hail is mistaken for heavy snow or rain. The reason that hail only infrequently appears in the aviation weather observations is that hail occurs in shafts travelling along with the CB clouds with which they are associated and could quite easily pass between weather stations unobserved.

A USAF study lists damaging hail encounters at heights up to nearly 50,000 feet, and the aircraft involved were not always right inside the thunderstorm cells. In about one-third of the cases the aircraft were in the clear and up to six miles away from the central core and flying beneath the anvil. Stones as large as 4-1/2 inches diameter were encountered above 20,000 feet.

Hail Damage

The damage that hail will do to an aircraft depends upon two factors: the size of the stones and the speed of the aircraft. The United States Civil Aeronautics Authority found in experiments a few years ago that three-quarter inch stones fired at 225 knots made no measurable indentation on a typical transport aircraft (DC-6) wing edge. One and one-quarter inch stones fired at the same speed made indentations of 4/100ths of an inch.

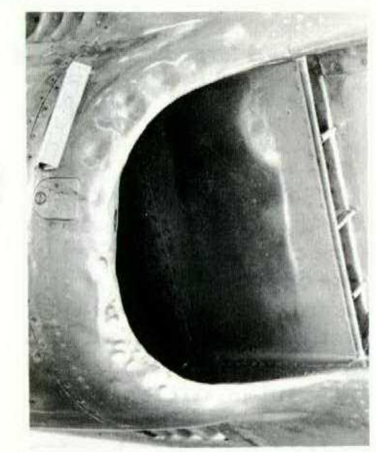
With jet aircraft, however, with their high TAS, half-inch stones can be damaging, and big stones very dangerous. The nose section, the leading edges of the wing and tail, cowlings, tip tanks, rocket pods, radar domes, and deicer boots are particularly vulnerable. Jet engines may be affected—not only the spinners and cowlings but also the compressor where damage may result from hail ingestion.

Aside from the price and time involved in repair, there is the consideration that for the particular mission during which the hail encounter occurs the aircraft's performance will be reduced below its original maximum. It has been reported that jet aircraft have lost as much as 80 knots from their original top speed from bashed cowlings and leading edges.

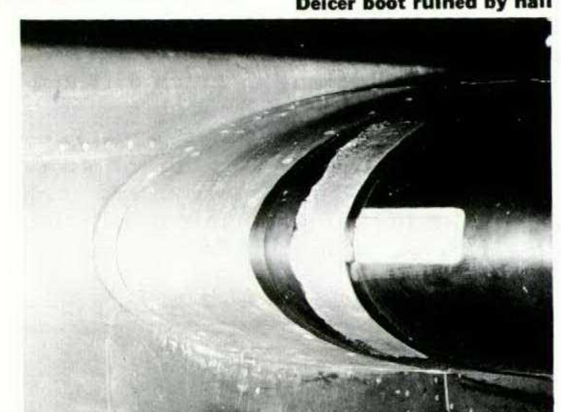
When a thunderhead is standing out by itself in the sky, no one is going to fly into it. A word of caution is in order, however; keep your distance. Some of the largest hailstones, falling out of a cumulonimbus anvil, have managed to catch the unwary. It's the CB you don't see that's more likely to catch you—you may be letting down through the clag, taking off into an overcast, or merely on IFR in cloud. At high altitudes, cirrus can be a real hazard in hiding thunderstorm cells until you're into them. Under these conditions radar may be of assistance, so get a steer from GCI. There are limitations to the effectiveness of radar though—aircraft have reported encountering hail even while under GCI control. Radar doesn't distinguish between rain and hail, nor between cells within a storm—penetrating between adjacent cells may place you in the way of hail shaft dropping outside one of them. Finally where the storm is extensive in area, the blip of your aircraft may be lost in or behind echoes from precipitation.

Thus hail is one more reason for staying out of a thunderstorm. If you can see a thunderhead stay well clear. Avoid cirrus layers in thunderstorm weather. Exploit radar assistance. And, if you do get caught, stick to the recommended handling procedures for your aircraft.

Hail did this

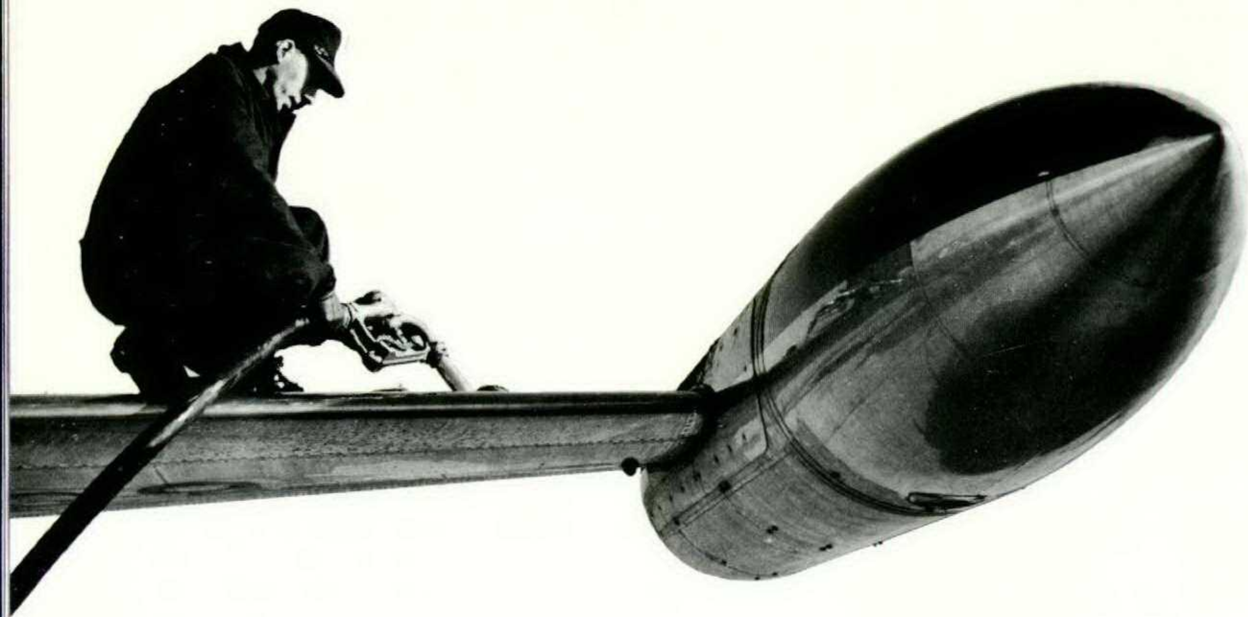


Dents can interfere with airflow



Deicer boot ruined by hail

Hail may also damage the compressor



FUEL HANDLING

by S/L W. Maguire
Directorate of Maintenance Engineering

A large jet engine may consume eight times as much fuel as a piston engine, thus eight times as much contaminant.

Safe aircraft operation is directly dependent on the quality of aviation fuel. The quality we are chiefly concerned with is cleanliness, or in the opposite sense - contamination. In absolute terms if the fuel is not clinically clean, that is not completely free of water or solid particles, it is contaminated. This contamination relates to solid particles such as rust, scale, sand and dust, lint, rubber, paint, and water in the dissolved, entrained or free (slug) form. Sources of the solid particles are generally the storage tanks, piping systems, pumping equipment, trucks, rail cars and tankers which store or distribute the fuel. Even the very air which we breathe contains dust and other matter which finds its way into the fuel.

With respect to water, dissolved water is the water that is soluble in the fuel. The amount that is retained in solution varies with the temperature and its chemical composition. This dissolved water is released from solution only by cooling; for example, 1,000 gallons of turbo fuel would produce about one pint of water if cooled from 75° F to -20° F. Free water, due to condensation from the air, seepage from the ground, or entry from some other source, becomes entrained or suspended water if subjected to agitation. This agitation, which is usually caused by pumping, produces minute droplets which may not be visible to the naked eye. At times these droplets are apparent in a milky form and because of their small size may not readily settle to the bottom. However, water in free or slug form is unusually easy to detect and settles readily below the fuel.

