RCAF

FLIGHT COMMENT

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FLIGHT COMMENT

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C O N T E N T S

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ROYAL CANADIAN AIR FORCE
DIRECTORATE OF FLIGHT SAFETY

SPRING IS HERE

Major William R. Maugans
Headquarters, 9th Weather Group
Scott AFB, Illinois

DAYS ARE LONGER; nights are shorter. The chill has left the air and the breeze feels warm and balmy. The cold, snow-covered landscape is showing patches of green. Oh, what a day for flying as our thoughts turn lightly to??? If you do fly, be careful! Old Mother Nature is still as deceptive as ever. Spring weather at its best is often chaotic. So keep your mind alert and on course—fly safely.

We are still familiar with old man winter's weather. We haven't forgotten the strong, cold fronts with their blustery winds, sharp turbulence and sudden snow squalls. Nor have we forgotten the warm-cold frontal systems with their extensive areas of precipitation (rain, freezing rain, sleet, snow—the works), icing, turbulence, low ceilings and poor visibilities. The only good thing about winter weather was the rarity of thunderstorms and tornadoes.

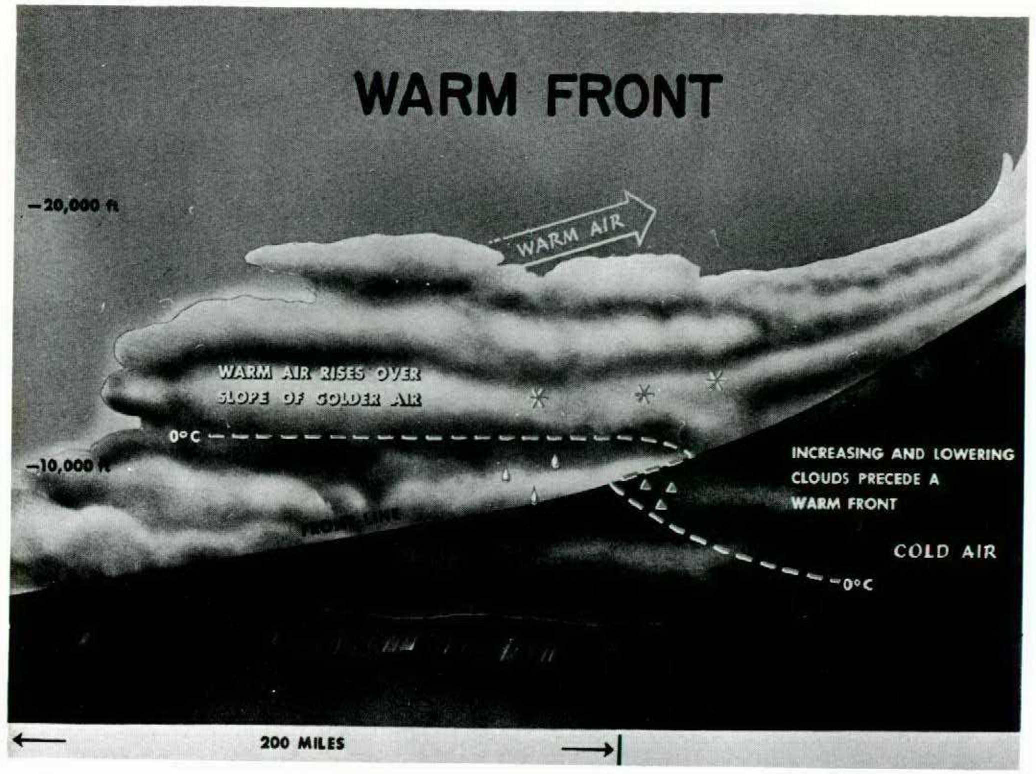
Spring, unfortunately, doesn't mean an end to all this. Although the frequency of strong, cold air blasts from the north lessens, this only serves to permit the warm, moist air from the south to begin its mid-latitude intrusion tactics once again. The conflict between these two different air masses often results in some of our heaviest spring snowfalls, accompanied by widespread areas of low ceilings and visibilities, freezing precipitation and icing. But, in addition, increased squall-line and air-mass thunderstorm activity and greater risk of tornadoes must be anticipated. These are the forerunners of the severe weather season.

IN-FLIGHT WEATHER HAZARDS

Let's refresh our knowledge of those weather hazards most likely to give us trouble in the spring.

Squall lines, thunderstorms and tornadoes can provide the worst possible flying conditions. During their first few hours of life, squall lines are composed of a continuous line of severe thunderstorms. There is also the added risk of isolated tornadoes in the vicinity of the squall line.

A tornado is a violent, whirling storm usually a few hundred yards in diameter, having intense cyclonic winds reaching speeds of 200 to 600 MPH. They may occur at any time during the formative stages of a squall line. They result from extreme instability and are usually associated with severe thunderstorms. Although the tornado is the most violent of storms, its life span is exceptionally short



and its destruction area over the ground is usually less than 25 miles in length. Its appearance is so typical and its size so limited that it is easily recognized and avoided in daylight.

Thunderstorms frequently accompany cold fronts and squall lines, and also occur within the air mass. Frontal and air-mass type thunderstorms all have the same general characteristics; strong updrafts of air, offset by downdrafts, both within and outside the thunderstorm cloud. The result is severe turbulence, with the greater portion occurring ahead of the storm in the "roll cloud" area. When the atmospheric freezing level is relatively close to the earth's surface, as in the spring of the year, tops of thunderstorms are generally low (15,000 to 18,000 feet). However, the best advice on flying any of these hazards is DON'T DO IT.

There is no preferred altitude or level for penetration of violent squall line activity. However, if a clear space a mile or more in width is evident, penetrate at that spot because the vertical velocity gradients near the center will probably not be severe enough to prevent safe transit. If it is absolutely necessary to penetrate a thunderstorm, and the pilot is given a choice, he should fly as near to 6,000 feet above the terrain as possible for a low-level penetration, or as high as possible to avoid the thunderstorms. However, the freezing level should be avoided because of dangerous icing and turbulence.

If, because of emergency, landing in a thunderstorm is absolutely necessary, expect sudden wind shifts, heavy rain and downdrafts with possible loss of airspeed and altitude. Also be alert to sudden pressure variation within the thunderstorm which will cause the altimeter to indicate other than true height.

ICING

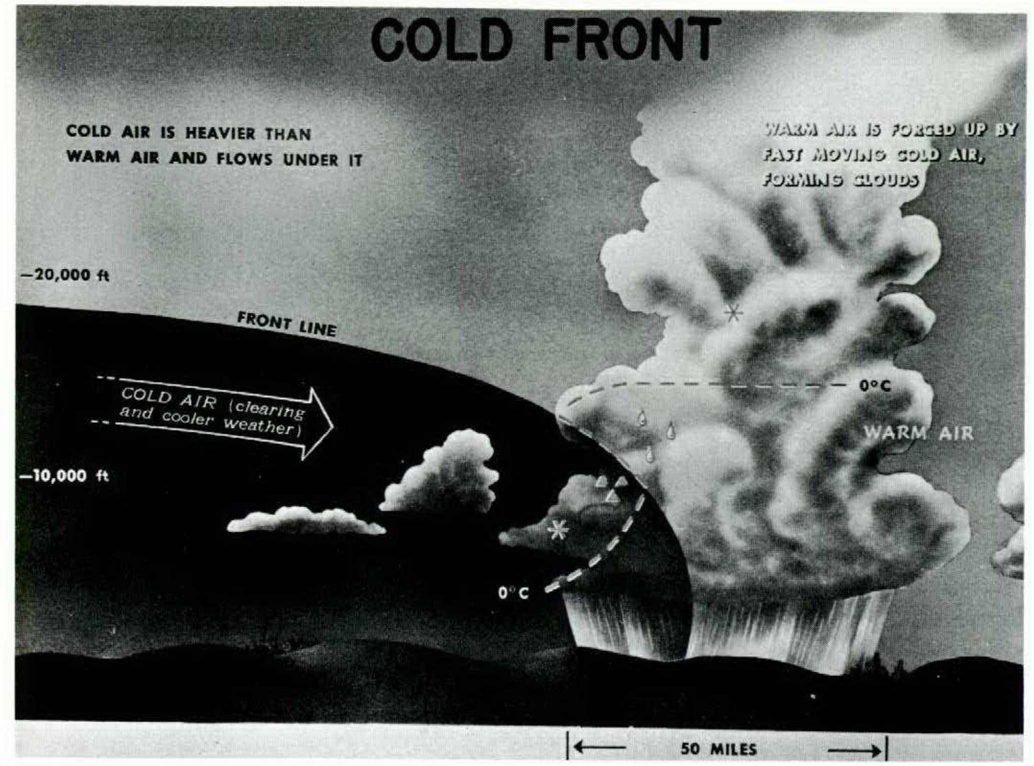
Icing is always hazardous and can be expected frequently through early spring; especially, in those frontal systems where precipitation is falling from warmer air aloft over a cold layer of air at the surface. Icing can occur anytime you are flying above the freezing level and clouds, rain, drizzle or wet snow are present.

To avoid clear or rime ice, stay clear of clouds or precipitation areas in which the temperature is near freezing or lower. To avoid freezing rain, climb into the warmer air which may be found above the frontal surface, or descend to a lower level if terrain permits and it is known that above-freezing temperatures exist at the lower level.

If you must fly in icing conditions, you may normally expect to find less icing at levels where the temperature is lower than--7 to --9 degree Centigrade, except in the case of cumulus or cumulonimbus clouds.

TURBULENCE

Turbulence is caused in many ways. Unequal



heating of flat, treeless terrain causes convective currents (updrafts) which create clear air turbulence. This same type turbulence is often felt in the vicinity of severe thunderstorms. High, gusty surface winds, temperature inversions and topography also create clear air turbulence.

Marked changes in wind velocity at altitude result in turbulent air. The degree of turbulence depends on the amount of change in wind speed and direction. This factor is the cause of clear air turbulence at high altitudes in the vicinity of the jet stream which is starting its northward shift in the spring.

Thunderstorms present a turbulence problem to the pilot that cannot be disregarded. The procedures prescribed for flying thunderstorms according to type of aircraft should be reviewed. The best advice is—Don't fly through thunderstorms unless absolutely necessary.

HAIL

Hail is one of the worst hazards of thunderstorm flying. It no longer seems safe to say that hail is more likely in one part of a thunderstorm than another. Hail is quite possibly distributed throughout the thunderstorm and is often encountered outside the cell itself.

As a rule, the more intense the storm, the more likely it is that hail will be noted. If the pilot can avoid the more active portions of the storm, the chances of encountering hail are somewhat reduced. However, with tilted thunderstorm cells, the hail may fall through the clear air outside the cell. In fact, there have been many pilot reports of damage from hail encountered in the clear air below the overhanging anvil top of the cumulonimbus.

