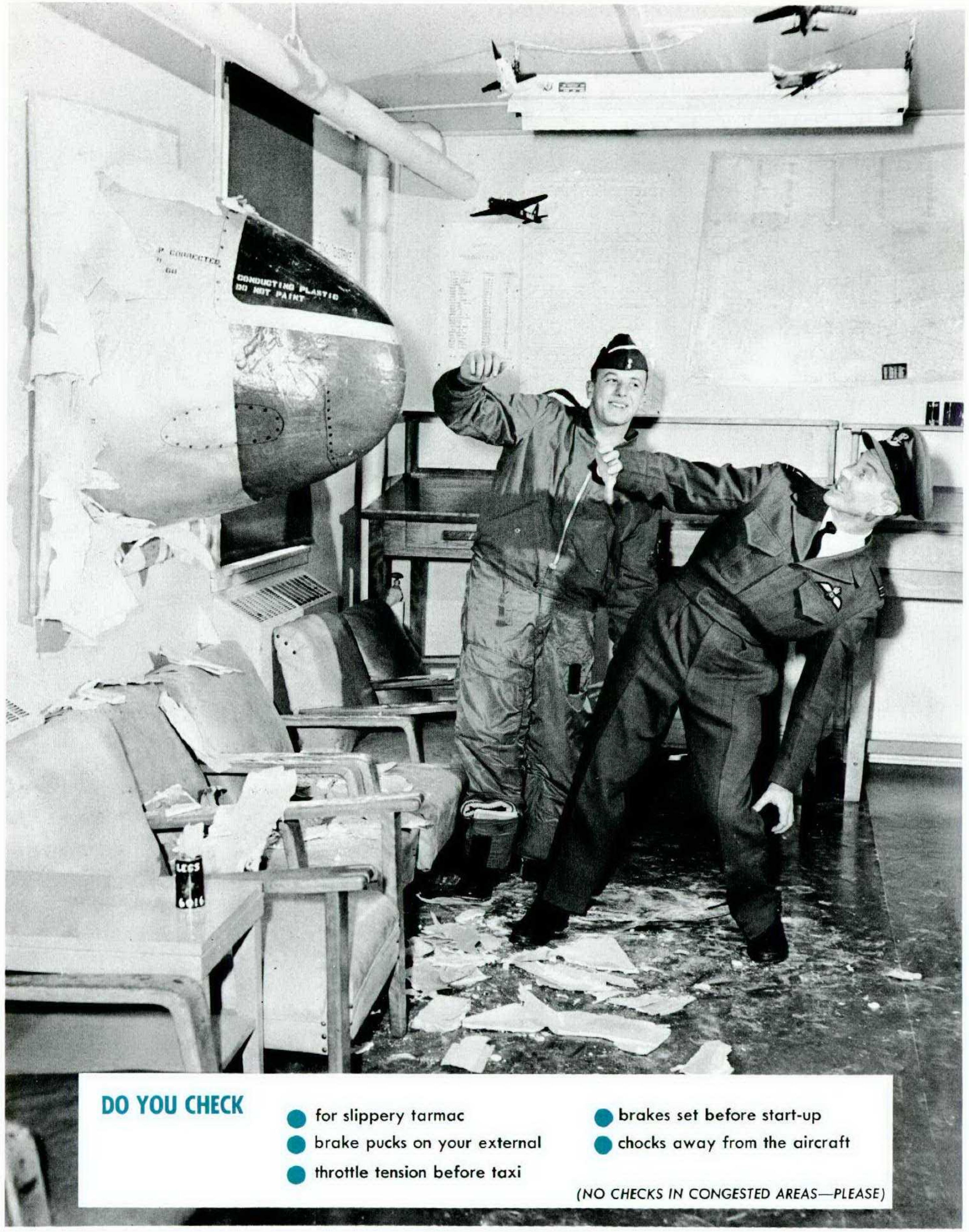
RCAF

FLIGHT COMMENT

FLIGHT SAFETY IN AMC

JULY • AUGUST • 1962



DO YOU CHECK

- for slippery tarmac
- brake pucks on your external
- throttle tension before taxi
- brakes set before start-up
- chocks away from the aircraft

(NO CHECKS IN CONGESTED AREAS—PLEASE)

THANKS TO STN. GIMLI (SEE PAGE 23)

FLIGHT COMMENT

July • August • 1962

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ROYAL CANADIAN AIR FORCE
DIRECTORATE OF FLIGHT SAFETY

The following article describes how we in the technical side of the RCAF perform in seeking to prevent technical defects and malfunctions, which have been reported, from re-occurring. This is a very important part of our work, and it merits the close and prompt attention we give it. I would like to comment here on the sort of attention that is also being given these days towards preventing defects and failures from occurring at all.

There has never been a time in our industrial history when more attention has been given to the prevention of technical failure or malfunction. This attention is manifested in a host of ways, but the most important contributors have been reliability groups, training in quality control, improved production techniques, improved design standards, improved materials, and "cradle-to-grave" testing.

Reliability has received more attention than most of the others. Defence production facilities have been required to produce brochures to demonstrate how they expect to achieve the required reliabilities. A major portion of the engineering staff has been assigned to reliability activity, some as members of reliability groups, some as reliability engineers in the design office, and still others in the quality control office.

There has been an unprecedented effort to train people in quality control. The USAF has mobilized a substantial number of graduate engineers into this work, which used to be left to technicians. Courses are now being given in universities, in factories, and in military establishments, to provide quality training. The aim is to make everyone quality-conscious so that, in effect, the whole production team has a preventative bias.

A great deal of money is being spent on publicity. Defence production factories are replete with posters designed to prevent carelessness in production, and to make all employees quality-conscious. The managements in some factories have incentive schemes to keep quality high. For the first time, quality control has a publicity budget.

There has been a substantial improvement in production techniques which prevent the production of bad products. For example, automatic inspection facilities are now an integral part of some production machines. In effect, a red light goes on when the product is outside prescribed limits. In many cases improved design has done much to simplify production, reducing the number of operations substantially and therefore the possibility of errors.