The questions usually asked at this point— why all this worry these days over contamination? Just what is clean or dirty fuel? How much dirt and water is in the fuel and just how much can an aircraft engine tolerate? These are good questions, and not easy to answer.

In the good old days aircraft like the Tiger Moth and Siskin could swallow some dirt and minute portions of water without much trouble. Small amounts of gasoline (low viscosity and specific gravity) were handled and consumed. This permitted long settling times - though not required - and if contaminant was present, a negligible amount was passed in a few hundred flying hours.

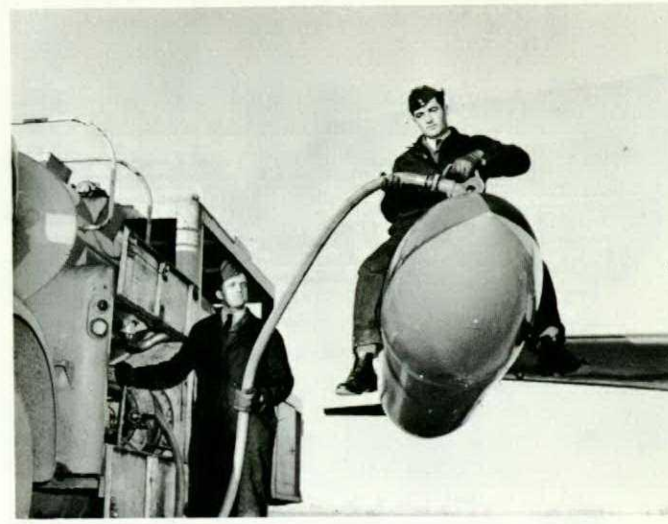
With the advent of high powered engines, particularly jet engines, delicate controls become a must. Very close tolerances are necessary to provide the required degree of control and power. Small clearances make fuel system components particularly susceptible to very small amounts of even minute particles of contaminant. High power demands mean high fuel flow rates at high pressures; for example, a large jet engine may consume eight times as much fuel as a piston engine. This in turn means that in comparison to a large reciprocating engine, a turbine engine is required to pass about eight times as much contamination in a given time, assuming the same level of contamination. The effects are widespread - more fuel used means more fuel handled, less settling time, increased tempo of handling, more wear and tear on the fuel handling equipment and on the aircraft engine components.

Water in the fuel causes plugging of fuel micronic filters due to icing, jamming of valves and passages of fuel controls due to corrosion, and engine flameouts.

Solid particles accelerate abrasion of fuel system components, cause clogging of filters, erratic functioning of control units, and at times complete power failure. In aviation gasoline, especially where the demand was small, these contaminants usually settled out. Jet fuels, however, are of a higher specific gravity and viscosity and are therefore harder to separate from contaminants. They have an affinity for water, remove rust from metallic objects, retain rust or particles longer. A five micron particle (5/25400ths of an inch) will settle approximately 18 inches per hour in aviation gasoline, and approximately 4 inches per hour in JP4.

Do you see the need for cleaner and drier fuels in this age of complex aircraft engines?

Authorities have been most conscious of the need and have installed water separators and filters in bulk storage installations and refuellers and micronic filters in aircraft. This equipment, if properly operated and maintained, will remove the solid and fluid contaminants.



The fuel delivered to your station may have a level of solid contamination of more than 200 mg per litre (about .032 ounces per gallon) of a particle size of more than 100 microns, and some trace of water. This same fuel, if the filtration and water separation equipment is properly operated and maintained, may contain only 4 mg per litre, of a particle size of 5 microns or less, and no entrained water on delivery to the aircraft. Because of delicate systems of our high powered aircraft engines, the aim is to deliver fuel to our aircraft engines contaminated to a level of less than 2 mg per litre, of a maximum particle size of 5 microns, and stripped of water with 100% efficiency. Does this "clinical" requirement not make you see the need for vigilance, adequate operation and maintenance, and alertness in all matters related to aviation fuel?

How good are your procedures? Are you taking the necessary precautions? Are you doing everything you can to ensure that clean dry fuel is delivered to the aircraft. You are? Don't be so sure!! Statistics and returns show that there are frequent recurrences of contamination — contamination that grounded aircraft, caused accidents, killed pilots, restricted operational readiness and capabilities — contamination because

someone forgot to drain the water from the tank car or road tanker before dispensing
someone forgot to dip for water
someone thought it wasn't necessary to drain the water from the separator or filter
someone neglected to change the elements in the filters and separators
someone didn't check the fitting of the elements during replacement
someone didn't think about settling and so, filled, and pumped from the bulk storage, in a haphazard fashion
someone didn't use the dust and water covers
someone used a dirty refueller
someone didn't check the filter before using the refueller
someone didn't recirculate a few gallons of fuel before pumping into an aircraft
someone defuelled an aircraft and then used the same refueller for filling aircraft
someone didn't drain the water from the tank and filter casing before filling an aircraft
someone didn't check for proper filter element and nozzle screen installation
someone dragged the nozzle across the ground, mud or snow and used it without any precautionary measures
someone didn't bother to drain the aircraft tanks for water
someone didn't change the micronic filters in the aircraft engine
someone didn't do his job
someone just forgot
someone just couldn't be bothered
someone was dreaming instead of thinking
someone thought that handling fuel was a distasteful task of no importance

WAS THAT SOMEONE YOU?

High standards of cleanliness can only be attained if you are alert and vigilant. Remember this, fuel must be clean and dry to keep the fires burning - yes, home fires too - for dirty fuel may kill a provider.

DON'T GO DOWN WITH YOUR SHIP

In the past, the time-honoured tradition of going down with the ship has made many a storybook hero—and just as many dead captains. Our answer to this tradition is safety equipment, particularly ejection seats. The following table summarizes the use of ejection seats during a 22 month period:

Ejected from	1957-58 Apr-Mar	1958-59 Apr-Jan
CF100		
successful	4	8
fatal	5	2
Sabre		
successful	6	6
fatal	3	2
T-33		
successful	1	5
fatal	1	0
Total		
successful	11	19
fatal	9	4