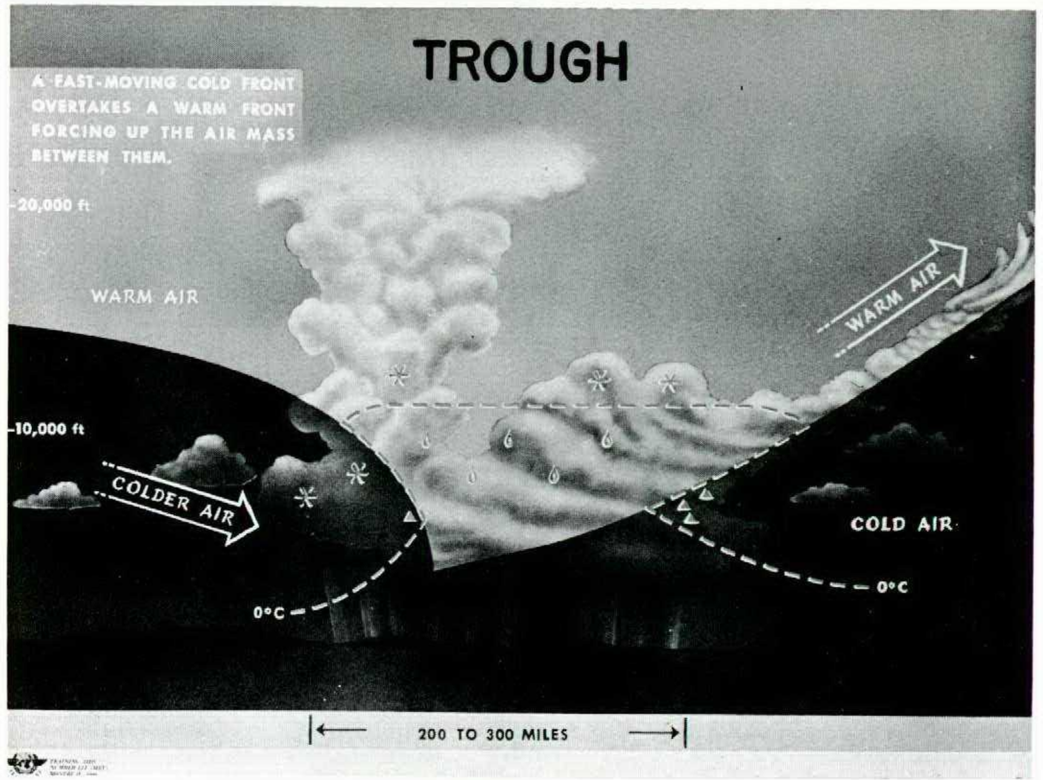
Current thinking is that we are dealing with a popcorn machine action when we speak of hail generation by thunderstorms.

GROUND AND IN-FLIGHT WEATHER SUPPORT BRIEFINGS

If your knowledge of wintertime flying conditions has lulled you into a false sense of confidence—snap out of it. Start paying more attention to the weatherman's briefing; listen carefully for those changes in the norm which forewarn of spring--thunderstorms and tornadoes.

Severe weather warnings issued by the Severe Weather Warning Center at Kansas City, Missouri, will again soon be flooding the weather teletype circuits and the airways. The weather man is required to brief you on all warnings affecting your intended flight route. Don't be bashful about asking questions. This will serve to alert the weatherman also to the changing season.

RADAR. Those of you lucky enough to fly a radar-equipped aircraft—use it. If you aren't that lucky, be sure your check with the weatherman is complete. Most USAF weather stations have a weather radar set capable of



giving a good picture of weather in the vicinity of the local station. Some weather stations have the AN/CPS-9 radar, which has a normal maximum operational range of 250 miles, and occasionally further. Reports from all CPS-9 radar sites are transmitted throughout the United States, so each weather station can give you a composite picture of the severe weather areas.

IN-FLIGHT ASSISTANCE

The proper use of available radio facilities for obtaining weather information has and will continue to prevent accidents and save lives. The best way to get both current weather observations, up-to-the-minute forecasts and radar weather assistance is to use the Pilot-to-Forecaster Service. Don't be hesitant, use Channel 13 and call METRO; he is as near as your Enroute-Supplement. Also, don't forget the FAA ATC In-flight Weather Safety Service and the ADC Radar Weather Vectoring and Advisory Service.

The severe weather warnings mentioned before are sent to FAA INSAC stations where they are included in the scheduled weather broadcasts and are given to pilots when they contact the stations for normal air traffic control purposes. The broadcast schedule, by the way, is also listed in your Enroute-Supplement.

PIREPS

Pireps of weather conditions are invaluable to the weatherman and to your fellow pilots. When you encounter weather conditions which have not been forecast, you are required to report such conditions to the nearest FAA Radio Facility. Don't be bashful, pass the word also to the USAF Channel 13 station nearest your route. Give your report in this sequence:

Any unusual or hazardous weather.
Turbulence.
Icing type and altitude encountered.
Precipitation, type and intensity.
Clouds, amount, type and height.
Temperature.
Type of aircraft.

When you close your flight plan, a few minutes spent in the weather station discussing your in-flight weather will pay dividends, as well as relieve your ulcers. I leave you with this suggestion—If you don't get all the weather information you want, ask for it.

EDITOR'S NOTE

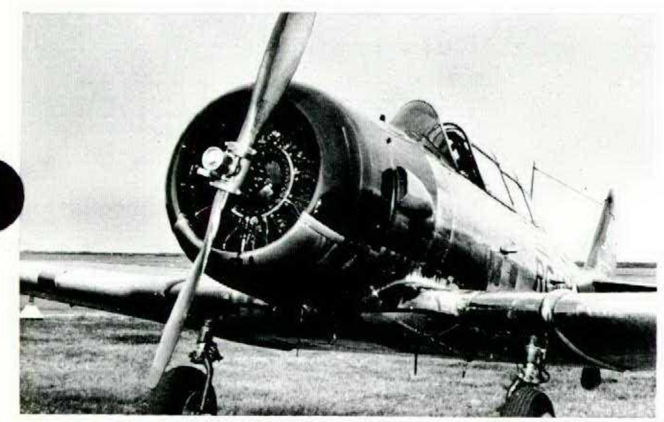
While some of the facilities mentioned in this article may not be available to a number of RCAF Aircrew, the moral of the article is clear. Get all the facts before leaving the ground, use all available facilities enroute for any changes, and report enroute deviations from original forecast.

F/C R. W. Clarke

F/C R.W. Clarke was solo in a Harvard. About thirty minutes after takeoff during entry to a loop, mist appeared on the windscreen. Altitude was 7000 feet and power settings were 28" MP and 2000 RPM. Smoke filled the cockpit and visibility was getting worse. The pilot immediately headed for base, advised the tower and called for landing instructions. He was cleared for a straight-in approach on runway 20. A successful approach and safe landing was carried out despite poor visibility within the aircraft.

Investigation revealed the propeller seal had ruptured, allowing engine oil to spray all over the aircraft.

F/C Clarke, an inexperienced trainee is to be commended for his remarkably fine job of returning to base and landing safely despite smoke in the cockpit and the reduced visibility. Heads-Up Flying all the way.



LAC J. B. Brousseau

LAC J.B. Brousseau was marshalling a C119 returning from a flight when he heard a hissing sound from the port engine. After reporting this to the Corporal on duty, an investigation was made which revealed a 3-inch crack in number two cylinder head.

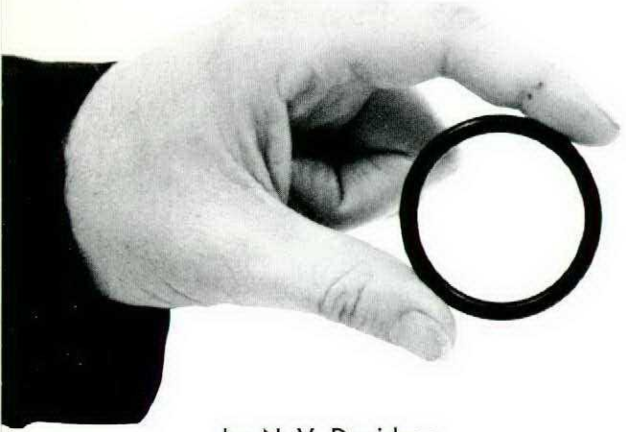
The engine had over 100 hours remaining until the next engine change, and would possibly have failed in flight had the crack not been detected.

LAC Brousseau is to be complimented on his "Good Show."

Stn Chatham

In the Jan - Feb issue of Flight Comment, the ground support personnel of Stn Chatham were given a Good Show for their speedy organization and efforts in recovering a distressed aircraft with minimum damage and delay. Since that occurrence they have again risen to the challenge and in similar circumstances recovered a distressed aircraft with nil damage.

Flying Control, Fire Department, ME Section and others involved along with Supervisors from the CO down can be justly proud of their organization.



as in O-RINGS

by N. V. Davidson
courtesy of the Convair Traveler

Installation of O-rings requires great care in every step of the operation, from removal of the old O-ring to the re-assembly of the component after the new O-ring has been positioned. This "gentle care" is necessary to protect the smooth surface of the ring.

Although selection of the O-ring should be determined by the installation drawing, a little logic will help when replacing this special kind of packing. If an O-ring has failed, obviously there was a cause. Perhaps it was the result of normal wear, but there may be contributing factors that should be noted.

Inspection of the old, damaged O-ring may indicate failure from wear, extrusion, excessive permanent set, excessive temperatures, or "nibbling" (partial rolling) in the groove. Failure from normal wear may be expected, but excessive extrusion may indicate that the O-ring was improperly selected for the groove in which it was placed, or that backup rings were not installed when necessary.

Irregular wear of the O-ring may indicate that it was deformed by abrasion from a burr. It is always possible that the O-ring failed because it originally had a defect that would have been cause for rejection, had the part been properly inspected before installation.

Only butyl rubber seals are recommended for use in Skydrol hydraulic systems, since they are resistant to Skydrol fluid. These rings are identified by a green stripe and a colored dot, or a green stripe and several colored dots, depending upon the manufacturer.

Teflon backup rings, used throughout the hydraulic systems, have a low coefficient of friction, and are resistant to Skydrol and most chemicals. Being split and beveled at both ends for overlap, they are ideally adapted to backing up the seal formed by the butyl O-ring. They can be quickly fitted and trimmed to exact dimensions.

If a backup ring is used on only one side, it should be installed on the downstream side of the O-ring. If pressure is in alternate directions, one backup ring may be placed on each side of the O-ring.

Wood or plastic removal tool will prevent damage to O-ring seat.

Ground work for a good O-ring replacement job starts with the removal of the old existing rings. Sharp or hard instruments should not be used for loosening or prying the old O-rings out of position. Any nicks or scratches incurred in the O-ring seating or groove can contribute to the failure of the new ring. To be safe in this regard, the removal tool, or tools, should be constructed of wood or plastic to preclude damage to the O-ring seat and adjacent area. The tool illustrated, or an orange stick, would be suitable for removing O-rings.

Particular care should be exercised when installing new rings to be sure that they are not forced over rough threads or corners in order to position them in their grooves or on the shoulders. It is always well to thoroughly inspect, clean, and reinspect O-ring seating and adjacent surfaces for defects or irregularities. Metal-bearing surfaces of the seal must be dust-free before a component is assembled.