New materials have done much to improve reliability and thus prevent failures. It was only five years ago that extreme difficulty was experienced in machining titanium. Now this material is machined as routinely as is steel, making it possible to use it in many applications where light weight and great strength are required.

Finally, there has been a revolution in the testing field. Test equipments have been designed to check every stage in the assembly of major weapons. The test equipment used for checking out the final assembly is often more complicated than the weapon itself. This "cradle-to-grave" testing has increased greatly the reliability, and hence the safety, of our weapons.

Of course it is the exploration of space which has sparked much of the reliability revolution which is flowing outwards to all weapons fields. It is easy to understand this when one realizes that there are no half-measures about a manned orbital flight around the earth. Once the rockets are ignited, the astronaut is on his way, and everything has to work right the first time if he is to survive. When John McCurdy made his epical flight over the ice in Baddeck Bay, N.S., in 1909, he at least could return to the ice at a moment's notice if he didn't think things looked right. This is not the case with people like John Glenn; and it is easy to understand why the attainment of very high reliabilities has gained an altogether new order of attention.

(C. L. Annis)
Air Vice-Marshal
Air Officer Commanding
Air Materiel Command

FLIGHT SAFETY IN AMC

Prepared by
Staff Officers AMC

The AMCHQ logistics staff is notified of all unsatisfactory conditions from service units and civilian contractors by Unsatisfactory Condition reports (UCRs) and Technical Failure reports (TFRs), etc. These forms are designed for reporting all possible malfunctions or conditions which might affect the safety of aircraft, either in the air or on the ground.

Periodic summaries of all returns are related to various factors to determine trends and conditions. When viewed over a period of several months, summaries indicate acute trouble areas to the applicable AMCHQ logistics staffs. Corrective action is initiated where warranted. These returns are monitored to establish "lives" for various components, and summaries are monitored to ensure that the "lives" so established are realistic.

When a technical report is raised as a result of an accident or incident, it is cross-referred to the D14, the operational report on the occurrence. The technical findings are often used in making the final cause assessment of the accident, and in determining steps to prevent a recurrence, especially where component failures or malfunctions are present.

In order to illustrate the workings of the technical investigation, a fairly well-known instance is presented to demonstrate procedures. It is not too technical, but it does have recurring ramifications which illustrate the follow-through required.

In 1958, 6RD was told to manufacture luggage-carriers for T33s. By November, 1959, it had completed the project, and the carriers were shipped to various user-units in Canada. It seemed at this time that they were well constructed, safe to carry, aerodynamically sound, and easy to maintain. Early in 1960, the T33 "cell" in AMCHQ received a D14 from station Uplands reporting that, during flight at approximately 5,000 feet, a luggage carrier had fallen off an aircraft.

An investigation proved that the rear mounting-brackets were not sufficiently secured on the jato hooks to take the stresses encountered. Paragraph nine of the D14 advised that a UCR would be submitted.

On receipt of the UCR, an AMCHQ specialist officer visited Uplands to check on the carrier and mounting. The UCR was returned to the unit with the notation, "Agreed that the mounting of the carriers is not entirely satisfactory. With this in mind, Air Force Headquarters, at AMC's request, have ordered CEPE to carry out both installations and aerodynamic tests on the unit."

At the same time, a signal was sent to all user-units recommending a slight modification to the rear mounting brackets, and a larger mounting bolt. This "fix" was to act as a temporary safety measure only.

A carrier was borrowed from Training Command and sent to CEPE Uplands to assist in its project, which began in August, 1960. The final, comprehensive report was dated March, 1961. In this report, CEPE recommended both a new type of bracket for both the front and rear mounting-points, and that the carrier be limited to 100-pound loads.

The recommendations of CEPE were studied by the engineering staff at AFHQ. As a result, the AMCHQ logistics staff was directed to prepare a modification leaflet for the new mounting brackets.

In April, 1961, 6 Repair Depot at Trenton was told to modify the attachment, as recommended by CEPE. At the same time, 6RD was also requested to make more carriers with the modified mounting bracket.

1. A routine steel analysis.

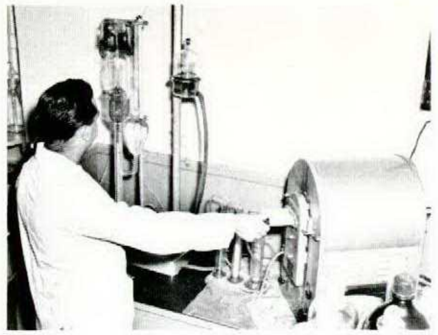
2. A tensile test on a 5,000-lb. Baldwin test machine.

3. Focusing a micrographic section for photography on the Vickers Projection microscope.

4. Using a toolmaker's microscope.

5. Using a Taylor-Hobson Surface Comparator to check the finish on ground surfaces.

1



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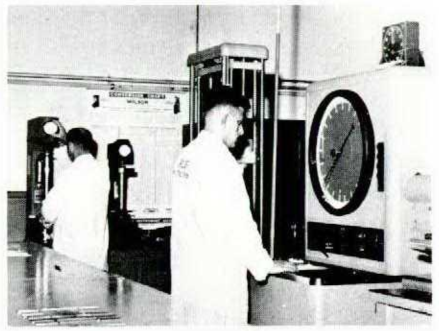