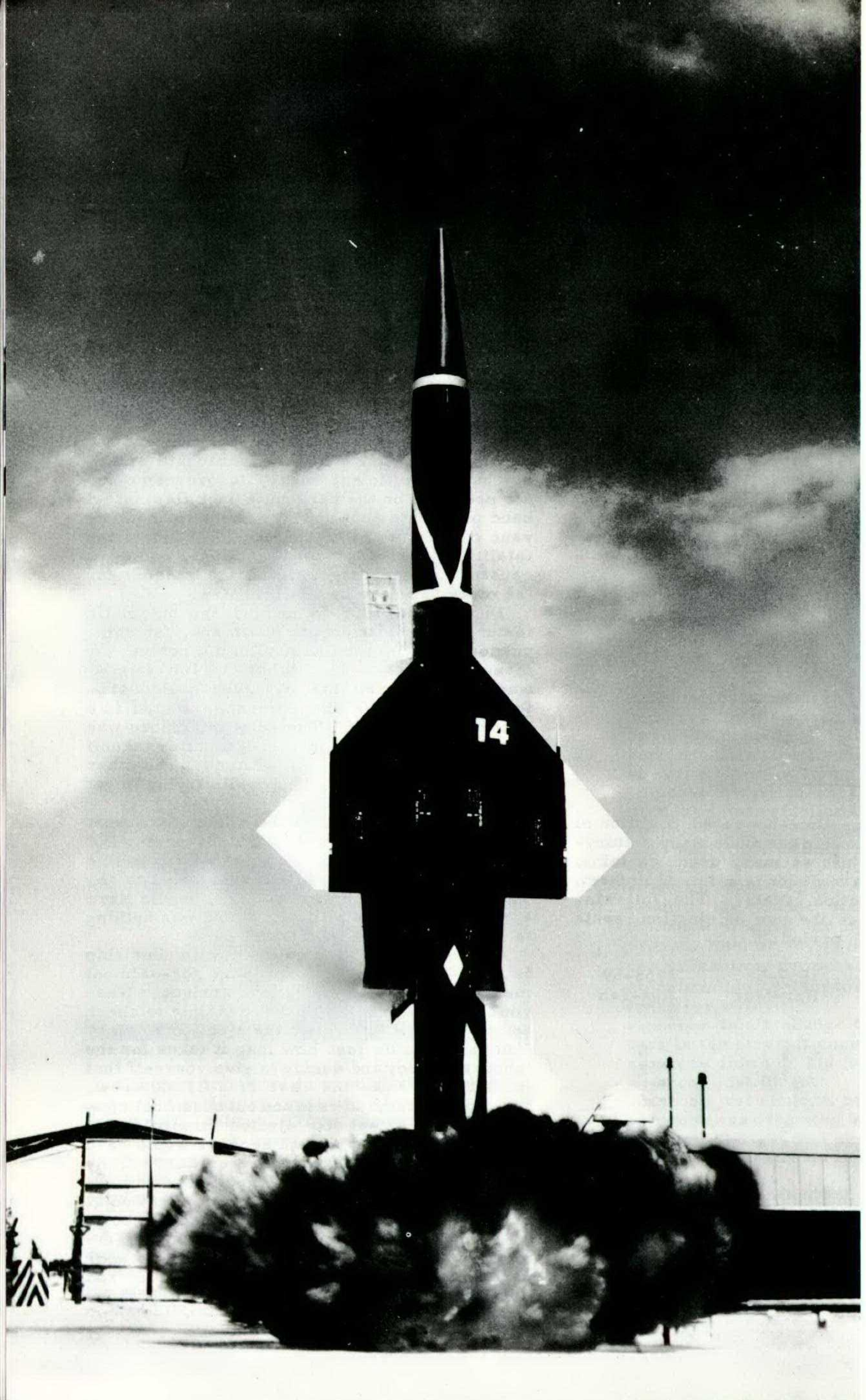
Experience and improved equipment have accounted for this very satisfying decrease in fatalities. But why should any ejection be a fatal experience? Let us take a look at the record.

During the 1957-58 period five fatalities (3 CF100, 1 Sabre, and 1 T-33) were the result of ejecting without sufficient altitude; two more (1 CF100 and 1 Sabre) were the result of not getting 'hooked up' properly; one happened when the back apron pin on a CF100 deformed during ejection through the canopy (these pins are now protected with metal cones); and one is assumed to be the result of the pilot of a Sabre falling in a back down position and the pack elastics and auxiliary parachute spring not having sufficient energy to overcome the air pressure on the parachute pack flaps (steel band parachute pack openers and a spring-type vane parachute are now in use). Of these nine fatalities five were low ejections, two were caused by carelessness, and the reasons for the other two have been eliminated.

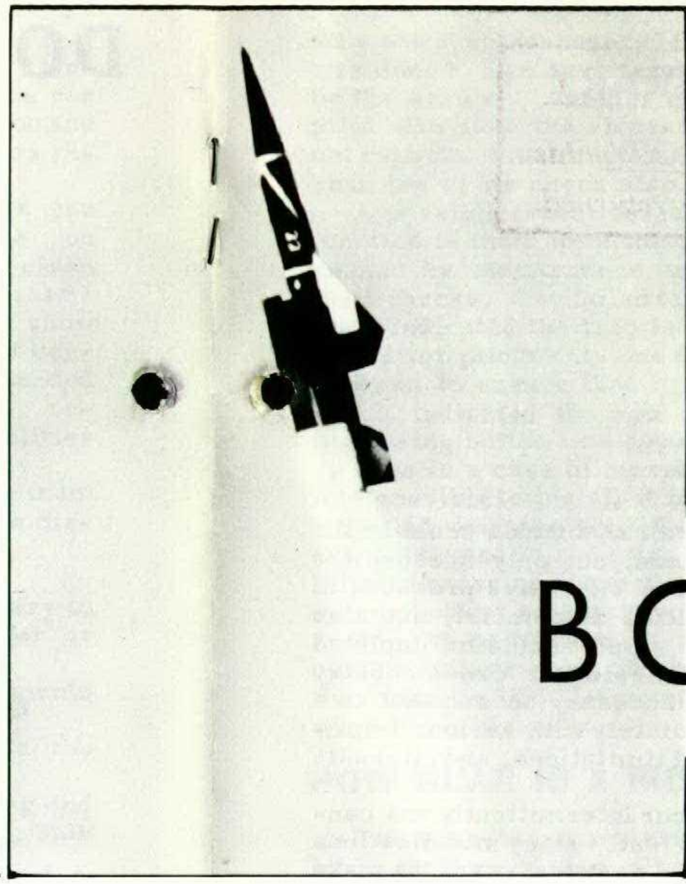
During the 1958-59 period the automatic features of one parachute failed and, for some unknown reason, the CF100 pilot did not use the manual release. The other CF100 fatality was scored when the observer could not be found even though the evidence pointed to a successful ejection. The pilot of a Sabre was lost when he had to eject shortly after takeoff and did not have sufficient altitude. The other Sabre pilot waited too long while trying to get his aircraft back to base.

If these statistics told the whole story most of our ejection worries would be over. But during these 22 months we have had to assume that at least 14 men did not know what to do. These men, according to evidence, should have ejected and did not. In fact there was nothing to indicate that they had tried.

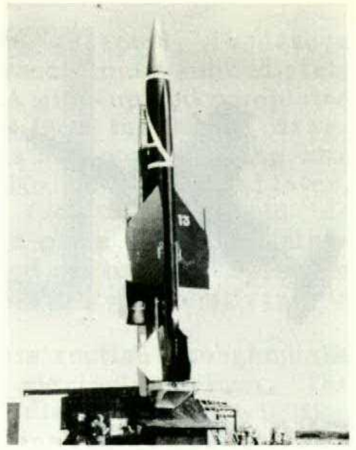
The decision not to go down with your ship is one that you have to prepare for—almost make—before the emergency arrives. When you are getting hooked up there is time to check and to mentally run over the ejection routine. You should know just how long it takes for the 'chute to deploy and decide to give yourself that much time. Take the case of a CF100 crew. They found themselves in and out of control condition at 7000 feet and ejected immediately. In this case a delay of two seconds would have been fatal, or at best extremely critical. They knew when to go and went. Ejection seats have been developed to the point where ejection at very low level is feasible. They cannot, however, make the decisions or go through the motions for you. The time it takes for your parachute to deploy is predetermined. You must have that much time in terms of altitude.



1.



2.

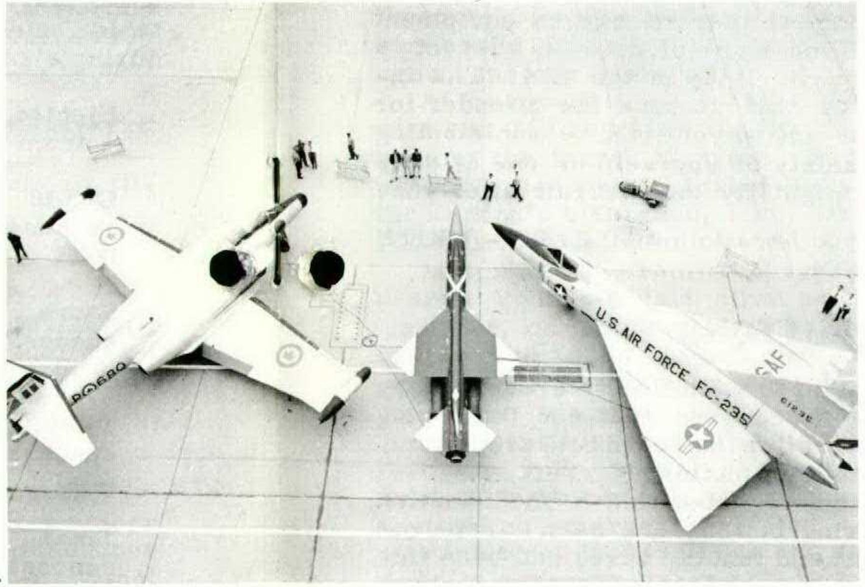


BOMARC

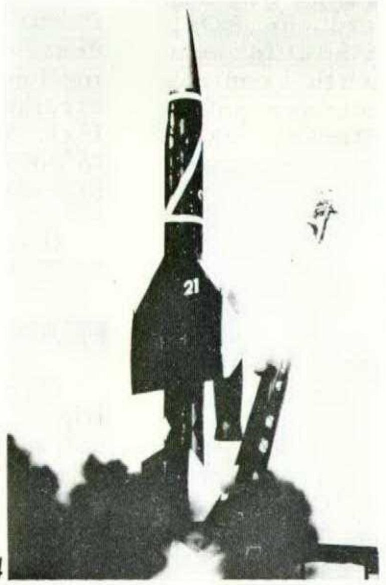
1. *Firing the Bomarc*
2. *The Bomarc in flight*
3. *Defence and deterrent*