Lubricating the Skydrol hydraulic system O-rings with Skydrol fluid to facilitate installation is recommended. It should be remembered, however, that mineral oil and greases should not be allowed to contact seals in the Skydrol hydraulic fluid systems.

A double check should be made before installing a ring to be sure that it is a proper replacement part for the particular system ... pneumatic, hydraulic, fuel, oxygen. Inspection of the new O-ring for imperfections consists of carefully stretching, then rolling it between the fingers and looking for indentations in the form of holes, spirals, pits, or grooves. Inspection of Teflon rings should include a check to see that surfaces are free from irregularities, that edges are clean-cut and sharp, and that scarf cuts are parallel.

If a new O-ring has been tried on a fitting and found to be too tight, it should be discarded ... NOT returned to storage ... because during the fitting process, the O-ring may have been damaged without the knowledge of the installer. This practice is good insurance against subsequent use of a damaged seal.

Care should be exercised in handling the O-rings to avoid marring the smooth O-rings surface with fingernails, tools, or fitting threads. O-rings should not be pinched between the boss and fitting, or damaged on sharp edges of the shoulder of the groove or fitting. Sometimes, running a nut on a thread will remove a burr.

Installation of the O-ring on a piston is a simple matter of stretching the O-ring and rolling it into place in its groove. Since no twist is allowed after the O-ring is installed, it should be straightened as it is installed.

When it is required that a number of the same size O-rings be moved across threaded portions of fittings, it is well to construct a smooth, thin sleeve to fit over the threads and to serve as a sliding surface. If only a few rings are involved, tough tape may be spirally wound over the threads to preclude damaging the O-ring smooth surfaces.

O-rings in the oxygen system must not be allowed to come into contact with any kind of oil or grease, because oil in the presence of oxygen presents a fire hazard and can cause an explosion, should both oxygen and oil (or grease) be present in any quantity. The rules of safety contained in the maintenance manuals should be observed when employing the use of O-rings in repair or maintenance of the oxygen system.

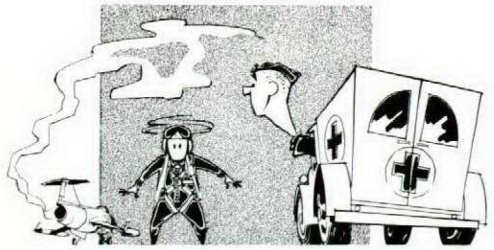
By keeping one's hands clean and paying particular attention to cleanliness of all parts involved with O-ring replacement, system contamination can be avoided. Many of the O-rings now supplied come in individually sealed and identified wrappings. This also helps in keeping O-rings clean and undamaged until they are ready for use.

When the assembly has been thoroughly cleaned, smoothed, and otherwise prepared, O-rings may be taken from their wrappings and inspected by stretching and rolling the ring between the fingers. If any fault is found in the new ring, it should be discarded, since the cost of this item is small compared to the cost involved in the failure of a system because of a faulty seal. Other O-rings of the same dimension and identification should be inspected at this time to ascertain if the "batch" is below specification.

Besides the procedures established by specification and design requirements, the routine of O-ring installation is guided by a great deal of miscellaneous technical data based on a common-sense approach.

Aerospace Accident and
Maintenance Review
November 1962

Many factors, plus normal wear, cause ring failure.



NEAR MISS

ANTI-ICING MYSTERY

Before proceeding on a routine patrol, the crew of a Neptune was briefed, that, for the portion of the trip over Vancouver Island, light icing and turbulence was forecast.

Proceeding on this part of the flight, the Neptune at an altitude of 10,000 feet ran into severe icing and the airspeed began to drop. The captain called for climbing power, started the jets and called for anti-icer check. The engineer and navigator confirmed the anti-icer operating lights were on and a check of the wings by a flashlight, indicated anti-icers were operating.

The airspeed continued to drop and further anti-icer checks were made. At this time the rear rest volunteered the information that there was lots of heat in his area. This information electrified the crew, who realized that the diverter valve was in the wrong position causing the heat to be diverted from the tail plane to the rear rest only. It was quickly re-set to anti-icing.

In the meantime, the nose was rising and the captain and co-pilot both got on the controls in an effort to lower it. The captain tried the Varicam (tail trim) in normal and emergency to no avail. At 110 Kts the Neptune stalled and fell off 200 feet. Emergency Varicam was tried again, this time with success and as control was regained jet power was applied and everything settled down using emergency Varicam.

A short time later with airspeed restored and Varicam apparently normal the captain paused to reflect and smoke a cigarette, other crewmembers could be seen, stealthily putting their chutes back in their bags.

All of this took place in a matter of three minutes and was decidedly hairy.

After settling down again the captain went back to interview the crewmen in the rear rest. He was positive the diverter was in the right position on pre-flight check. The results of this interview were:

1. Rear rest disclaimed any knowledge of existence of the valve.
2. Rear rest unaware that heat in that position indicated heat being diverted from empennage.
3. Rear rest acknowledged movement in the ECM antenna near the valve, but not touching the valve.

The captain returned to the cockpit slowly shaking his head. Some points brought out by this Near Miss are:

1. Don't touch switches and/or handles if you don't know what they are for.
2. All members of aircrews should have a working knowledge of the vital systems.

I WAS LUCKY

I was captain of a Voodoo detailed for a normal AI training mission. While taxiing to the button of the runway I was completing my vital actions for takeoff and proceeded to lower the seat to the full down position. On the last inch of movement of the seat there was a noticeable complementary movement of the control column which immediately attracted my attention. Further tests proved that the control column had moved about two inches to the right and locked. It was impossible to move the ailerons although the stabilator remained unaffected.

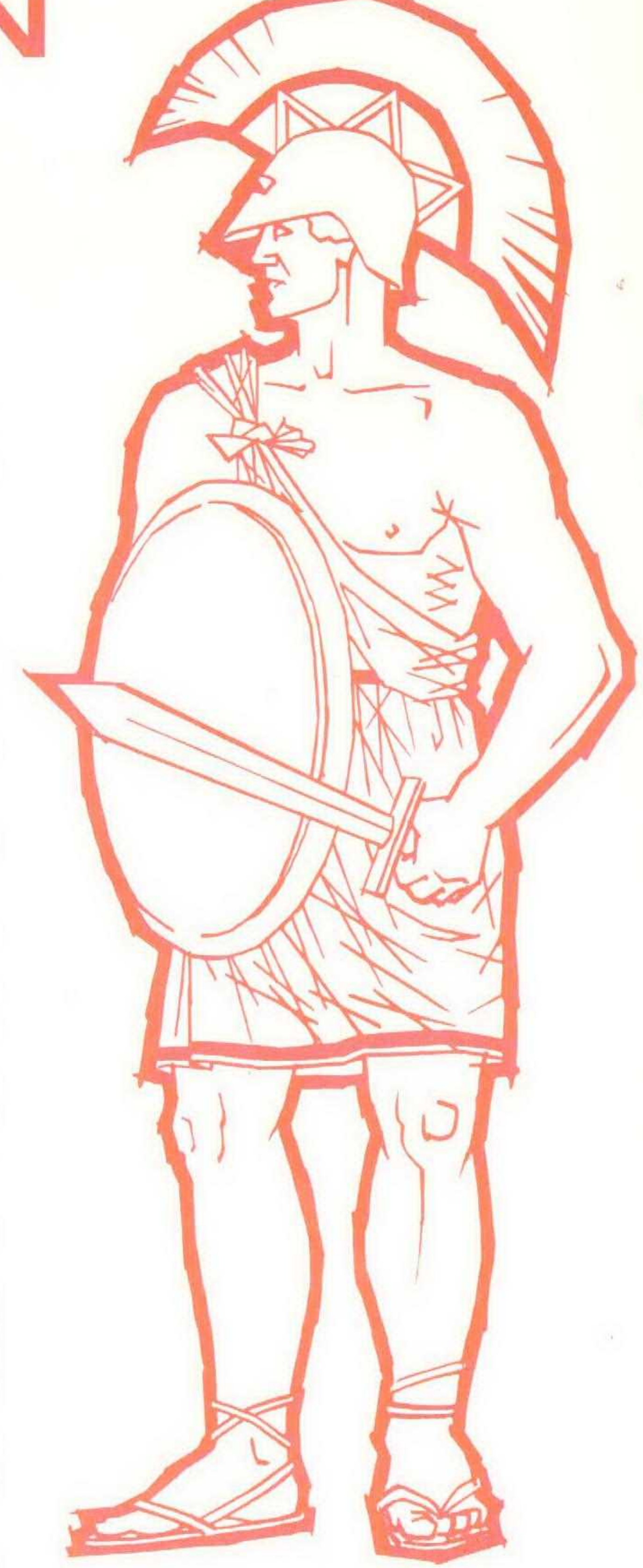
I discovered that by raising the seat a little, I once more regained control of the ailerons but each time the seat was lowered to full-down, the same effect was evident—the ailerons seized and defied movement.

I returned the aircraft to the dispersal area where an immediate investigation revealed a flashlight wedged just underneath the front seat in such a position that it was being forced into the control housing every time the seat was lowered.

It is fortunate, that in this instance, this pilot, for some reason needed the seat in the full-down position. While the "vital actions" check calls for the pilot to adjust his seat, any other pilot may have done this adjustment without reaching this position and discovering the flashlight until a much later stage of flight.

Pilots, in general, are reminded of the need to check cockpits thoroughly for foreign objects. Ground crew are reminded—"!.

ΓΝΟΘΙ ΣΕΑΥΤΟΝ



"KNOW THYSELF"

By JEROME LEDERER
Director, Flight Safety Foundation, Inc.

THAT SHOULD BE GREEK TO YOU. They are the historic words of the great Greek philosopher, Socrates. They represent the foundation of philosophy and of safety, especially aviation safety. They mean: "Know thyself."

In a normal life the desire to "know thyself," especially your limitations, is usually suppressed by pride or ego; you do not like to admit your weaknesses even to yourself. In a democratic civilization you are under no compulsion to be self-critical because your dignity as an individual is respected. So long as your actions harm no one else, you may do pretty much as you please, whatever your faults or deficiencies.

But paradoxically, you as a member of a combat crew are obliged to unearth and to recognize your limitations because your technical, physical or emotional shortcomings may jeopardize the survival of your team as well as your own survival.

You are important as an individual only to the extent that you help or inspire your team to accomplish your assigned missions. In a combat crew there is no room for grandstand players, no room for prima donnas. You must learn to manage yourself for the best interests of your team.

Are you aware of your shortcomings? A few clues will help you discover them.