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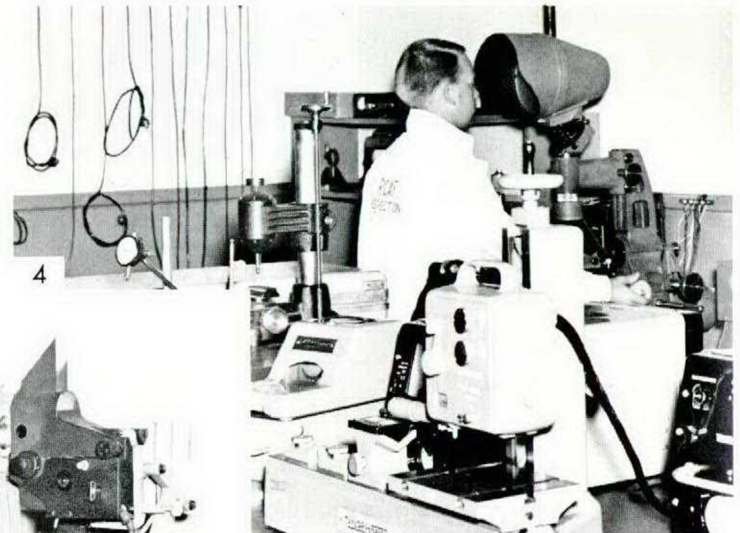

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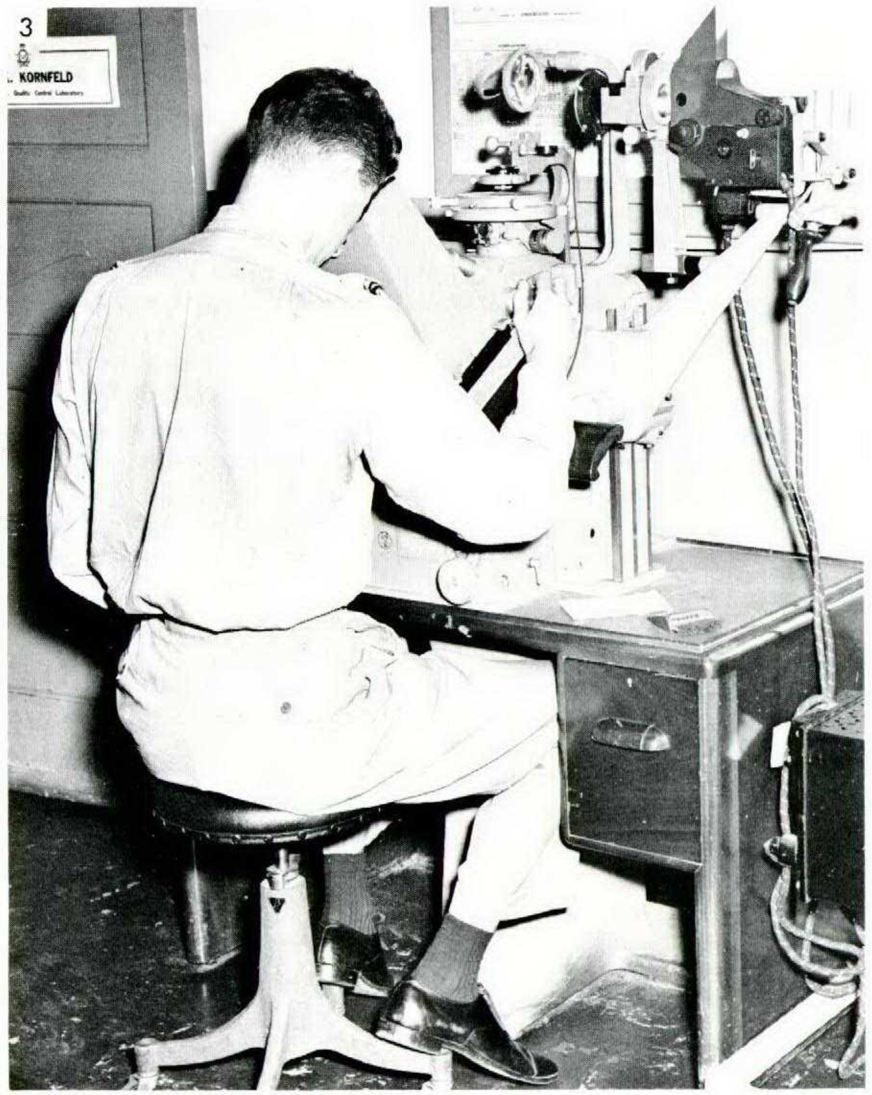


5

It appeared then that the problem had been solved. But 104 Composite Flight at St. Hubert submitted a UCR which said that the jato hook actuating-levers should be modified to prevent accidental jettison of the carriers. This of course, was an entirely different question, but it involved the same equipment.

A signal from Station Saskatoon confirmed St. Hubert's suspicions. A carrier had been accidently dropped near Lakehead. This incident led the log staff to believe that the mounting brackets (old type) were undamaged, and that no reason for the jettisoning could be determined. In view of this, it was established that it was distinctly possible for a build-up of ice on the jato hooks to cause them to actuate.

In October, 1961, it was recommended to Air Force Headquarters that the jettison capability should be retained, but in the same month an article in Aerospace Accident and Maintenance Review said that the USAF was abandoning the jettison feature on its carriers, in favor of locking the jato hook with a safety pin.

AFHQ was reluctant to eliminate the jettison feature, because it was possible that the carrier might puncture the plenum chamber in a wheels-up landing. After some discussion with the USAF, however, authority was granted to install safety pins in the jato hooks.

In December, 1961, a modification leaflet instructed all units to drill the trigger of the jato mechanism and install a safety pin. During the same month, a T33 at 3 Fighter Wing landed wheels-up with a luggage carrier installed. This did not damage the aircraft, but in fact prevented a certain amount of damage.

The cause of the unsatisfactory condition was never really obscure. Sometimes, though, a component malfunction or failure occurs without apparent reason. Further investigation is requested of the RCAF materiel laboratory at Rockcliffe. The materiel laboratory also works to prevent accidents before they happen, by investigating manufacturer's competence, and by quality control checks.

The RCAF "mat lab" is primarily an expert testing agency. Its staff includes civil servants skilled in scientific fields, and service personnel with aircraft technical trades. Facilities include metallurgical, chemical, environmental, and instrument-testing departments, and a section providing basic and advanced training for all personnel.

The assistance provided by the laboratory to AMC includes qualification of products, quality control assistance, and failure analysis.