4&5. *Ready to go*

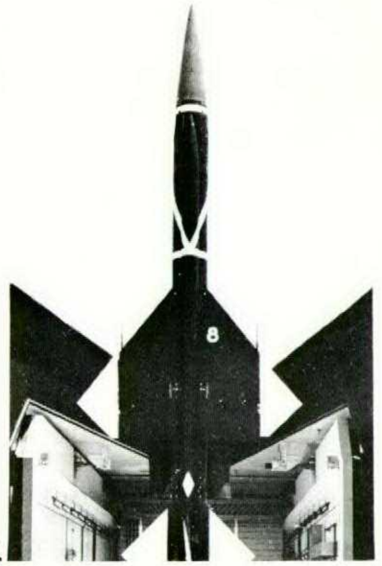
The Bomarc is a surface-to-air missile. Initial acceleration is produced by solid fuel booster engines. As the speed is increased a point is reached where ram jet engines provide additional thrust. This combination of engines carries the missile to an altitude above 60,000 feet and accelerates it to a speed in excess of Mach 2. The Bomarc receives guidance from an electronic computer until its own target-seeking radar locks onto the target.



3.



4



5.

NEAR MISS

TWO HUNDRED DOLLARS A MINUTE

Immediately after takeoff in a T-33, the pilot noticed that the port tip tank cap was missing. As a result the port tip tank wouldn't feed. He attempted to pressurize the tank by closing the foot warmers and turning up the heat. This did not work so after flying around for twenty minutes he was ordered to jettison the tanks. The cause of the fuel tank cap coming adrift was directed to maintenance but this pilot evidenced a serious lack of knowledge of the aeroplane when he tried to pressurize a tip tank that had a cap missing. This is like trying to pump air into a tire that has suffered a blow-out. In this particular case the starboard tank wouldn't feed either so the syphoning action from the port tank caused a stbd wing heavy condition after the twenty minutes of flying time that was spent in trying to pressurize the capless tank.

In another case that is still under investigation the same thing happened. But this time the CO has recommended that the pilot be made to pay for the tanks. Do you know the cost of a tip tank? Well it's $1988.00 each and 1988 x 4 is $7952.00.

From these two cases, and others, it appears that pilots think they cannot land a T-33 with full tip tanks. We suggest they read the EOs.

We hasten to add a caution—if the difference in weight between the tanks is such that control cannot be maintained to the touchdown point, then by all means jettison the tanks. While tip tanks are expensive, T-birds are more expensive.

PLEASE WRITE IT UP

A student and instructor were doing a local night checkout in a T-33. The student received a blast of air in his mask and, when it persisted he gave control of the aircraft to the captain. The trouble could not be cleared up using the recommended procedures. By the time a landing was made the oxygen pressure had fallen to zero.

Since April, 1956, there have been 47 reported cases of "run-away" oxygen regulators. Most of these have occurred in the CF100, but instances have also been reported in the T-33. A "run-away" regulator at altitude could be the cause of great concern, not only because the escaping oxygen causes excessive pressure in the mask with resulting discomfort, but also because the oxygen supply could be depleted rapidly. On a long mission or cross country flight it might be necessary to descend to a lower altitude immediately with serious implications; weather, fuel limitations, and alternate landing aerodrome.

These failures occur intermittently and cannot be found by ground test. Many modifications have been made in the past few years to make the regulators as reliable as possible. The only way to detect such failures is through pilot reports. Pilots are known to have had such malfunctions and cleared them by flicking the "press to test button", squeezing closed the hose to the mask, or by "bashing" the regulator. The regulators have resumed functioning and on landing the incident was forgotten and not written up in the L14. These methods can be employed in an emergency. But how can you ensure that the offending regulator will not stick on a subsequent flight? Have it removed.

The regulator is part of your lifeline. Treat it with the respect that all oxygen equipment deserves. If you know of, or even suspect a malfunction, write it up in the L14. The instrument Tech will remove the offender for test. By your action you will be contributing to the flight safety of yourself or one of your buddies who might fly the aircraft after you.

(Kick it if you have to but PLEASE - WRITE IT UP.—ED)

FEATHER BUTTONS

On runup prior to takeoff for a cross country flight, it was discovered that one feathering button of an Expeditor feathered both propellers. The other button did nothing.

Investigation revealed that a modification to the feathering buttons had been carried out at another unit and that the wires had been improperly connected. This leads to the question: Why was it not discovered when the modification was done? Lax maintenance procedures must be the answer. Another question, why had the pilot who flew the aircraft to its present unit not reported a malfunction? The pilot must have been lax in his check also.

A possible reason for not catching this malfunction is that, when the feathering button was pushed by Maintenance and the ferry pilot in their checks, they failed to notice which instrument indicated the drop in rpm. In questioning Expeditor pilots only one in four stated that he checked to ensure that it was the right needle which indicated the rpm drop when the port feathering button was depressed.

This is a case of Murphy's Law at work: If it is possible to install it incorrectly, it will be installed incorrectly. Even though the fault can be traced to a design discrepancy (possibility of crossing connections or two connections on one button) technicians must be alert to, and avoid, the operations of Murphy's Law. And both groundcrew and aircrew must be sure that they actually SEE IT—not just think they see it—when carrying out routine checks.

HOW NEAR IS A MISS?

The exercise was carried out at 18,000 feet by a section of two CF100's doing practice identification runs alternatively acting as target and fighter. The section was under GCI control although the navigation of the section was the responsibility of the target aircraft. The weather conditions at the time of the exercise were 19,000 feet overcast, visibility 15 plus. In order to carry out the exercise satisfactorily each crew had to make a minimum of four identifications of the target aircraft. The section had filed an IFR flight plan but when it was realized that the exercise could not be completed and be back over the beacon with the minimum of 4000 pounds of fuel, the leader cancelled IFR through GCI and refiled VFR. At this time three successful runs were still required, two by one crew, and one by the other.

At the completion of each run and prior to the next run GCI reported the sections pigeons to base to the target aircraft. At this time the exercise was being carried out at the limit of the section's clearance, i.e., barely within the 100 mile radius from base.

Minimum requirement of fuel back over the beacon VFR was laid down as 2000 pounds. However, on completion of the third run the leader had 2300 pounds and wingman 1900 pounds. At this time pigeons being 325 at 91 miles the wingman, who had been the target and responsible for the navigation during the last two runs, at last realized that fuel is a critical requirement while flying jet aircraft and that an emergency existed. Although GCI was informed that fuel was extremely short no definite action was taken by the section to offset or check on their predicament. No wind check was made, a GCI GCA was accepted. The leader descended to five thousand almost immediately was vectored onto GCA pick-up and completed cockpit check ten miles from the button, dragging the aircraft in at a high power setting with everything hanging. No. 2 descended later, being the shorter of fuel, and withheld his cockpit check until the glide path was intercepted. The lead flamed out on the runway and the wingman landed with barely enough fuel to taxi to the ramp.