Are you overconfident? A clue to this killer is the disregard or scorn of checklists. Checklists are vital. You cannot remember all you know about the operation of modern aircraft. You may get by without a checklist for a limited time, even under conditions of fatigue or stress. You may already be allowing important items on the checklists to slip by without knowing it. A dangerous act may be performed several times before it becomes fatal. But you cannot fool the force of gravity. Ultimately the laws of probability will win. For example:

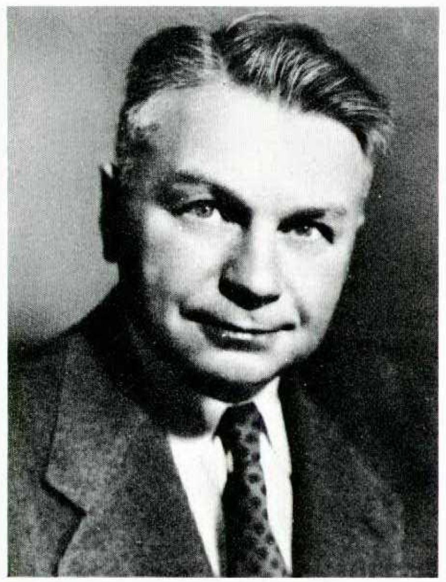
A pilot had read and initialled all the safety directives and had been given a thorough cockpit checkout. He taxied out, held near the end of the runway long enough to complete his engine run-up and cockpit check. Shortly after the takeoff roll was started the plane veered slightly to the left. Inspection of the runway showed that the right brake was applied at this point.

The aircraft became airborne in a three-point attitude. It continued nose high while commencing a roll to the left. The roll continued until the plane struck the ground in an inverted attitude. It exploded and burned on impact and the pilot was killed instantly.

Investigators found the aileron trim tab, fused by the fire, in a 15-degree left wing down position. The elevator trim tabs were found in a 19-degree nose high position. Rudder tabs were destroyed beyond investigation.

The pilot evidently had neglected to check his trim tabs.

Overconfidence in yourself may also be recognized by not taking adequate time to check weather, to prepare a flight plan, to check your fuel, your equipment, or to complete properly any of the numerous steps required for the organization of a successful mission.



ABOUT THE AUTHOR

Although more than ten years have passed since Mr. Lederer's article, "Know Thyself," first appeared in Combat Crew, his message is still timely. The author, a practicing aeronautical engineer for more than 35 years, has earned an eminent reputation in the safety engineering field. Born in New York City in 1902, he received his degrees at New York University and was awarded the David Orr prize for excellence in professional subjects. During World War II he served as consulting operations analyst for the Air Force, and at war's end was made bombing research analyst for the U.S. Strategic Bombing Survey.

Another clue to overconfidence is a feeling that you've had enough instruction either in the classroom or in practice. This leads to inattention. A few misadventures, if you survive them, will soon teach you that you will never learn all you should know about flying. A bit of apprehension is better for your safety and that of your crew than overconfidence.

Are you impatient? This is a close ally of overconfidence. The clues to this weakness are more easily uncovered. Are you inclined to neglect details because you want to be on your way? Would you take a gamble with the weather or a mechanical fault or some personal mental stress in order to get through to keep a date or to get home?

Your flying safety officer can easily dig up examples of accidents where a pilot took off in the face of dangerous weather to get to a sick child, endangering and later killing his crew, or of pilots with inadequate instrument training deliberately taking a chance going through a turbulent front instead of waiting for it to pass.

Impatience is an insidious weakness because it may strike only at odd times and at long intervals. Watch for it!

Are you self-centered? Your overconfidence and impatience may be closely related to egoism. The clues: Do you feel that the others are "dopes" if they don't see things your way? Are you inclined to be loud, argumentative? Is everyone out of step but you? The underlying cause for this attitude may be a sense of inferiority.

You must learn to subordinate yourself to the safety and welfare of your group. If you are self-centered, this will tax your willpower to the utmost. Your teammates will early recognize this trait in you, and you may expect to suffer from it not only socially but in flight as well, and this could be fatal.

Are you vain? If you are a self-centered pilot, you may lead your team into trouble by unreasoning insistence on a dangerous course of action. If, in addition, you are vain, you are heading for suicide because you will not admit your mistake even after it is made. A typical case would be a missed approach to a landing—overshooting, perhaps, but you are too vain, too proud to go around again. The result will probably be a crash into a ditch, a fence, or an embankment, followed perhaps by explosion and death.

Because of vanity, crewmen will rarely admit to nervousness, fatigue, mental stress; but as a good teammate you will consider the safety of your crew above your pride and ground yourself for the sake of your team. You would want your teammates to do this for you.

Pilots are prone to place extraordinary importance on what other people think of them. This will cause you to make decisions in the interests of saving face instead of saving lives.

In the battle of vanity vs. gravity, there is no doubt that gravity will ultimately win.

Are you even mildly irresponsible? There are various degrees of irresponsibility. Reckless taxiing and buzzing are extreme examples. Even mild irresponsibility is evidence of incapability of becoming a successful crewman. One clue to detect this weakness may be lethargy in recognizing the importance of vital information, or not giving information to others who should be concerned. You might overcome this deficiency by training yourself to ask, "What have I found out that someone else should know for his safety?". You would not want some other person to withhold information that might be vital to you. If you should make a very hard landing, for instance, and not note it in the Form 1 or tell maintenance personnel about it, you are to a considerable degree irresponsible. Or, you may encounter very severe turbulence without reporting it so that others can avoid it. Irresponsibility includes thoughtlessness and carelessness.

These are a few shortcomings that you as a crewman need to uncover for yourself, and to correct, to become a useful member of your team, to conserve the lives of your crew as well as your own. Some men have more capacity—mental and emotional—than others, so some members of a team may at times be required to make up for the weakness of others, but it is the team that counts, not the individual.

Teamwork is of supreme importance to a combat crew because you are required to fight two enemies simultaneously: 1) the aggressor nation; 2) the force of gravity—and gravity is the bigger killer of the two. It fights you in peace as well as in a shooting war. It never relaxes.

Aviation is terribly unforgiving of any incapacity, carelessness or neglect. Know thyself.

Combat Crew

EXPLOSIVE INCIDENT

Never, never, make assumptions where explosives are concerned. (That is - if you value your life).

Take the case of the NCO who was briefing another NCO on a crashed CF104. Without stopping to think or check the mechanism, he pulled the emergency canopy release and to his surprise a couple of shots were fired from the cartridges.

This NCO assumed no charges were installed since the pilot had ejected and all explosive items would have been removed prior to shipment of salvage aircraft.

Moose Attacks Jet Airliner, Delays Takeoff

The bull moose lowered his head, pawed the ground, charged and clobbered his opponent right between the No.1 and No.2 engines.

The roaring Boeing 720 jet, taxiing for a take-off wasn't staggered very much by the blow, but officials of the Alaskan city's airport were.

"It gets expensive," Tony Schwamm, Anchorage international airport manager, said. The plane was delayed about 30 minutes for a checkup.

The moose, apparently unhurt and unimpressed, trotted away.

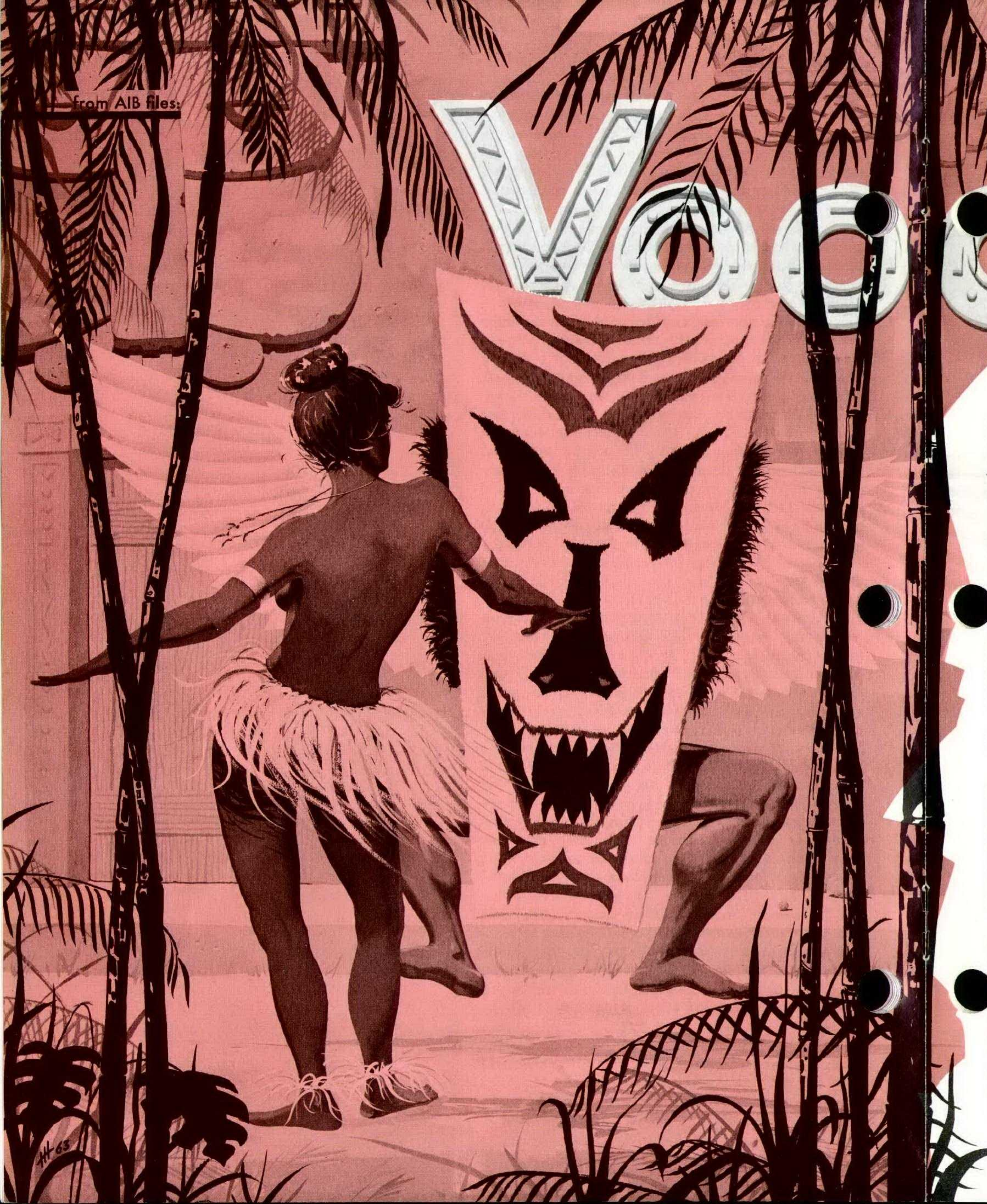
Sadstistics

Herb Caen, columnist for the San Fransisco "Chronicle," reports that the local chapter of the California Traffic Safety Foundation, in noting the tragic plane crash at Idlewild that took 95 lives—says, "Think what pressures would be brought to bear if such an accident took place every day for a week. Six hundred and sixty-five killed. Horrible! However, even if such an unlikely series of disasters took place, the toll would be 70 less than the lives lost on our highways in one week. The figures tell the terrible tale: an average of 105 killed a day in the U.S., 735 a week, week in, week out—and you still won't even buy safety seat belts, will you?"