Qualification of products consists of lab tests on companies who are potential suppliers to the RCAF, to determine if they have the competence to manufacture to meet Air Force specifications. Companies are asked to submit sample products for testing by the lab or other agencies such as the department of Mines and Technical Surveys, the National Research Council, or D.N.D. Inspection Services. AMC staffs direct D.D.P. to purchase from these companies, to ensure high-quality products.

Quality control assistance includes running metallurgical checks on sample products, to determine the quality of the work turned out by company metal-working machinery. These checks are run semi-annually, or oftener as required, in order to maintain tight control.

Analysis of failed or unsatisfactory components to determine causes and to arrive at acceptable solutions is also done. AMC technical staffs find out about difficulties by the UCR's and TFR's sent by the units. These returns often indicate serious or repetitive problems, which require immediate technical investigation in order to determine a "fix."

To facilitate the lab investigation, staffs requesting assistance must provide background information and, if possible, the failed components. A problem well-defined is half solved; for this reason, the utmost in co-operation from all personnel associated with aircraft is needed, to ensure that problems are reported promptly and accurately.

Seen Any Good Films Lately?

The films we recommend all deal with flight safety. Ask your FSO if he can arrange for you to see the following:

"Air Defense Flying Safety" (USAF, color, 14C/3595). Of interest to both aircrew and groundcrew.

"These Things Happen" (RAF, black and white, 14C/3618). A graphic portrayal of how little events and distractions can snowball—in this film they lead to the loss of a Canberra. Stresses the groundcrew aspect.

"FS Report #1" (USAF, 1959, black and white, 14C/3359). Shows problems of both aircrew and groundcrew; gives examples of small and large accidents.

F/C J.G. LEGER, F/O W.C. THOMPSON

F/O W.C. Thompson and a student were in a T-bird practising manoeuvres. They practised stalls at 16,000 feet and climbed to 35,000 and had a Mach run and maximum-rate descent to 23,000. After two spins, and while the student was pulling out of the dive with the throttle closed, F/O Thompson flamed out the engine. As the rpm passed through 20 per cent the radio faded; about five seconds later, the battery master was off. F/O Thompson took control and put the battery master in override without success. In the meantime, he turned the aircraft toward the field and began a flameout pattern. He tried the battery at intervals gliding towards the field, and selected the IFF to emergency.

While approaching High Key at 7,000 feet, the undercarriage was selected down; hydraulic pressure dropped to 450 psi and came back up to 1,000 psi by the time downwind was reached. The downwind leg was extended slightly to compensate for the lack of flaps.

F/O Thompson reported that he was slightly "hot", so he "...selected speed brakes and battery master again to override, but there was no 'joy'. We crossed the button at 125 to 130; touchdown was about 1,000 to 1,500 feet down the runway. There was no trouble braking to a stop and rolling clear."

F/O Thompson's professional skill and judgement in carrying out the flapless forced landing earned him a personal letter of commendation from the AOC TC, and a Good Show from Flight Comment.

LAC P.C.T. DAVIES

A pilot was authorized for a night flying exercise in a T33. The engine had been started, and the aircraft was just about to leave the line, when LAC Davies signalled the pilot to shut down. Hydraulic fluid was leaking from the port undercarriage uplock.

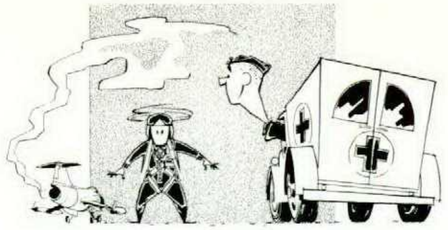
The exercise called for GCAs, which require many undercarriage selections. Hydraulic pressure would thus have been exerted on the leaking uplock during most of the flight. This could have resulted in depletion of the hydraulic fluid, and possibly fire, because the leak was in the wheel well, forward of the engine.

By his acute observations in the dark, LAC Davies probably averted serious consequences, and therefore deserves a Good Show.

Can You Operate Your Safety Equipment in the Dark?

Sarah is simple; all the instructions are printed on the equipment. But what if it's dark, and you can't read them? When that aerial flips out it could damage an eye—and then you'd really be in the dark! Again, can you tell which end of the flare gives light, and which one emits smoke? A rescuer can't see smoke at night.

Think it over—check EO 55-40D-2—see the light—practise—before it gets dark!



NEAR MISS

BUCKING BAR

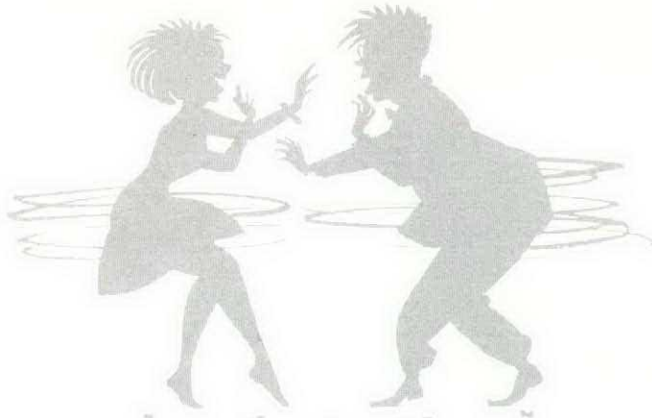
A technician carrying out a primary inspection on a Voodoo found it impossible to rotate the armament door. Examination of the fuselage showed minor damage just forward of the door. When panel 211 was removed, a bucking bar, 5-1/2 inches long and 1-1/2 inches square, was found to be lodged under the rotary door actuating cylinder.

The bar was numbered "240" by electric pencil. Investigation indicated that RCAF personnel were not responsible.

Only minor metal work was required to repair the slight damage—but think what might have happened if the bar had worked into that position just prior to an attempted door rotation in flight!

The moral is clear: Do a complete tool check BEFORE leaving the job.