Mistakes made by this section throughout the trip are numerous and glaringly obvious. The more outstanding being disregard of navigation and OTU regulations, inability to recognize and counteract an emergency due to lack of knowledge, and overall complacency.

Attempting to get a DCO has probably caused as many accidents in the past as any other single factor and this one falls within this category. OTU instructors have stated that this particular exercise should have taken about one half the time used by the crews involved. When both crews were interviewed they saw how close they came to losing an aircraft and probably their lives—yet at the time they just didn't think. After facing the wrath of the CFI they realized the importance of navigation and fuel management.

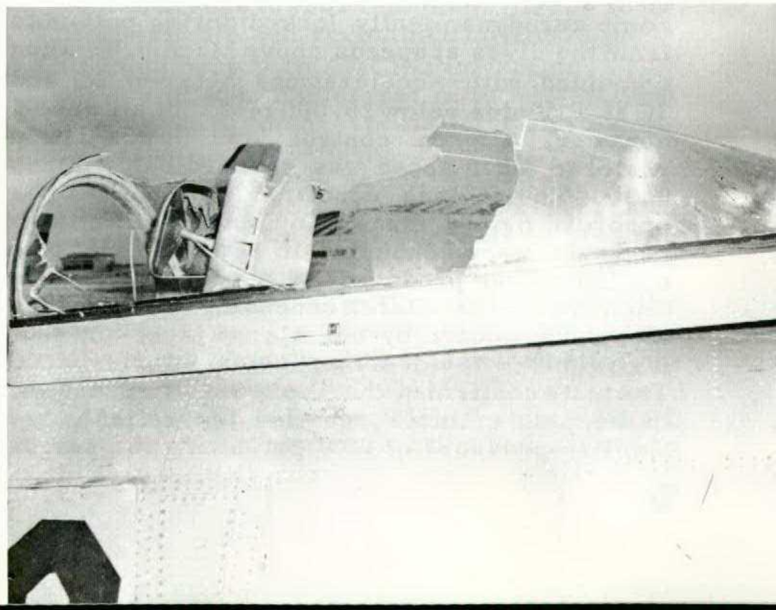
HARD HAT SAVES PILOT AND AIRCRAFT

After completing a gunnery exercise at 10,000 feet, a formation of three F86's descended through cloud and levelled out at approximately 1000 feet and 350 to 360 knots. Soon after levelling out a bird struck No.3's canopy. The canopy and windscreen were shattered and the pilot's hard hat torn off.

The return to base was uneventful.

Here is a case where a hard hat undoubtedly saved a pilot's life. Without it he would have been knocked unconscious, at least, and at an altitude of 1000 feet he would not have had time to recover.

When a hard hat is a man's best friend



VFR IS NOT FOR OSTRICHES

It was a clear night, dark because of the absence of a moon but visibility was excellent. The exercise, a T-33 night proficiency training jaunt was done under IFR. Approach Control was asked for a clearance to the field via single beacon approach. GCA was not in active operation because of the fine weather. Clearance was received and descent commenced. It had been noted that a CF100 was estimating the beacon a minute or two after our T-33 and that approach control was providing altitude and time separation between the two aircraft prior to clearing the CF100 down.

Intending to shoot a few touch-and-go landings the T-33 pilot cancelled IFR on passing the beacon inbound (5 miles) and requested landing instructions. He was cleared to the traffic pattern and instructed to call the tower "3 on initial". (The runway in use was straight-in from the beacon.) Switching channels the pilot noted heavy VFR jet traffic in the circuit pattern and because of the heavy TR traffic was unable to call until about two miles out. Just as he pushed the button to transmit a CF100 slid past his port tip tank. It was close enough to make you think. In conversation with the CF100 pilot later, it was found that he had not seen the T-33, nor was aware of its presence in the area until he passed it. This CF100, by the way, was the same one that had been cleared down behind the T-33 with normal IFR separation. How then the meeting two miles out? The CF100 pilot had cancelled IFR in penetration turn and, not slowing to approach speed of 250K, as did the T-33, had cut the corner past the beacon and came charging in. Tower was aware of the heavy traffic in the circuit area but was not keeping individual aircraft informed.

This type of near miss is preventable if:

- Pilots, whenever possible, cancel IFR over a known fix (radio beacons) thus providing the tower of their exact position.
- Pilots adhere to laid down procedures as to circuit heights and speeds.
- Control tower operators keep pilots informed of the position of other known traffic.
- Anti-collision lights are provided for all types of aircraft.
- Pilots keep their heads out of the cockpit in VFR conditions.

(The status of anti-collision lights was reported in the Jan/Feb issue of Flight Comment. —ED)

SABRE AILERON

During the course of a flight test programme to determine conditions which would produce aft overheat light warnings in the Sabre 6, a number of sustained dives were carried out at Mach numbers above 1.0. It was discovered during these tests that the ailerons could become aerodynamically locked during pull-outs from the dives at speeds above Mach 0.97 when combined with accelerations between 2G and 3G at altitudes below 25,000 feet. In all cases, however, aileron control was immediately restored when speed was reduced below Mach 0.96. The locking condition was sometimes preceded or accompanied by severe buffetting.

Tests were conducted to establish that this condition was produced by aerodynamic hinge moments on the aileron exceeding the operating moment produced by the aileron jack, and that it was not the result of mechanical interference. The tests confirmed that the hydraulic pressure in the jack cylinder equalled the relief valve limiting pressure of 3400 psi during the period that the ailerons could not be operated. It is believed that the rapid rise in aerodynamic hinge moment, which was measured in the tests, is due to a corresponding change in the shock wave pattern.

On the basis of the findings of these tests, it is recommended that pilots of Sabre aircraft should initiate recovery from supersonic dives at a sufficiently high altitude to ensure that the speed is reduced below Mach 0.95 before reaching 20,000 feet. If the condition of aerodynamic locking of the ailerons is inadvertently encountered, open the speed brakes, throttle back and reduce the diving angle. Rapid recovery of control will occur as soon as the airspeed is reduced below approximately Mach 0.96.

It should be remembered that aileron trim should not be applied during the period when the ailerons are locked, since this will result in a severe rolling manoeuvre when aileron control is restored.

Canadair Service News

How often have you said, "Why don't they do something about this." This being something that does not fit, or a piece of equipment that could be designed better, or the like; and they being the men who decide what we do and what equipment we use. Fortunately we live in a democracy where your voice can be heard by the men at the very top. If, in your opinion, something can be improved raise an Unsatisfactory Condition Report (UCR) and let the red tape start to unravel. It has been said that a UCR can be compared to the ballot you cast on election day—it's a way of making your wishes known 'at the top'. To check on our ballots we asked AMCHQ for some facts.

AMCHQ informed us that 8428 UCRs were raised in 1957 of which 1039 were classified as urgent, 4449 routine, and 2940 as information. In all 5866 called for action, and actioned they were. Every one actioned achieved the aim of the UCR. If the UCR was not concerned with flying the action that was taken made our work easier. Each one actioned that was concerned with flying was a stride in the direction of flying safety. But are we making full use of the UCR? Do we understand just what happens when a UCR is submitted?

Let us assume that a technician has seen an unsatisfactory condition, prepared a UCR, and sent it on its way. Here is what happens to most of them—and please note the number of people involved in the long chain of events that has been set in motion.

> The UCR goes to your specialist officer for his comments.
> It then goes to the station CTSO for his comments.
> It then goes to your Command HQ for their comments and recommendations.
> They pass it to AMCHQ for action.
> The UCR is registered in to AMCHQ and then sent to the specialist officer concerned.
> The UCR is then actioned.
> When completed, the UCR is sent back to you through the above channels in reverse order.

Perhaps you are familiar with much of the action which occurs outside of AMCHQ. But what happens when the UCR disappears into that mysterious building called AMCHQ?

First the UCR is registered in to AMCHQ by the Statistical Services Section and passed to the specialist staff concerned. It is registered into the applicable branch and passed for action to the project officer. (Every move made by the UCR is registered as AMCHQ considers the UCR to be very important and treats it as such.) Secondly, the UCR is reviewed carefully by specialists. If the UCR is reporting a condition for the first time, unless it is a dangerous condition, likely no remedial action will be taken but the information is filed for reference. If the condition being reported is a repeat of one or more past UCRs, then action is required.