Aviation Insurance News

from AIB files:

Voodoo SHIMMY



The incidence of nosewheel shimmy in the CF101B posed a problem for the accident investigators of DFS. There were six failures of the nosewheel steering torque arm since 5 April. Five occurred since 31 July of which four were in a two-week period.

Of the four latest failures, one occurred on takeoff at Comox, one occurred on landing at Bagotville and two on landing at Uplands. When the torque arm breaks, the shimmy dampening action is disconnected and a violent and dangerous shimmy results causing considerable damage to fire control system components in the nose of the aircraft. In addition to these accidents there has been a considerable number of nosewheel shimmy reports usually corrected by changing nosewheel tires.

INVESTIGATION

During the course of the investigation of the failure at Uplands, CF101B nosewheel assembly specialists from Bendix, South Bend Indiana and Ogden, Utah, were called in for consultation. A CF101B which had a torque arm failure on 11 Sept was used for investigation and the results were verified on another aircraft which had a failure on Sept 5.

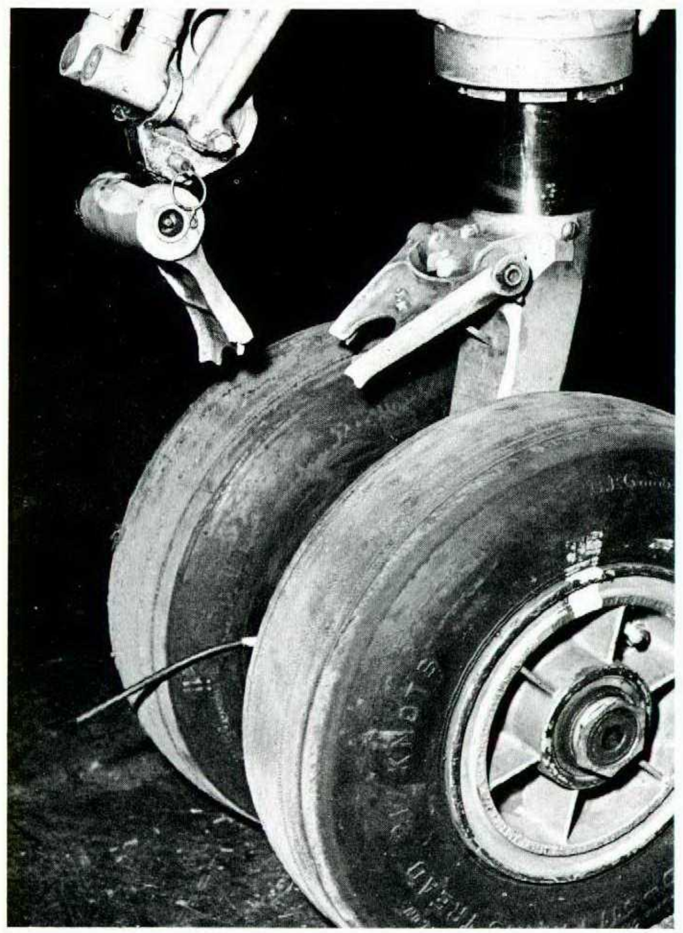
The correct installation and rigging of the nosewheel assembly was checked and found serviceable. An electrical circuit and nosewheel steering functional check was conducted without any malfunction. Pilot technique was checked and except for minor differences and discrepancies in rotation speeds nothing else significant which could have contributed to the accident was discovered. A metallurgical examination of the first torque arm which failed (5 April) revealed that it failed in buckling which had overstressed the material in a single occurrence. The character of the fracture excluded any material failure. The other five failed torque arms possessed identical fractures.

The investigation then proceeded to determine whether shimmy dampening pressure was being maintained in the steering unit. There was no sign of external leakage present. In order to check internal leakage, either in the compensator which provides shimmy dampening pressure to the nosewheel, or in the steering control valve assembly which steers the torque link, a pressure gauge was installed in the pressure side of the compensator. The system was pressurized and then cut off. The compensator pressure read 50 PSI. After 30 minutes there was a pressure drop of 8 PSI. The steering unit was cycled completely and pressure was cut off. The compensator pressure read 50 PSI. In 30 minutes the pressure dropped to 35 PSI. This indicated internal leakage. The next step was to try and isolate the leakage.

The compensator was removed from the aircraft and pressure checked at 80 PSI. Pressure was maintained for 30 minutes and a loss of 10 PSI was noted. The hydraulic test stand was calibrated and it was found to be leaking about 10 PSI. The compensator was then stripped to check the valve and O ring. They appeared in good condition. There was no evidence of fluid in the spring housing which would be indicative of O ring leakage. Fluid in the compensator by finger test, felt as if contamination was present.

The next step was to check the check valve in the steering control valve assembly. If leakage was present in this valve the pressure

Magnified contamination particles from the steering and shimmy dampening hydraulic system.



Examples of nosewheel steering torque arm failure.

would leak from the compensator thus reducing or eliminating dampening pressure. This check was accomplished by applying a pressure to the steering control valve from the return port. A pressure of 100 PSI was applied and a drop of 20 PSI was noted in 7 minutes. The control valve was reactivated to flush any possible contamination and a pressure drop of 40 PSI in 5 minutes was noted. To have a serviceable dampening unit no pressure drop is acceptable either in the compensator or in the check valve. The check valve was removed and stripped. Contamination was quite evident. Residue had collected in and around the valve, the valve sleeves and on the needle itself. The main pressure filters were removed and metal particles 1/16" - 1/8" were visibly embedded in the filter. Other contamination in the filter was also evident. All samples of fluid and the filters that were taken from the aircraft under investigation were sent to NRC for analysis of amounts and composition of the contamination.

The contaminant consisted mainly of:

(1) Very fine silicious material. Some larger particles were also present, the largest size particle being 75 microns;

(2) Metallic wear particles, the largest being 375 X 40 microns (slivers);

(3) Resinous material, (150 X 75), 150 X 150 and 275 X 275 microns) and

(4) Fibres 1300 X 5 and 2500 X 30 microns.

It is difficult to define or place limits on the cleanliness of a hydraulic fluid, without some knowledge of what contamination level the system, in which it is being used, will tolerate. The samples covered by this report appear to be quite clean when compared with previous fluids from other aircraft, which have been analyzed in the laboratory. The CF101B hydraulic system is not very tolerant to solid contamination and the fluids must be considered as being dirty.

A check of the main filters on the Pressure Drop Test Unit showed the filters to be dirty (pressure drop of 20 PSI). The By-Pass Filters were also visually checked and were very dirty. The restrictors from the steering unit were then stripped and contamination was very evident, some visible to the naked eye.

Checks of the same nature were then tried on five aircraft including some that were serviceable. Three out of the five were found serviceable, e.g., no compensator leakage.

A check of tire installation and maintenance was then conducted and it was found that the latest EOs (110-5-2A) and (05-185A-2G) calling out new and improved installation instructions were not available in tire shops. It was also noted that nose tire pressure of 170 PSI were not being maintained. Tire pressures on the same leg were reading differently and at one base some tires were found to be 40 PSI under pressure.

CAUSE

As a result of this investigation it was concluded that loss of compensator pressure was intermittent due to contamination in the hydraulic system. With the loss of shimmy dampening pressure and shimmy induced by various other reasons such as tire roundness, underinflation and runway surfaces, violent shimmy of the nosewheel leg assembly occurred which allowed the nosewheel to shimmy beyond its limits, breaking the torque arm in a buckling load at its weakest point.

REMEDY

To prevent further accidents of this nature AMC HQ published a special inspection calling out complete inspection and flushing of the hydraulic system of the aircraft and disassembly and cleaning out of the steering and shimmy dampening system. In addition the following other points were recommended:

(a) Ensure pip pin on torque arm is removed before towing;

(b) Check for correct tire pressure;

(c) Match all tires by manufacturer;

(d) Check for tire roundness - replace tires with difference in diameter exceeding 1/4 inch; and

(e) Match all nosewheels by manufacturer.

Since the inspection has been completed there have been no further accidents of this type attributable to contamination or tire problems.

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Near Misses on the Ground

A collision of aircraft on an airport can produce the same gory mess as a collision at 20,000 feet! Recent incidents, involving aircraft of four separate airlines, point up the fact that near misses are occurring on the ground as well as in the air. For example, in one instance an aircraft taxied onto a runway in front of a landing aircraft; in another, two aircraft took off simultaneously on intersecting runways. Analysis of these and other similar incidents reveals that contributing causes were:

(1) not using airline name and complete trip number on every radio transmission;
(2) not "reading back" restrictions to hold clear; and
(3) not having radio volume control turned up sufficiently.

Flight Safety Foundation

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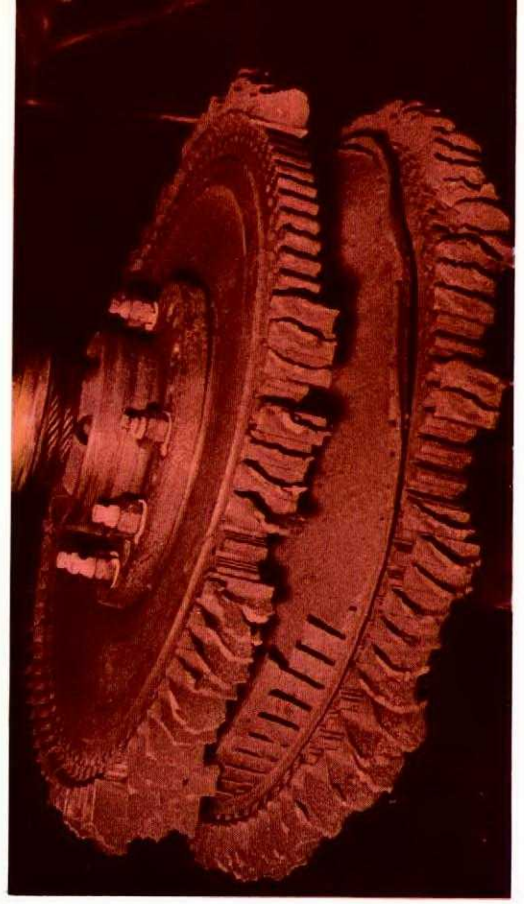
All the ability in the world goes to absolute waste if it is not seasoned with good judgement.

2 Marine Aircraft Wing

DON'T GO IN THE  RED

In a recent CF101B accident the crew were forced to eject after experiencing a simultaneous double compressor stall resulting in over temperatures and severe damage to the turbine rotors of both engines. Understanding the problem and thereby avoiding or correcting excessive exhaust gas temperatures (EGT) will prevent serious difficulties in the air (and on the ground).

The flight started with an early morning phone call to pilot and navigator for a practice scramble. The pilot conducted two normal single-engine starts which allowed him to check his emergency fuel on both engines. All aircraft and engine instruments checked serviceable on takeoff and climb.

The aircraft was vectored to a target and the pilot carried out a supersonic type of interception. He broke off his attack manoeuver at approximately 40,000 feet at a very low indicated airspeed. The pilot came out of afterburner into military power, checked airspeed, started to unload the wings (Zero G) and roll inverted in an escape manoeuver. As he did so he heard a noise described as "KABOOM", followed by vibration in the airframe, lasting 4 - 5 seconds.