THE TWIST



AOIs for all aircraft invariably quote the maximum G loads permitted for the configurations in which the aircraft is flown. Moreover, AOIs for fighters include restrictions on G during rolling manoeuvres. It is important to keep strictly within these limitations; if you don't know why, read on.

If, during a manoeuvre involving application of G, the aircraft is rolled at the same time, severe loads may be imposed on the structure, even at G loads appreciably lower than the maximum permitted for "straight-pull" manoeuvres. The wing is subjected to the twisting loads caused by the ailerons, as well as those imposed by the high speed and angle of attack.

Unfortunately, the accelerometer can measure only the load factor in the pitching plane; it is not designed to measure the torsional loads in a rolling manoeuvre. With full aileron deflection at high speed, the accelerometer reading can, in some cases, be doubled as an indication of the structural stress on an aircraft.

Every time a load is applied to a structure it is shared, in some way, between every component of which the structure is made. Whenever a load or stress (which is load spread over a given area) is applied to a piece of material, a change in its shape takes place and the strain energy is absorbed. In a complex structure, such as a wing or main fuselage frame in which bending, shear and torsion is taking place, a small element may be loaded in more than one plane simultaneously.

In any element of a given material, however, there is a limit to the strain energy that can be absorbed. Although the forces giving rise to the stress combination may be low enough to produce insignificant strain when taken singly, the total strain energy demanded of the element by the combination may far exceed its capacity, and failure will result. For example, in a wing designed for an ultimate strength of 10 Gs, failure may well occur at between 50-60% of this figure when combined bending and torsional loads are applied.

BENDING

In straight-and-level flight, the resultant lift distribution is symmetrical, as shown in Fig. 1. When positive G is applied, the resulting distribution increases, but remains symmetrical, as shown in Fig. 2.

If aileron is applied in level flight, Fig. 1 is modified by the changes in local lift, as shown in Fig. 3.

It can be seen that the downgoing aileron increases the local lift by increasing effective angle of attack, whilst the upgoing aileron reduces it.

If aileron is applied rapidly, the lateral inertia of the aircraft resists rotation, causing a large bending moment to be applied at the wing root on the side of the downgoing aileron.

This bending moment is only applied while the tendency to roll is being resisted by inertia, for as soon as the roll is established, the lift distribution regains its symmetry.

Thus, if we now combine aileron and elevator, the effect is accentuated, as in Fig. 4; the maximum bending occurs at the moment when aileron is first applied.

TORSION

When a straight wing is subjected to a bending load, the applied moment is ultimately absorbed by the wing root structure (Fig. 5). The effect of sweepback on a wing taking the bending load is to introduce an additional moment, tending to twist the wing off at the root. (Fig. 6). Of course, both diagrams are greatly simplified; they ignore the effects of drag and local pitching moments.

The delta wing is a development of Fig. 6 because the load-carrying structure is virtually a swept wing (as shown by the shaded area of Fig. 7).

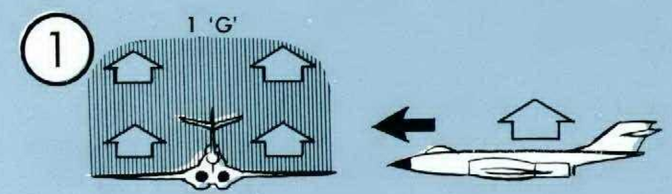
Finally, if aileron is applied, a torque or twisting moment is introduced along the wing span; the downgoing aileron usually twists the wing nose-down and the up-going aileron twists the wing nose-up.

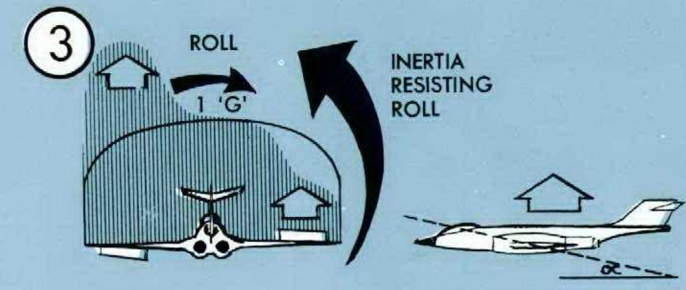
If we now refer to Figures 4 and 6, and add together the effects of torsion from aileron alone, the bending from aileron deflection and the bending from the G applied, and apply this to a swept structure, we see that with relatively little effort the result may be shattering.

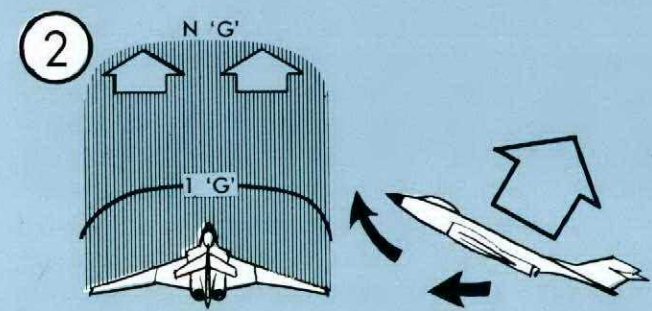
Because it is so easy to overstress an aircraft by an imprudent combination of aileron and elevator while staying within written limitations, the pilot is faced with recognizing just how far to go. The solution is not simple, because the accelerometer—or the time-honoured "seat of his pants"—tells him little. The only advice which can be reiterated is...

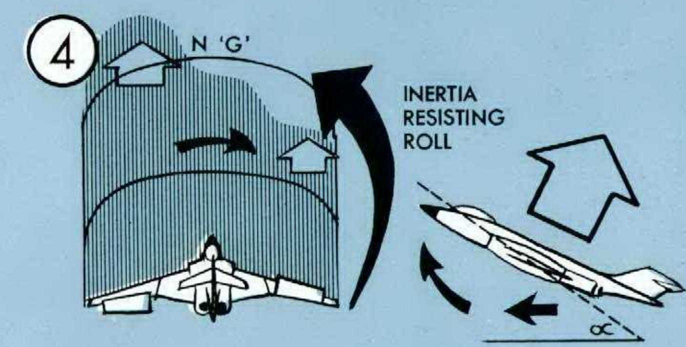
DON T USE HARSH AILERON MOVEMENTS AT THE SAME TIME AS HIGH G, WHEN FLYING AT HIGH INDICATED AIRSPEEDS, and KNOW YOUR AOIs.