The UCR is studied together with all past reports. Such a study will sometimes reveal an immediate solution. A review is made of recent engineering changes both in production and for retrofit. Often these were designed to solve problems - the very problem which appeared on the UCR. If the UCR suggests a modification, and many do, it may require in addition to our study, evaluation by the manufacturer, the contractor, CEPE or all of them. Even though modifications are not involved, the subject of many UCRs require comments by the equipment manufacturer, the aircraft contractor, or both. In some instances the UCR is passed to the American Services for their information or comments. Only after AMCHQ is quite sure they have an answer - and the correct one - do they complete the UCR and send it back. If obtaining the answer is going to take longer than, 30 days (Urgent UCRs), 90 days (Routine UCRs) and it frequently will, an interim reply will be sent. The 30 day or 90 day period beginning at the time the UCR is received at AMCHQ.

Here are a number of variables, that affect the length of life of a UCR, in the order of their importance: the amount and quality of data supplied by the originator; the amount and quality of detail supplied by the originator; the recommendations and actions suggested; and how far afield the actioning staff must go for the fix.

A UCR can be a credit and an asset to the RCAF when compiled with intelligence by each incumbent from the originator through to completion. Remember any UCR that affects Flight Safety gets top priority.

OXYGEN

Oxygen can kill you by; lack of it—hypoxia, too much of it—hyperventilation, and by poisoning—carbon monoxide. You have heard all this before and have been trained to use oxygen wisely. But how long is it since you have refreshed your memory, reviewed your oxygen training? How to use it, when to use it, the proper procedures, and the testing and care of your personal equipment.

During 1958 the following D14s were received at AFHQ reporting oxygen incidents:

CF100	-	45
T-33	-	16
F86	-	1

That is a total of 62 in twelve months. Eleven D14s on oxygen were received during January and February of this year. To complete the picture mention must be made of over 700 TFRs forwarded to AMCHQ regarding regulator replacements.

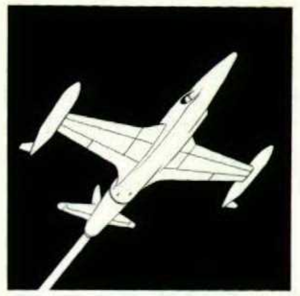
The CF100 D14s, when analysed, showed two problem areas; runaway regulators (19 cases), and lack of knowledge (26 cases).

The engineers are working on modifications to the A20 regulator, mods #8 and #10, that should eliminate future malfunctions. A study is also being made with a view to simplifying the oxygen system. Training staffs have been asked to expand their initial program and to increase refresher training. Medical officers and aeromedical training officers will be informed that greater participation will be expected of them.

An aggressive approach is required if oxygen incidents are to be reduced; a fact born out by the apparent lack of understanding, not only by aircrew, but also by squadron commanders, technical personnel (including MOs), COs, and AOsC, Often specialist and supervisory staffs disagree with one another, and very few D14s give enough detail or include test reports. A recent D14 listed anoxia, hyperventilation, fatigue, discomfort, and apprehension as a possible cause of an aborted flight! A D14 from Portage la Prairie and one from Bagotville show that staffs on these stations are concerned about this problem and have started full scale investigations. Here it might be well to stress this point: rather than everyone conducting his own private test or investigation have one thorough investigation that gets the MO, SAEO, FSO, OC, etc., into the picture. Make a clean sweep of the whole oxygen situation.

In the near future you will be receiving a questionnaire similar to the bail-out questionnaire. We very much regret another form but we are concerned about oxygen incidents. It's a problem that demands the attention of all levels—top to bottom. Oxygen problems are serious. They jeopardize men, equipment, and the mission.

ARRIVALS and DEPARTURES



Too Hot To Be Handled

Two pilots were signed out to do an IF flight in a T-33. The captain, who normally flies a CF100, reports: "After completing the instruments, I took over control to do the landing. A normal circuit was made. Speed was 130 knots on final approach, with dive brakes out, and fuel contents 240 gallons. A long hold-off was made counteracting a strong drift. The aircraft was straightened out for touchdown. On touching the aircraft skipped and drifted slightly. On second touchdown the nose started rocking up and down and overshoot was initiated. The nosewheel started bouncing and on the second or third bounce something gave way in the nose. There had been no noticeable response from the engine and during the last violent bounce the attempt to overshoot was ceased. I called to the aircraft ahead to keep clear and the tower called for the barrier. On hitting the barrier, the aircraft was pulled sideways taking the rest of the nose gear as the aircraft was brought to a stop".

This aircraft will require fly-in or MRP repair.

Here is a case of a pilot, inexperienced on a type, not realizing his or the aircraft's limitations. Briefing in such cases should stress the need for observing recommended procedures. But, however you look at it, trying to land off a hot approach is always dangerous.

Insufficient Information

When an incident is assessed as "Maintenance Error" it is usually because someone did not read the appropriate instruction or, if he did, failed to carry it out. Here is one that happened because there was insufficient information in the EO.

As the pilot reported it: "An AI approach recovery was made from a normal AI mission and an overshoot carried out. On the overshoot, the undercarriage retracted normally and I set course to get set up again for another practice AI approach. In level cruising flight, with the airspeed slowly increasing from 300 knots, the nosewheel unsafe light came on and a muffled roaring sound, very similar to that resulting from extension of the T-33 speed brakes, was plainly audible. I immediately opened the dive brakes and closed the throttle. As the airspeed dropped back to about 230 knots, the light went out and the sound of rushing air ceased. The airspeed was maintained at 140-150 knots and a low pass carried out for inspection of the aircraft in the clean configuration by the tower. The tower advised that the nosewheel door appeared to be partially hanging in a cocked position. As I had a 300 pound differential in fuel load I balanced it, anticipating possible hydraulic malfunctions, lowered the undercarriage normally and carried out a routine landing."

Examination of the aircraft showed that when the nose landing gear was raised the hydraulic flexible hose in the nosewheel well buckled because it was 1-1/2 inches too long. This prevented the uplock from engaging. The technicians who made up the line followed instructions laid down in EO 05-1-3. Since the EO did not explain how to determine the hose length from the assembly length or part number they could not double check their work.

No mention is made of a retraction test after the line was changed as is specified by EO 05-1-2A. If the retraction test had been done the error in the length of hose might have been discovered.

The unit concerned has taken UCR action. They have also procured copies of Aeroquip Bulletin No. 240 on aircraft flexible hose assemblies as supplements to EO 05-1-3.

Investigate (To Inquire Into)

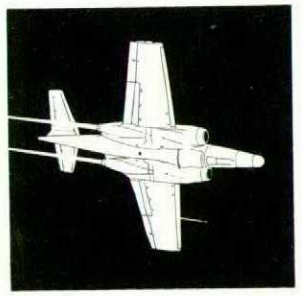
"The purpose of accident investigation is to determine what happened, why it happened, and how it happened in order to keep it from happening again" should sound familiar to anyone who has read R.C.A.F. Bulletin No. 33. It is conceivable that time and energy could be wasted if an investigation is carried to a point where we're looking for the cause of a cause of a cause. It is inconceivable that more than a very few investigations should end with "Obscure due to lack of evidence". Not to inspect a component that may be damaged should never be considered.

Take the case of a T-33 that ran off the tarmac and damaged the undercarriage. The port brake went "flat" as the aircraft was being swung into line after a flight. The investigation was fine up to a point, a sample of the hydraulic fluid was not taken for testing. Why? We'll never know.

A series of similar incidents had happened at another unit and the cause was traced to contaminated hydraulic fluid. (If a particle of the contaminant keeps the poppet valve in the master cylinder open the fluid will by-pass the piston.) At this unit it was also discovered that the "flat" could often be cleared by moving the brake pedal with the toe. This would wash the obstruction out of the poppet valve. The cause of the contamination was traced to the practice of filling hydraulic tanks with "coke" bottles and other unauthorized devices.