When in the inverted position the pilot noticed that both temperature gauges were reading over the 700 mark. He gave the escape manoeuver his full attention at this time, believing that he had an armament door rotation or double compressor stall and all that was required to overcome the stall would be to lower the nose and reduce power. When the nose dropped below the horizon he eased the power back to idle and rolled right side up at an indicated airspeed of 250K.

When the pilot recovered from the manoeuver with both throttles at idle, both EGTs were still in the vicinity of 700 and both engine RPMs were steady at approximately 30%. He realized now he was in real trouble. He immediately stopcocked the left throttle, the left EGT began dropping. He then depressed the emergency relight button and put the left throttle in the idle position. The left EGT gauge continued to drop and there was no increase in RPM. Shortly after, the left generator went off the bus illuminating the master caution light and the appropriate telelight panel. The altitude at this time was 30,000 feet and he advised that they were heading towards Comox on one engine—or so he thought.

A total of four attempts were made to relight the left engine using normal and emergency procedures, without any results. During this time the right engine was left in the idle position, the temperature remaining at 700C. After four attempts to "unstall" the right engine, and as a last resort he moved the throttle to military power and went into afterburner. The EPR remained at zero thrust and the EGT rose to between 900-1000 followed by the afterburner overheat light illuminating. He immediately flamed out the engine. The crew ejected successfully about 2,300 feet above ground. They were back in the squadron seven hours later. The RCAF Search and Rescue system, that responded in this efficient manner earned the respect of all.

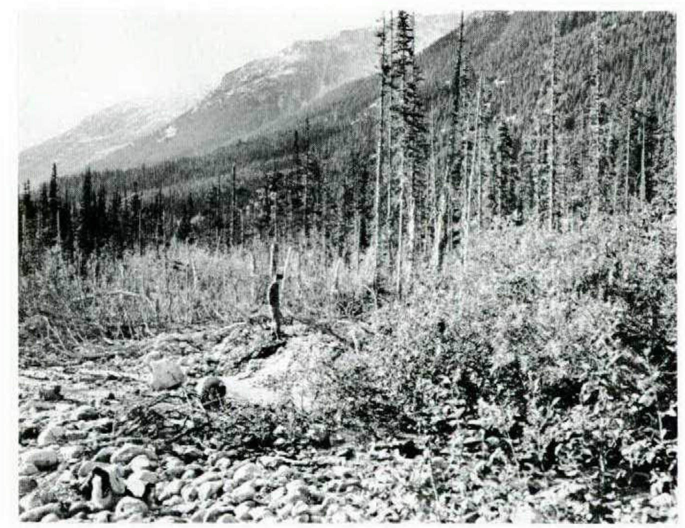
The aircraft was discovered a short distance from where the crew landed, with the engines about 1/2 mile from the main impact point. A visual examination revealed both engines had almost identical damage in each of the turbine assemblies. They were destroyed to the degree that they were useless for their designated role of driving the compressors. Most of the damage occurred at the very beginning in a very short space of time.

The hot end of the right engine from the turbine nozzle case aft revealed it was exposed to greater extremes of heat than the left engine. This created the same damage but to a far greater degree. The right throttle was left at idle (with the engine windmilling about 30-35%) with an EGT over 700 degrees for a relatively longer period of the time than the left engine and the throttle control was placed in afterburner as a last resort giving temperatures up to a maximum reading (1000) of the EGT gauge.

In the June 1961 issue of "Aerospace Accident and Maintenance Review" James J. McGrath, a member of the SAAMA "Quick Fix Team" of Pratt & Whitney Aircraft Company, wrote an article called "Hot Pipe Sensitivity" in which he outlined some of the problems of excessive exhaust gas temperatures. The following paragraphs are reprinted from that article as they shed some light on this particular accident.

"Experience has shown that there is a definite relationship between excessive gas temperatures and premature engine removals. The fuel control is designed in such a manner that normal exhaust gas temperatures will be maintained with a safe margin. However, the control cannot compensate for operational and maintenance malpractices. Furthermore, under extreme flight conditions or in the event of a malfunction the regulation of engine internal temperatures can be marginal or even above the desired limits.

It is sheer folly to treat over-temperature lightly. Just because the turbine does not fly apart or the engine melt away, there is no reason to assume that the engine cannot be or has not been damaged. Several momentary periods of high oven-temperature will have

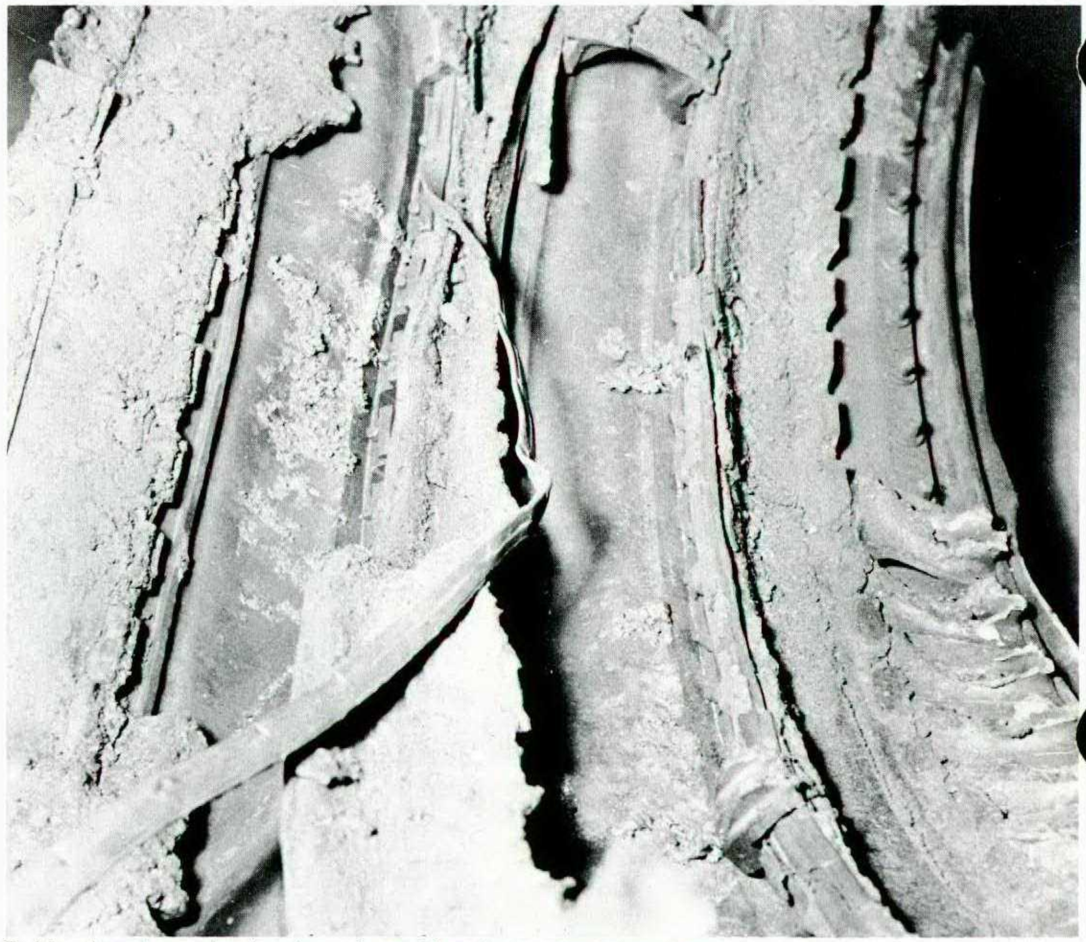


Main impact area.

as profound an effect on the engine as a single prolonged period of a lesser degree. Excessive internal temperatures aggravate such conditions as creep, (elongation, in the case of blades, as a result of load over temperatures) deformation of sheet metal parts and drooping. Operating the engine within the specified limits of temperatures, RPM, and turbine discharge pressure, or engine pressure ratio, should become instinctive technique to jet pilots and engine technicians.

For a given throttle position and indicated airspeed on J57 engines, exhaust gas temperatures will increase slightly with altitude. Retarding the throttle will usually maintain the temperature within allowable limits whenever a tendency to over-temperature is encountered. It may be possible to control excessive acceleration temperatures by means of a slower throttle movement. In many instances such as for takeoff, operation at Military Power thrust or during an acceleration, the maximum allowable temperatures are time-limited. Whenever allowable temperatures cannot be maintained or controlled in flight, a landing should be made as soon as practical. Excessive temperatures should be reported by the pilot in the L14 as a major entry. It is particularly important to record the peak temperature reached and the length of time that the temperature was above the maximum allowable, in order that prescribed maintenance inspections may be made.

AIB investigators were immediately aware of extreme over temp. Starboard Engine 2nd and 3rd stage turbine wheels illustrate extreme damage from over temp. Port Engine similar emphasizing this happened in a matter of seconds.



Turbine shroud case showing signs of metal flow from extreme over temp.

A pilot's best assurance that his engine will complete the mission and render long and dependable service is to maintain engine operation always within the limits of the temperature of RPM. Whenever possible do not use a thrust setting higher than is necessary to accomplish the assigned mission because engine life is closely associated with temperature and RPM, even when the allowable limits are not exceeded. The "Time-temperature-RPM" relationship within the engine is an important factor in engine durability and reliability. The most important of these is temperature although all three enter into the picture.

In a turbine engine, high-load and high-temperature are usually experienced at the same time. The loading on the turbine and compressor blades is mainly the combined result of centrifugal force, associated with RPM, and some gas or air load, associated with engine internal pressure. When the turbine discharge pressure, which is indicative of other internal pressure is high, so also will be the exhaust gas temperatures. This means that when the turbine blades are subjected to their heaviest load, the material of which they are constructed will be at its weakest. The compound effect of high RPM and high temperatures results in an astounding increase in the rate of creep at very high thrust settings when the centrifugal load is the greatest. The ends of the compressor blades and the rims of the turbine wheels tend to travel outward. The rate of creep increases tremendously as the RPM and the exhaust temperature approach maximum. Numbers can be assigned to the relative amounts of creep to show what actually happens at varying exhaust gas temperatures and engine speeds. For a typical J57 engine turbine blade, the rate of creep is approximately as follows:

Max Allowable EGT	Takeoff RPM	Creep (Units/Hour)
80%	95%	1
95%	97%	5
100%	100%	50
105%	101%	2500

Turbine life is directly proportional to the number of creep units per hour. On the ground, the engine specialists play an important part in prolonging engine life and controlling this thing called "creep" by proper adjustment of controls within the allowable limits of temperature, pressure, and RPM. In the air the pilot controls the magnitude of creep by the manner in which he operates the engine.