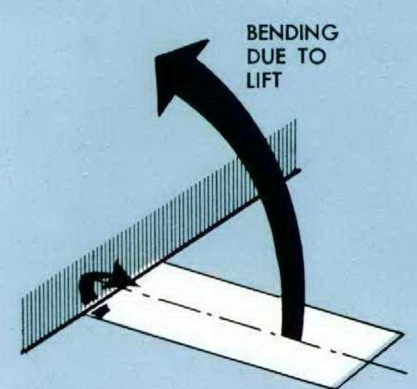
RAF Flight Safety
Fighter Command Review



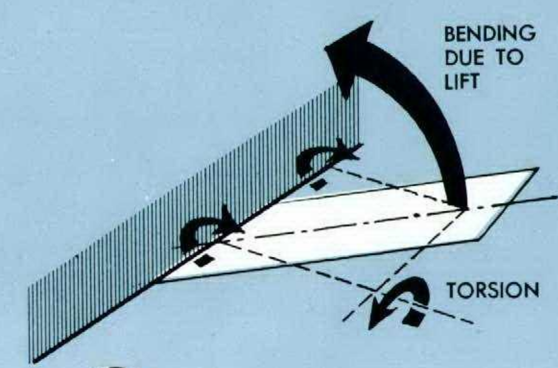




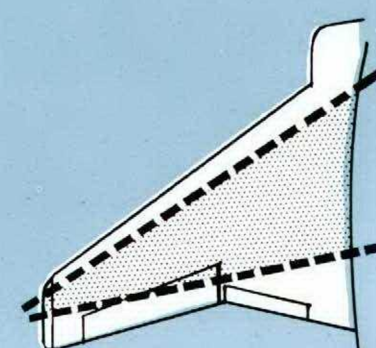




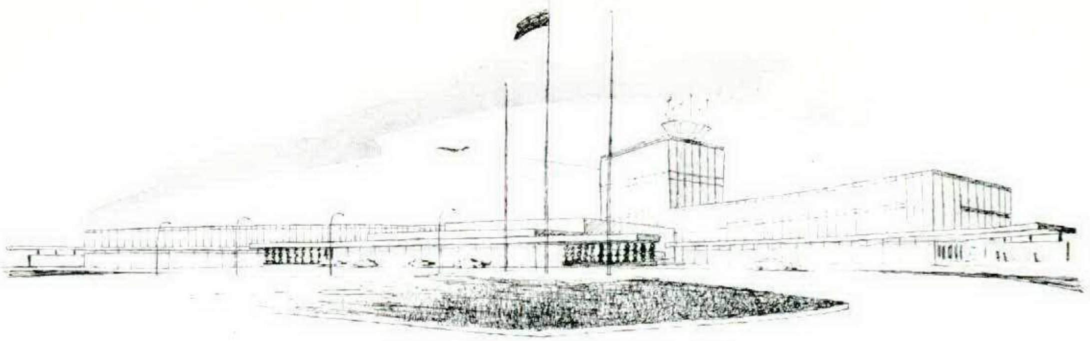
5 UNSWEPT WING
ALMOST PURE BENDING
REACTION AT WING ROOT



6 SWEPT WING
BENDING AND TORSION

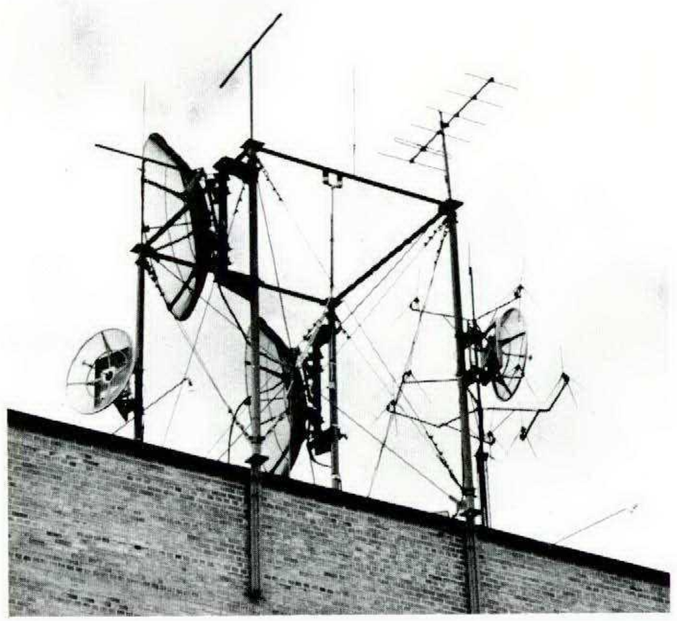


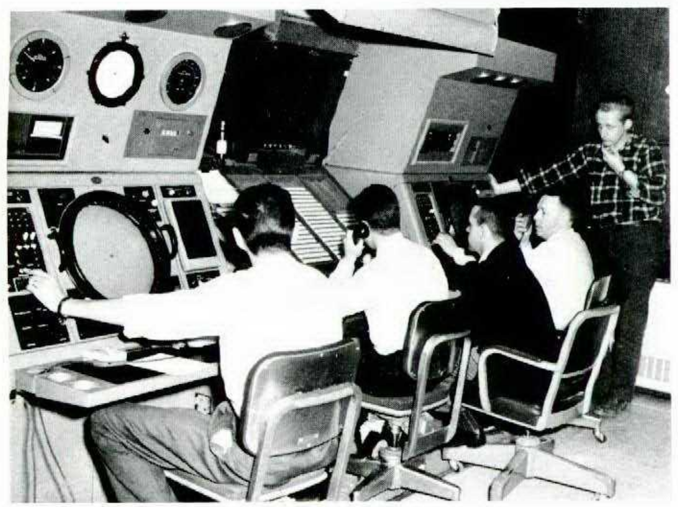
7 DELTA OR SEMI-DELTA



DOT TERMINAL CONTROL

by DOT ATC Division, Ottawa





These are the DOT approach controllers who marshal aircraft into the proper approach and departure patterns.