A case of no inspection concerns the overspeeding of a Harvard engine. The overspeed condition resulted in a vertical dive after a student had tried a Cuban 8. The circumstances did not indicate an assessment of "pilot error". The engine's time was almost expired so it was returned for overhaul without any inspection. If the crew were not guilty of poor engine handling, why not look for the cause within the engine itself?

This station has had 13 cases of overspeeding in six months and is carrying out a "comprehensive review of overspeeding". The end of this sad tale is that no technical investigation was carried out. And again we'll never know if we missed the clue that would save expensive engine changes in future.



Suppliant Aircraft

The accompanying pictures show aircraft in a very human attitude of supplication. Could their plea be for a little less carelessness on the part of Master Maintenance? Here are their stories:

Late one afternoon a Cpl and two LAC AFTechs were carrying out a retraction test on a CF100 as per EO 05-25F-2, part 3, section 1, para 60. The undercarriage was found to be operating satisfactorily. An emergency lowering of the wheels and flaps was made and the system was bled. The Cpl detailed one of the LACs to install the ground locks, but after a lengthy search no locks were found. The crew carried on and after completing a safety check lowered the aircraft as overnight jacking isn't allowed. The brakes proved very spongy so they proceeded with bleeding the foot motors and brake pistons. This was done with the electrical power on and the hydraulic test rig at 1500 psi. As it was quitting time a general clean up was started and the Cpl looked for the Sgt to report that no nose ground lock was available. The Sgt could not be found because he was on barrack block duties. The crew went home.

The next morning the Cpl and his crew proceeded with the brake bleeding and attached the test rig. The results are here for you to see. When the hydraulic pressure reached 700 psi the nosewheel retracted, and the aircraft fell on its nose damaging the radar nose assembly, airframe structure, some plumbing under the port engine and a Comstock motor generator assembly. An investigation revealed the undercarriage selector button was in the up position. The cost of this — well over $10,000.

Why did it happen? One: the undercarriage ground safety pin was not installed. Why one couldn't be found is another story. Two: another crew worked on the aircraft during the night, unknown to the Cpl. Three: a cockpit check was not made before work commenced in the morning. Four: the Sgt supervisor was employed on barrack duties putting the load on the Cpl. It's the same old story, with the same old ending, all because the position of the undercarriage selector was not checked before pressure was applied to the system.

The second story also concerns a retraction test. On the day preceding the accident the T-33 was placed unserviceable because the outer right hand fairing door was hanging in flight. During the evening the unserviceability was rectified and several undercarriage retractions carried out to test its operation. In the morning the T-33 was towed from the hangar to the flight line and BFI'd.

A student pilot arrived. He checked the cockpit and, because the undercarriage "looked like it was down", he did his external, removed the safety pins and prepared to start-up. When the battery master switch was turned on the horn did not blow. The starting cycle was commenced and another aircraft bowed to Mecca.

Each report on this type of accident brings new, and sometimes wonderous, excuses. Yet each case ends "Maintenance Error" and "Disciplinary Action". The cost, the inconvenience, of these accidents can be calculated. But how much does it cost Maintenance in terms of lost confidence? This is important. As long as our air defence is a team effort each team member must have the respect of his counter part—air for maintenance and maintenance for air. And, until prayer rugs are provide for aircraft, each member must feel a personal responsibility for keeping our aircraft flying.

Soon as the cycle began . . . . Crunch

700 psi and $10,000 later

Runaway Mule Kicks Bird

Not too long ago I had occasion to see a ground handling accident from moment of conception to final ignominious ending.

My partner and I had clambered into the cockpits of two adjacent CF100's. We were now impatiently watching an airman trying to start a tempermental energizer with little success.

After some time our airman decided to obtain another energizer. Needless to say, at about this time his patience had been worn quite thin. In anger he roared towards the flight line and seized the nearest energizer available, snapped it onto a nearby mule and careened back towards the aeroplanes.

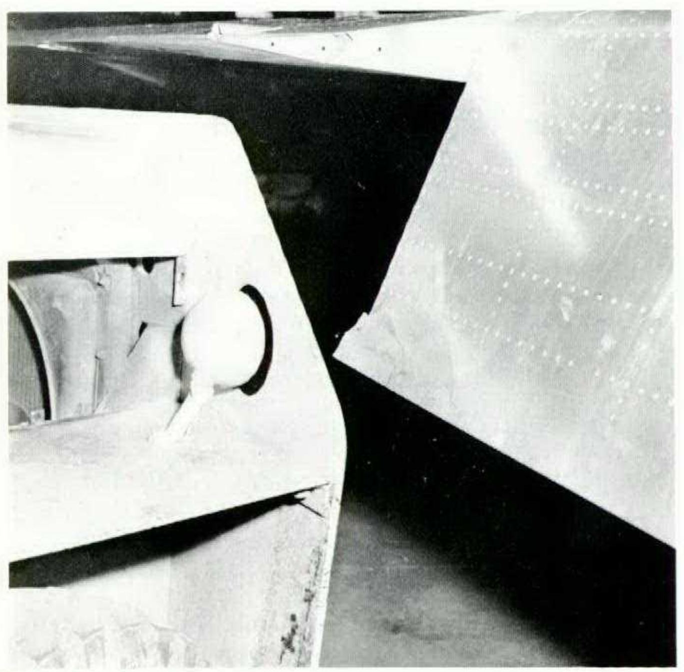
Unfortunately the energizer had been carelessly connected, it cut loose and had soon passed the mule. The airman leaped from his mule and gave chase.

Another airman nearby, seeing the energizer hurtling towards him quickly dug in his heels with the intention of catching it. Fortunately he changed his mind and used a better method.

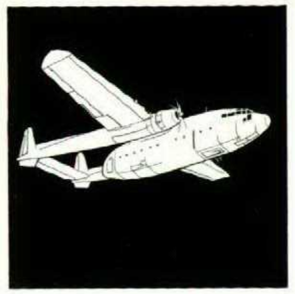
The two airmen finally trapped the runaway energizer and were congratulating each other when they heard a dull thud. Turning about they saw a mule firmly imbedded in the flap and aileron of my partner's aircraft.

What had happened was that when airman number one had leaped from his mule he had forgotten to stop it.

(This sounds like an accident that started to happen before the energizer refused to work. When you get up on the wrong side of the bed, or let the morning traffic get your goat, or let anything rush you into 'taking it out' on ground equipment you are begging for an accident. And an accident will seldom keep you waiting.—ED)



Eying the damage

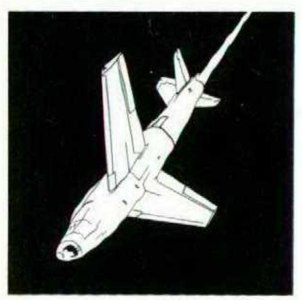


Design Defect

The minutes of a flight safety meeting that was held on the 21 Jan 59 at 435(T) Sqn contained a recommendation to modify the emergency undercarriage switch shield in the C119 aircraft.

The following is a quote: "The similarity in location design and coloring of the Emergency Undercarriage Switch Shield and the Emergency Power Switch Shield is considered to have been a factor in the nosewheel of a C119 aircraft being retracted while the aircraft was on the ground. To prevent a repetition of this type of accident it is recommended that the Emergency Undercarriage Switch Shield be safetied with a very fine locking wire and consideration be given to painting it a lighter shade of red."

It is ironic that on the 5 Feb 59 just two weeks after 435(T) Sqn brought this design defect to the attention of all concerned, an accident happened at Rivers, caused by the similarity of the emergency undercarriage switch and the emergency power switch. In this particular case an accident wasn't prevented but it does prove that 435(T) Sqn is on the ball.



Too Many G's

A young Sabre pilot was briefed by his flight commander to practice aerobatics and forced landings. The pilot took off and climbed to 10,000 feet, then carried out a PFL and overshoot. He climbed to 25,000 feet and did a few loops and rolls. In the process he lost a bit of altitude and decided to climb back to altitude before carrying on with the exercise. Up to this point we have a conscientious pilot trying hard to perfect his flying skills, and doing well.