Turbine blades are carefully inspected and measured at engine overhaul. Those which have elongated beyond tolerance limits and those which show evidence of distortion or cracks must be replaced. In extreme cases, the blades may even fail before the engine becomes due for overhaul. It can be readily seen from the above that when an engine is operated at the lowest temperature and RPM shown, the turbine blades will last 2500 times as long as they will if the engine is operated at the highest temperature, and RPM shown. Although an engine will operate satisfactorily at the maximum allowable temperature and RPM, it is obvious that the operating time between turbine blade replacement and other possible engine difficulties will be greatly increased if conservative engine operation is the rule and not the exception."

In the accident recounted here, had the pilot of this aircraft immediately throttled back to reduce the EGT rather than leave the throttles at military power until he had recovered from the escape manoeuver, the engines should have recovered from the stall as the airspeed increased. The fact that the pilot considered the completion of the escape manoeuver more important at the time than the excessive EGTs caused the engine to operate under severe overfueling conditions which in a matter of seconds resulted in catastrophic turbine damage and subsequent loss of thrust. From that point on, nothing the pilot did could have changed the inevitable result.

The cause of the compressor stalls is obscure. It could have been caused by the engine operating on emergency fuel but the pilot was adamant that he was on normal selection and physical evidence to prove this was destroyed. The most probable cause of the stall, therefore, was a condition of flight induced by the pilot that caused a distortion of air flow in the inlet ducts resulting in a double compressor stall.

To conclude, regardless of the type of jet aircraft you are flying you must adhere to the temperature limitations laid down in the Aircraft Operating Instructions—beware the red lines.

The two articles "Voodoo Shimmy" and "Don't Go In The Red" were prepared by S/L TM Webster, Inspector of Accidents in the Directorate of Flight Safety, AFHQ.

SAFETY FIRST

Officers from the Directorate of Flight Safety conducted the annual Flight Safety four-week course at RCAF Station Trenton, in November. The thirty-five students who completed the session came from the Army, Navy, and Department of Transport as well as the RCAF.

Group Captain AB Searle, Director of Flight Safety at AFHQ, said in his introductory remarks: "You have the best product in the world to sell—Flight Safety. Everybody needs it, it can be used over and over, it is cheap and durable and we hope that through your efforts it will soon be found everywhere".

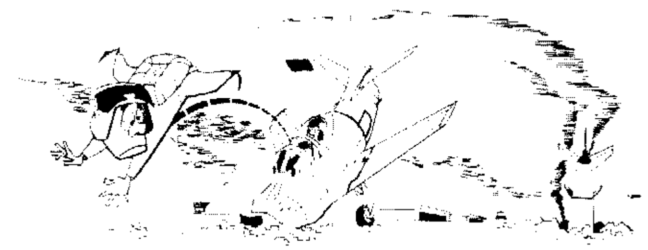
The course comprised classroom work, field exercises and visits to industrial plants. The hundred-hour curriculum included lectures and practical demonstrations in accident prevention, accident investigation, aero medicine and related subjects.

First Row—left to right. F/L RG Gallinger, F/O C Batcock, F/O AS Armstrong, W/C D Warren, S/L AH Petrin, F/L HA Smith, F/L LW Reid, F/L JA Scholey.

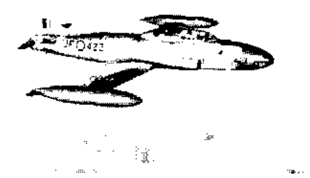
Second Row F/L DH Hook, LT WG Charland, F/L HF Luck, F/L JS Middleton, F/L JS Bray, F/L GA Saull, F/O DG McQueen, F/L RF Brown, F/L RE Fulcher.

Third Row—F/O BA Evans, LT TW Pollard, F/O MW Stedman, F/O TM Harris, LT GE Plawski, F/O DF Haines, F/O RJ Saulnier, Mr AJ McDonell, DOT.

Back Row—F/L WP Cunningham, F/L RG Armstrong, F/L GD Walker, F/L NL Webb, F/L RW Price, LT CF Poirier, F/O TS Neill, F/L GR Hostyn, F/L DL Redmond. (F/L HE Brown—absent)



ARRIVALS and DEPARTURES



OVERWEIGHT—OVERRAN

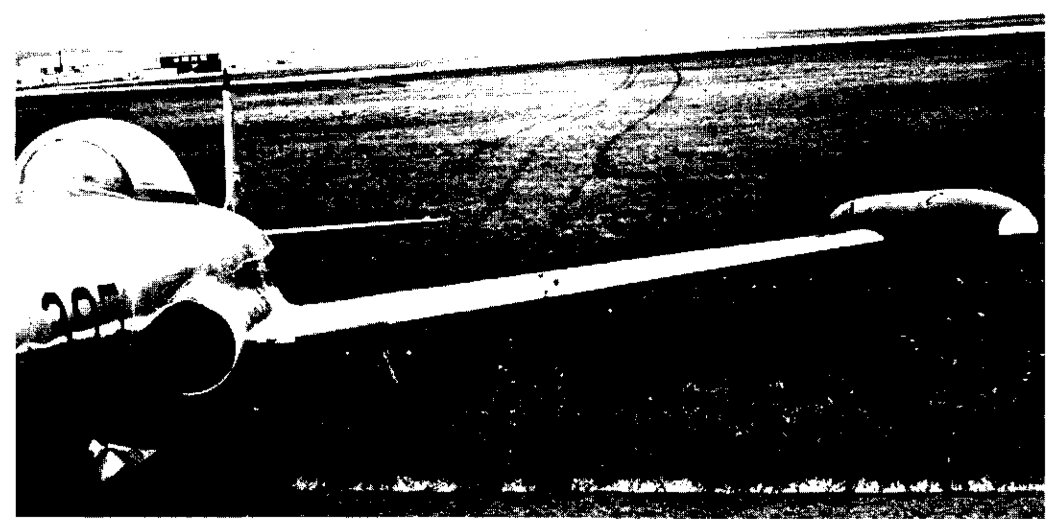
Planning a VFR flight to Victoria the pilot checked Notams and noticed the restrictions on runway 26-08.

He then computed the fuel he required for a departure from runway 08 at Vancouver to arrive at Victoria with an all up weight suitable for landing on the runway available. He departed the ramp with 440 gallons on board and was cleared for an immediate departure on runway 26 as the wind at this time was calm.

This departure required considerably less fuel than the one originally planned.

Arriving at Victoria the pilot was cleared for approach on runway 26 and after questioning NOTAM restriction was offered and accepted runway 20, 5030 feet. As he lined up with the runway he commenced prelanding check on brakes and undercarriage. As he was checking his fuel his attention was distracted by a tower transmission regarding a light aircraft in the circuit. He misread his fuel totalizer to be 280 gallons and failed to notice that his tip tank warning lights were not on.

The aircraft touched down at 100 kts on the first 500 ft. Braking action was checked as nose was lowered to runway. Immediate braking was applied and was good until about 1/2 way down the runway. The last half, however, was wet and braking action deteriorated rapidly. Speed was too low to overshoot so the pilot elected to stopcock the engine. He continued pumping and releasing the brake but with little



effect. The aircraft ran off the end of the runway across the overrun area, continued to roll forward, over the wet grass and into a ditch, at about 2 MPH.

As the pilot was completing shut down procedures, he noted a fuel totalizer reading of 372 gallons.

The cause of the accident was assessed as aircrew - error in judgement. The pilot had anticipated the short runway with the calm wind but did not allow for subsequent poor braking condition because primarily he had misread his fuel totalizer and landed overweight. A damp runway and a slight incline compounded his difficulties.

The nosewheel undercarriage doors were damaged, the pitot head torn off and the nose gear attachments were bent and broken. There was no severe structural damage.

Even though this pilot did considerable planning for runways and fuel-weight requirements, it is unfortunate he allowed himself to become distracted when reading his fuel prior to landing. The lessons for all are clear. Check, and then check again.

THE MORNING AFTER

An instructor pilot was detailed to complete a T33 instrument check ride with an OTU student. Normal checks were carried out on the ground and in the air. Upon passing through 25,000 the instructor noticed the port leading edge tank was venting fuel. He selected L.E. tanks on and by-pass. He then doubted his remedy and suspecting anoxia he checked his 0^2 and found it in good order. He checked with the trainee pilot who confirmed his action correct.

They levelled off at 35,000 and after two 180 degree turns the instructor felt nauseated and was sick in his mask before he could get it off. Everything seemed hazy to him so he did further 0^2 checks. The next thing the pilot remembers was at 30,000 feet doing a steep level turn. He realized he was ill and should return to base and asked the trainee, who was in control of the aircraft since takeoff, to descend to base.

As the aircraft descended, the check pilot had another blank spot and the next thing he recalls was at a lower altitude 5,000 to 10,000 feet. He then felt able to fly the aircraft and a straight-in landing was carried out.

Investigation revealed the incident was caused by the poor personal habits of the pilot, in that he unwisely and intemperately imbibed freely the previous evening, and as was his habit did not eat breakfast that morning. He may also have felt some effect from a virus infection that manifested itself some 24 hours later.

Aircrew are reminded of the effect that intemperate drinking and eating habits can have on their flying and possibly their Service careers.

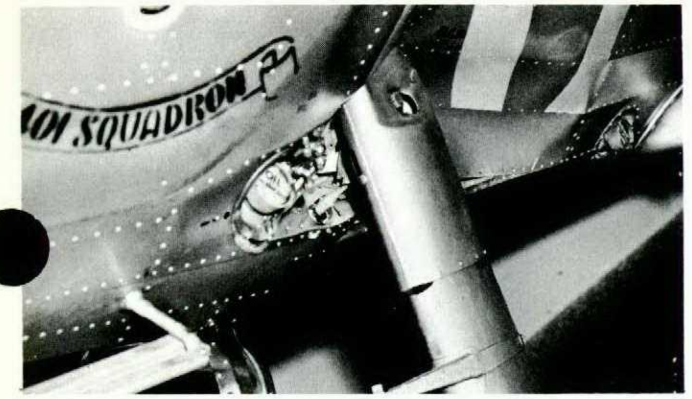
The warnings in this incident are abundantly clear and supervisors particularly, should not tolerate any similar occurrences.

A BIG FLAP

A student pilot was authorized for an exercise in an Otter in a dual conversion training program. After completing several exercises in cross-wind takeoffs and landings, and short field takeoffs, the instructor advised the trainee to do a straight ahead runway landing after retarding throttle to simulate engine failure. The tower was advised of this action.

At approximately 100 feet, after pilot under instruction had selected flaps to the climb position and with airspeed at 70 kts, the throttle was retarded. As the pilot at the controls lowered the nose to commence glide, the tower called to request them to use another runway as another aircraft was landing on the former designated one.

The instructor was in the process of acknowledging the message when he noticed that the aircraft was sinking rapidly. Unknown to him the pilot trainee had retracted the flaps from the climb to cruise position. The instructor took immediate control and applied full power, selected flaps down and began to pump the hydraulic pump. It was too late, the aircraft struck the runway heavily on the port wheel then bounced back into the air. It was kept airborne and the pilot climbed away with climb flap set. The tower was notified of the emergency and another Otter in the circuit was asked to fly formation to determine the extent of damage. The inflight inspection revealed that the port



oleo strut had torn a hole in the port side of the fuselage.