Terminal control, an integral part of the Department of Transport's Air Traffic Control system, was established at certain terminal locations to provide control service to IFR traffic operating within a defined area about these airports.

Because justification for a terminal control facility is based mainly on traffic density, complexity, and location of the area, such facilities are not in evidence at all terminal locations. Where terminal control is not established, control of the IFR traffic is exercised from the area control center concerned.

The areas of responsibility for terminal control units vary in size, depending on local conditions. However, an average would be from 700 feet above the ground within a radius of 45 nautical miles to an altitude usually below 25,000 ft. Where possible, the terminal control unit is made an integral part of an area control center, in order to consolidate and simplify co-ordination of IFR traffic.

At the present time, the Department of Transport operates terminal control facilities at Frobisher Bay, Gander, Halifax, Quebec, Montreal, Ottawa, North Bay, Toronto, Lakehead, Winnipeg, Saskatoon, Regina, Edmonton, Calgary and Vancouver.

Radar is employed in the application of IFR control, and standard radar separation of five nautical miles is applied accordingly. The type of radar currently in use at these facilities is of the medium long-range type, with the exception of Gander, which has a short-range, high-definition type. Both provide adequate radar coverage in the areas concerned; interference caused by the terrain and/or atmospheric conditions can be eliminated or reduced by the use of interference-suppressing features incorporated in each system.

For example, moving targets only can be presented, thus eliminating undesirable ground returns, and precipitation interference can be suppressed by the use of a feature known as circular polarization.

There are several other features incorporated to improve the radar displays; all of them contribute greatly in providing the controller with uninterrupted visual information on aircraft movements, resulting in a high degree of safe and efficient control.

Two radar transmitters equipped with emergency power supplies ensure that radar service will be available under most conditions. Operators of this equipment are licensed IFR controllers who have taken a course in radar theory and have had practical training.

A terminal Control facility normally consists of a control tower and three IFR Sectors: Arrival (Radar), Departure (Radar), and Flight Data Position.

Control Tower - A control tower is normally responsible for the control of all VFR traffic operating within a certain distance of an airport, and for the control of all vehicular and aircraft movement on the operating surface of the airport. At the present time, control from a tower is based mainly on information received visually; the complexity of some airports, however, is pointing to the need for equipment which will supplement line-of-sight information.

Arrival (Radar) - The arrival controller, on identifying incoming traffic, will vector the aircraft to an approach aid and give descent instructions to the approach altitude. When the aircraft has been vectored to the approach aid and is the first aircraft to land, it is then turned over either to the control tower or the PAR controller.

Departure (Radar) - The departure controller, on identifying the departure, will vector the aircraft to a navigational aid and ensure that the required radar separation is maintained between other departing and arriving aircraft. On reaching the navigational aid, and before leaving the terminal area, the aircraft is handed over to the center enroute radar controller.

Flight Data Position - The controller at the Flight Data Board records all aircraft movements on strips, co-ordinates with the area control center on aircraft entering and leaving the area, and issues departure clearances to the control tower. He must also keep the tower advised of incoming traffic so that the flow of IFR traffic may intermingle with the VFR traffic without conflicting. In some extremely busy locations, an additional position is required, because the co-ordination of the traffic flow requires the full attention of an additional controller.

In addition to surveillance radar equipment, precision approach radar is operated at Gander and Toronto, and installation of it is well-advanced at Montreal. It is expected that the Montreal installation will be commissioned approximately June 1, 1962. PAR will also be installed at Vancouver, Halifax, Edmonton, Winnipeg, and Calgary.

The type of equipment being installed is capable of multiple runway coverage. All systems will be remoted into the terminal control sectors. The precision controller can therefore be located adjacent to the arrival controller, thus enabling the essential co-ordination to be carried out most effectively. With the introduction of precision approach radars, the monitoring of aircraft movements can therefore be accomplished from the extremeties of the surveillance radar coverage continuously to the touchdown point on a runway.

In addition to the prime functions of a radar-equipped Air Traffic Control facility, there are many other services that are or can be provided, which contribute greatly to flight safety. Radar navigation and traffic advisory services are examples. Information on heavy precipitation areas, and vectoring around these areas, can also be provided on request.

Radar has also provided a method for pilots to advise of radio equipment malfunctions— right-hand triangular patterns for "receiver operating only", and left-hand triangular patterns for "transmitter and receiver both inoperative."

Because of the ability to see aircraft movements continuously, assistance to aircraft in distress can be directed accurately to the aircraft, or to where it was last seen on radar, thus minimizing search times.

During the past few years, consistent with the growth of air traffic, the introduction of new equipment into the Air Traffic Control field has been extensive, and has resulted in a great increase in flight safety. The research and development necessary to keep pace with the increased demands of aviation is continuous.

SCUBA

SCUBA diving (diving with Self-Contained Underwater Breathing Apparatus) is fast becoming a popular method of getting away from it all—on a temporary basis, of course. But if you are a pilot or a member of a flight crew (or even a passenger), it would be a good idea to acquaint your FPMO with your SCUBA hobby and get expert opinion on it and your flying.

The USAF has an incident on record where a crew, flying a pressurized aircraft in the late afternoon following a day of diving at depths of only 20 to 30 feet, became incapacitated in flight. Fortunately the flight engineer proved to possess a greater tolerance for diving and, luckily for all, was rated in the aircraft.

Here is the why of what happened:

It is generally concluded that for the average individual, submersion to depths of 30 feet or less can be tolerated indefinitely without the necessity of decompression. The deeper one dives or the longer the exposure, however, the more excess nitrogen is dissolved in the blood and tissues. Upon surfacing, this excess nitrogen is released from solution in the form of bubbles.