While in a gentle turn another Sabre carried out an attack on him. Not being chicken our pilot broke into the attacking aircraft and did several evasive turns, including a hard pull up causing what appeared to be an overstress condition. The pilot not realizing the overstress broke off the engagement and carried on with the exercise, doing a few more aerobatics before returning to base.

A technical inspection of the aircraft revealed severe damage to both mainplanes. The G meter was up against the stop indicating that the aircraft had been subjected to at least 10-1/2 G's. Both wings were badly wrinkled and several rivets were popped at the main spar. Some of the wrinkles were over 1/4 inch deep. The upper surface of both wings were also rippled over a length of 10 feet. The aircraft was not considered airworthy for a fly-in repair.

Now what makes a good pilot do things like this? The pilot's action in this flight could not be farther from the professional approach that is required of our pilots. Not only did he show a lack of discipline in participating in an unauthorized air fight but also a definite lack of airmanship, first in overstressing his aeroplane, then by continuing aerobatics after the overstress.

Some people take more teaching than others, let's hope that this boy has learned his lesson.

Letters to and from the Editor

Have We Got Troubles

The pilots of the Comet shown in your Jan-Feb issue can hardly be blamed for paying more attention to inside their aircraft rather than outside — they've got so much trouble that the CF100 must be the least of their worries.

What with no oil pressure on any engine, and an IAS of only 45K with wheels down we doubt they'll make it as far as the CF, in spite of Maching .7M.

P.S. Could this photo have been faked?

H. G. Morson, S/L
412 (T) Squadron

(It was faked.—ED)

Artistic License

DFS807 11 FEB ERRORS IN DFS POSTERS PF VOL 2 NUMBER 13 AFHQ/CAS/DFS SABRE LANDING WITH D DOORS DOWN PD SHOULD BE UP PD VOL 3 NUMBER 2 AFHQ/CAS/DFS SABRE LANDING WITH D DOORS DOWN CMM DIVE BRAKES IN CMM FLAPS UP PD SHOULD BE D DOORS UP CMM DIVE BRAKES OUT CMM AND FLAPS DOWN

CANAIRPEG

(Our boner. This, however, does not detract from the message—with all that runway why land short.—ED.)

Compressor Stall

In the article on Compressor Stall, by S/L E.D. Harper in your May-Jun 1958 issue he states that, "Compressor stalls may exist in part of a compressor without any noticeable effect on engine operation".

In my experience this is very unlikely. If blade stall commences in a particular stage more work will be thrown on the remaining stages. That is, the reduction of airflow resulting from the stalling of one stage has the immediate effect of increasing the angle of attack relative to the airflow of the remaining stages, and if the engine is operating close to its "Surge line" at the time all the blades can be considered to stall simultaneously and the combustion chamber pressure relieves itself forwards through the compressor producing the "BANG" of typical surge.

If the temperature of the air entering the compressor is lowered and all other factors remain constant the compressor delivery pressure will increase, and if the intake air temperature is reduced sufficiently the "WORKING LINE" and "SURGE LINE" are the same and the engine will produce a high $N/\sqrt{T}$ surge even under steady running conditions. (N= engine rpm and T= true intake temperature).

Any engine will stall when the value of the expression reaches a value predetermined by matching the compressor and turbine.

S/L Harper then goes on to state that the recovery action in some compressor stalls is to "close the throttle relax and enjoy life for a short while". While this is true in some instances it is not quite true in the case of High RPM Surge.

The conditions for this type of surge are engine rpm at or near maximum, low airspeed resulting in reduced intake temperature or bad airflow distribution in the intake caused by high "G" turns at the tropopause when the temperature is below I.C.A.N.

Surge is indicated by a sudden drop in rpm and the characteristic "BANG" is not always audible. The rpm stabilizes below idling and JPT increases 100° - 150° higher than normal idling and a rumbling noise is evident.

Normal recovery action is to close the throttle fully immediately and dive the aircraft.

Recovery is indicated by a sudden increase of rpm and a drop in JPT.

So it can be seen that even with the engine fuel system functioning correctly compressor stalls can still occur and maintenance personnel are well advised to ascertain gauge readings and altitude before adjusting fuel system components.

Incorrect pilot diagnosis has on occasion resulted in the wrong action being taken by maintenance personnel.

LAC. T. Griffiths
RCAF Station Lachine

(The author has been asked for his comments.—ED)

Crystal Ball

The article "Crystal Ball" in your Jan-Feb issue implies that a weather radar, properly used, has infallible capabilities which permit accurate short period forecasts. We have had some experience in Training Command making use of a very fine weather radar at one of our flying training units. This equipment is actually installed, owned and operated jointly by the National Research Council, the Research Council of Alberta, and McGill University, who are conducting hail research in the area. In return for the use of station facilities, the equipment has been located in the station meteorological office so that it is available to meteorological section personnel when it is in operation.

While I would not debate for a moment that weather radar is an excellent aid to the weather forecaster, there have been indications that a lack of awareness of the limitations of the equipment by the users of weather information may develop a complacency with respect to thunderstorms which results in a failure to take precautions which one would normally take on the basis of an official weather forecast alone.

I do not think that "always erring on the safe side when trying to figure the weather" is the answer, since the capabilities of the equipment do provide for a more efficient flying training operation, and second-guessing the professional meteorologist without due cause is a questionable flight safety measure. It is considered to be important, however, that we not permit our enthusiasm for the capabilities of expensive new, but unproven, equipment to blind us with respect to limitations which invariably exist.

E. R. Johnston, G/C
Training Command HQ

("Crystal Ball" was reported on the same basis as an error in judgement by a professional pilot would be reported—to profit by experience, and not for the purpose of second guessing the meteorologist. Our presentation was based on the assumption that when a station is on the fringe of a storm the line crew should be informed of the situation.—ED)

FLIGHT COMMENT

ISSUED BY
DIRECTORATE OF FLIGHT SAFETY
R.C.A.F. HEADQUARTERS • OTTAWA • CANADA

May • June 1959

Heads-Up Flying 1

A Crash Position Indicator 3

Two Eyes in Vision 5

Hail 6

Fuel Handling 8

Don't Go Down With Your Ship 11

Bomarc 12

Near Miss 14

Unsatisfactory Condition Report 17

Arrivals and Departures 19

Thrust 'n' Parry 23

OFFICIAL INFORMATION—The printing of this publication has been approved by the Minister, Department of National Defence. Contributions are welcome, as are comment and criticism. Address all correspondence to the Editor, Flight Comment, Directorate of Flight Safety, RCAF Headquarters, Ottawa 4, Ontario. The Editor reserves the right to make any changes in the manuscript which he believes will improve the material without altering the intended meaning. Service organizations may reprint articles from Flight Comment without further authorization. Non-Service organizations must obtain official permission—in writing—from RCAF Headquarters before reprinting any of the contents of this publication. The opinions expressed in Flight Comment are the personal views of contributing writers; they do not necessarily reflect the official opinion of the Royal Canadian Air Force. Unless otherwise stated, contents should not be construed as regulations, orders or directives.

Published every two months, Flight Comment may be purchased from The Queen's Printer, Department of Public Printing and Stationery, Ottawa, Ont. Single copy 50 cents; 1 year subscription $2.

BIRD WATCHERS' CORNER

SPRING FEVER FLICKER

Goes bugaboo at the first signs of spring and chases other species as well as his own. Can be seen performing his suicidal gyrations at all levels and often ends up several feet below ground.

CALL: WOTTADAY! WOTTADAY! WOTTADAY!

YOU CAN CONTRIBUTE TO FLYING SAFETY

NEAR MISS

SAFETY SUGGESTION

OPERATIONAL HAZARD REPORT

To be completed by anyone having knowledge of an occurrence, or situation the reporting of which would benefit the RCAF Accident Prevention Program.

This report may be anonymous.