The aircraft was landed without further incident.

The cause of the accident was attributed to aircrew error in that the captain did not take over control soon enough. Distraction by the control tower so that he did not notice the cruise position of flap, diversion of other aircraft and lack of experience by the pilot at the controls initially are considered to be contributory factors.

ATC have restricted the practise of forced landings from altitudes less than 500 feet above ground or water and aspects of engine failures at low altitudes are to be stressed during ground school lectures.

NEVER SAY DIE

A Sabre had an undercarriage unserviceability. The L14B entry read: "Starboard undercarriage would not extend or "D" door would not come up on retraction". Prior to his entry, this aircraft had experienced undercarriage difficulties on take-off at the rate of once every three flights when it was necessary for the pilot to re-select once to get the doors up. A multitude of ground retraction tests and careful inspection of the undercarriage system failed to duplicate the unserviceability on the ground. Squadron pilots were briefed to watch for undercarriage door malfunction on take-off and report same to squadron EO after placing the aircraft unserviceable.

Since a combination of several circumstances was the source of the malfunction, one hundred man-hours were spent to rectify the unserviceabilities on this aircraft, by the long and tedious process of elimination of possible causes. At the same time it provided one of the best "on the job" training sessions for many squadron personnel in the AFTech and ETech trades. It also showed that a serviceable ground retraction test does not always guarantee a serviceable air test due to the impossibility of simulating air loads on the gear.

The first operation in the process to determine the malfunction, was a complete check of all switches by ETechAs for proper voltage, continuity and function. The hydraulic utility system was then flushed out. Twenty-five retractions were carried out with no malfunction. The aircraft was test flown but returned unserviceable again.

Upon retraction it was found that the undercarriage would come up but the "D" doors occasionally would not. It was also found that when tapping the starboard oleo near the uplock and "D" door sequence switches, part 152-54291-30, the "D" doors would then come up. The starboard uplock and "D" sequence switches were removed and new ones installed complete with harness. The aircraft ground checked serviceable with 24 retractions. It was test flown but again returned unserviceable.

All micro switches and the hydraulic selector solenoid were again checked by the ETechAs for proper voltage and continuity and all checked out serviceable. The AFTechs checked all linkage and hydraulic jacks for proper measurements and function. The bolt AN5-21A was found bearing on the threads and fitting sloppily. It was removed and the proper bolt installed. Also the "D" door actuating cylinder, part 151-58641-7 was adjusted one thread to agree with EO 05-5E-2.

After completing a number of retractions it was found that the starboard oleo was giving an unsafe indication intermittently. The starboard down lock switches were again checked for operation and it was found that the bracket holding the down lock switch was slightly bent and therefore binding the plunger that operates the micro switch and not letting it return to its full travel when the down pin was released.

The above mentioned bracket was straightened and the tension increased on the return spring. The plunger was also cleaned and oiled. Eighty-nine retractions were carried out with no malfunction and the aircraft was put on test flight.

The test flight was unsatisfactory due to twenty-second lag in "D" door operation.

The undercarriage selection valve was replaced and ground retractions carried out but the "D" door lag was still evident.

During succeeding ground retractions it was noticed that the nose door jumped slightly at the front hinge as it locked up. The front hinge bolt AN44-16 of the -4 was found to be badly worn and sloppy. It was replaced by a new bolt and retraction checks carried out with no malfunction. The aircraft was placed on air tests.

Two air tests were carried out successfully for operation of undercarriage system and the aircraft was then returned to the flight line.

This was a step by step process to determine and correct the components causing the trouble. It was a "never say die" attitude that brought results in time. It wasn't easy - frustrating, boring, but absolutely essential.

MURPHY'S LAW?

A pilot had been practicing circuits and landings in a Yukon during a night exercise. After eight uneventful landings a large wind shift was experienced, veering from 240/20 to 300/20 requiring more rudder application to prevent weather cocking. The pilot noticed that hard left rudder aggravated rather than corrected directional deviation and further ground taxiing indicated that when full rudder was applied the right brake was activated resulting in a strong swing to the starboard.

Investigation revealed that the brake control tube on the first officer's outboard brake pedal was incorrectly installed. It was further revealed that this malfunction would only be discovered when full rudder was required.

This unserviceability was not previously detected because this was probably the first time for full rudder in a year's operation of the aircraft.

Normal maintenance inspection of these controls would be done while in the neutral position or close to it hence binding of the components would not be visually revealed.

The rest of the Yukon fleet were inspected for this malfunction and all brake control tubes were found correctly installed.

The incident was assessed as contractor maintenance.

BE SURE IT'S SAFE

A CF104 had been unloaded from a C130B and was being prepared for reassembly. While the aft fuselage of the aircraft was being moved from the transport stand by means of a hoist sling assembly, four DEE rings, which connect the attachment plate to the sling cable, snapped. The fuselage dropped about five feet between the legs of the hoist with the vertical stabilizer falling on to the aft fuselage stand positioned beside the hoist. Considerable damage to the aft fuselage resulted.

Investigation showed the cause of the incident to be materiel - defective manufacture. Personnel involved were familiar with the sling and followed approved procedures.

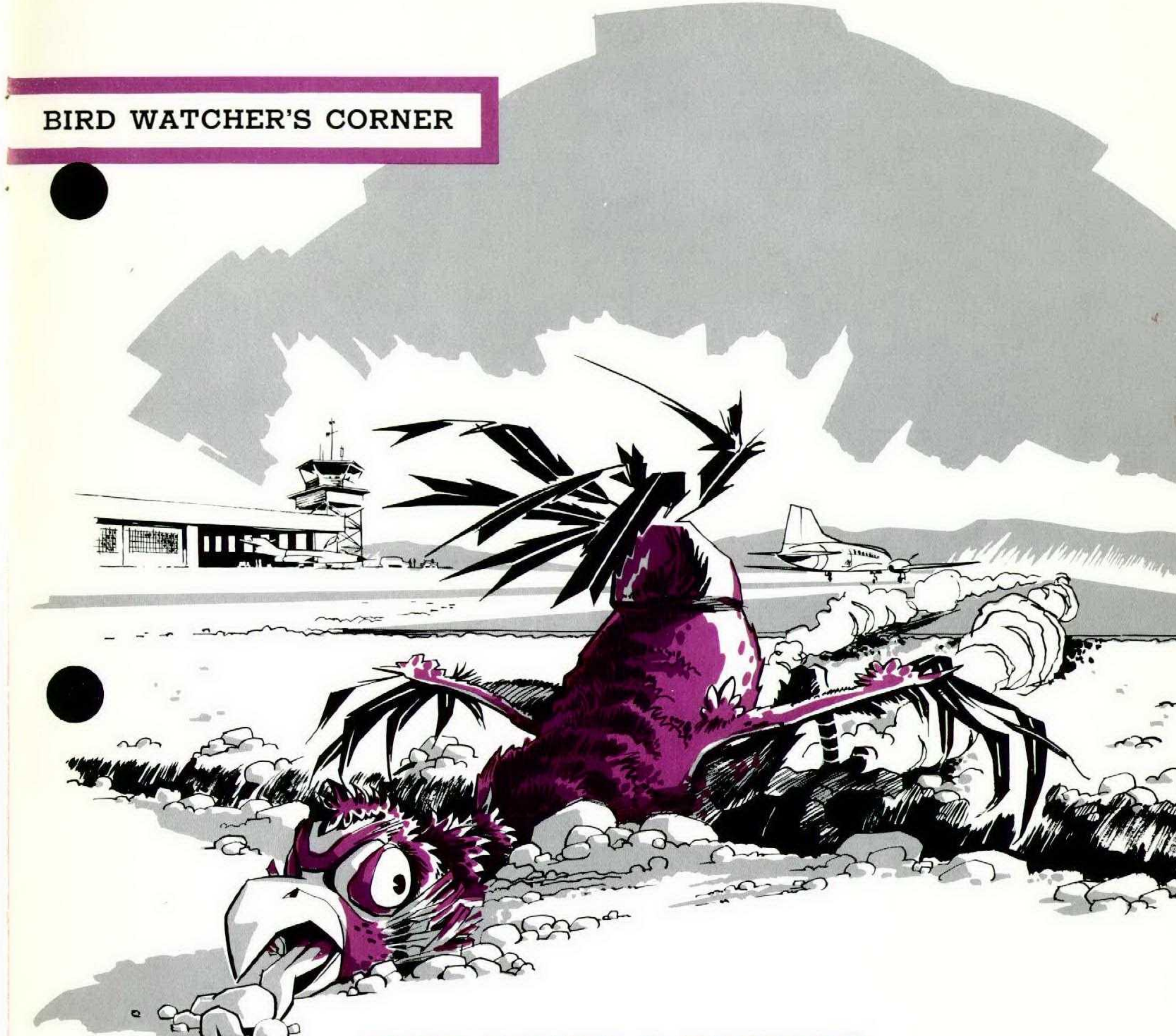
Failure of the rings was caused by inferior welding technique as the failed butt welds showed very poor penetration. All slings have been modified locally by replacing DEE rings with lap-welded rings.

All units are advised to ensure that all lifting tackle and particularly new equipment be carefully inspected for reliability and safety before being used.

About The Cover

The theme of our cover is based on the article "Know Thyself", appearing on page 9. F/O J. G. Fortin, 410 Sqn posed as our modern equivalent of ancient Greece's "citizen-soldier".

BIRD WATCHER'S CORNER

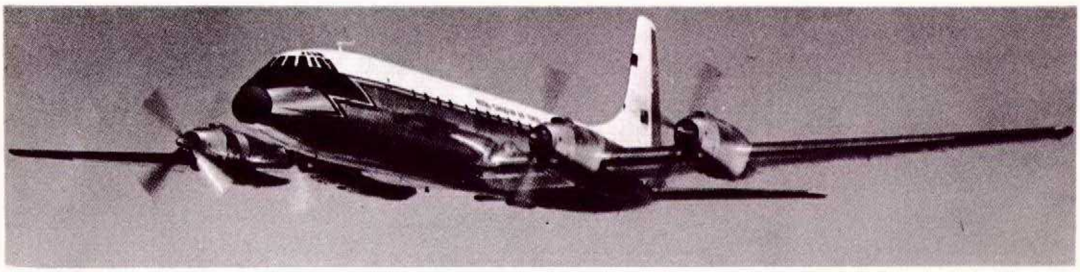


THE LONG LANDING, BOONDOCKS SEEKING EAGLE

This species is brother to the "Bandy-Legged Brake-Burner" and can usually be found a few hundred feet beyond the runway in various conditions. Favourite position seems to be in a nose down attitude, apparently pecking for seed in the inevitable ditch.

This bird does not easily adjust to such situations as a shorter runway, a wet surface, or calm conditions. Usually sets up his approach and lands as a matter of habit, rather than by conditions existing at the time.

CALL: LANDEDTHISWAYYESTERDAY
SHOULDAGONAROUND
THOUGHTICOULDHACKIT



"Whatever our task it is always fundamentally a case of flight safety."

(R. J. Lane, Air Commodore AOC ATC)