The greater the difference between the partial pressure of the gas dissolved in the tissues and the atmospheric pressure, the larger and more numerous the bubbles of escaping nitrogen. From sea level, each 1000-foot increase in altitude reduces atmospheric pressure by .49 pounds per square inch. Conversely, each foot of descent in sea water increases pressure by .445 pounds per square inch.

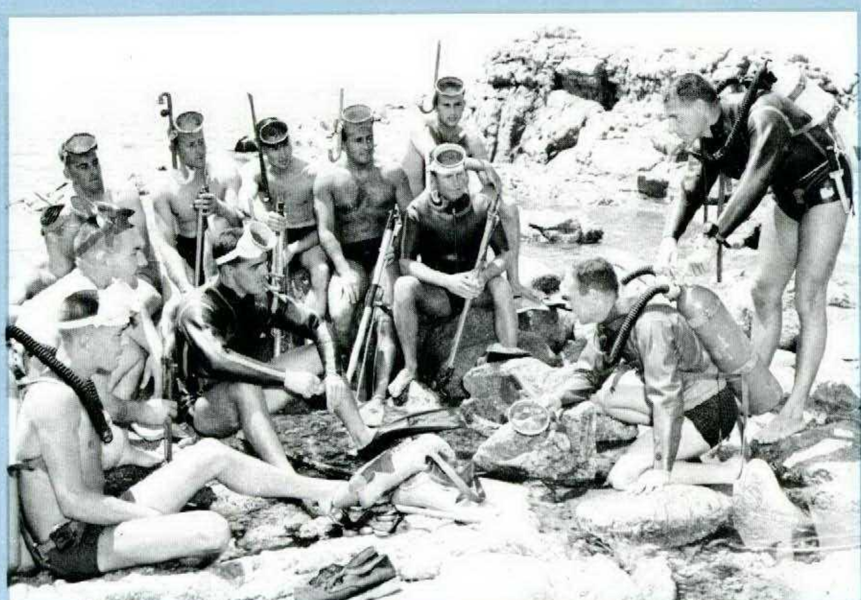
Thus, we see that for the crew in the incident, flying at a cabin altitude of 8000 to 10,000 feet was in effect the same as submerging another four or five feet during their diving fun, under which conditions slow decompression was mandatory if no symptoms of "the bends" were to appear.

Individual tolerance to decompression sickness (bends) varies widely. After sufficient exposure to pressure, symptoms will always appear within 24 hours; in 85 percent of those who suffer the bends, symptoms will appear within four to six hours, and the remaining 15 percent will show symptoms within 12 to 24 hours.

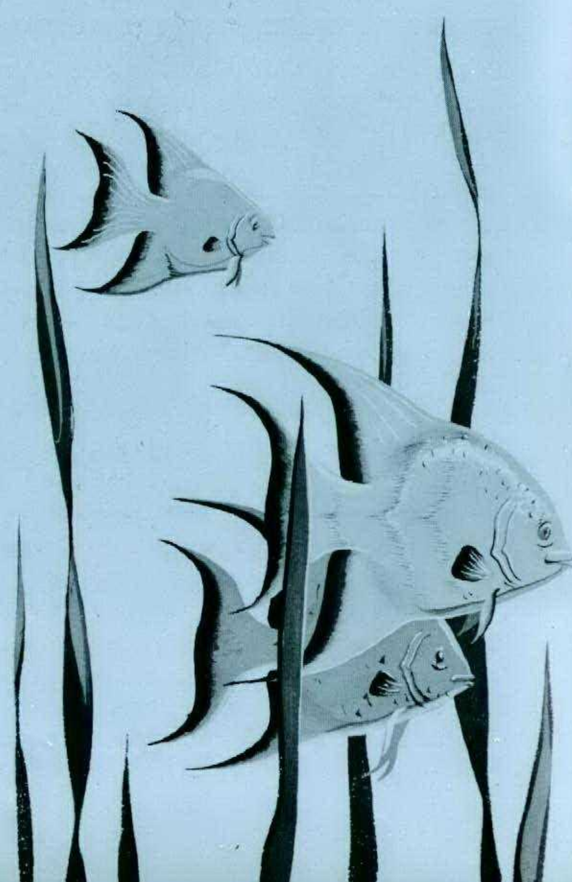
In the incident mentioned, the pilot and copilot were incapacitated within four hours after their SCUBA diving session, whereas the flight engineer remained "untouched" until some 12 hours has passed—time enough to put the plane and its ailing pilot and copilot safely on the ground.

If you count SCUBA diving as a hobby, or are thinking about it, consult your FPMO. SCUBA or "skin" diving may dissolve enough nitrogen in the diver's body to produce bends during pressurized cabin flight undertaken within 24 hours after surfacing. Flight personnel are urged to discuss all such possible hazardous activities with the FPMO. (Extract from Flight Safety Foundation Newsletter).

SAC Safety Memo



Members of the "Sardo Squids", a skin-diving club formed by members of the RCAF's Air Weapons Unit at Decimomannu, Sardinia, get some first-hand instruction from Sgt. Vic. Evans, right, on the use of SCUBA (Self-Contained Underwater Breathing Apparatus.)



Please Don't Feed the Birds

It's amazing that our birds aren't all dead considering the rate we've been feeding them a diet that is impossible to chew or digest. It's true, they are a hearty flock and we haven't had too many just up and die, but the medical bills are staggering!

The majority of these ailments (FOD) are normally discovered during periodic physical examinations (scheduled maintenance inspections). In reviewing medical reports for the past year, we find that the most frequent ailment is excessive dental damage. This requires, at minimum, a partial plate and often a complete new set of teeth (compressor or turbine blades). Do you realize what a new set of teeth for one of our thoroughbred fowls cost? It's in the neighbourhood of $90,000, and that ain't bird seed!

Specialists sometimes prescribe a mixture of peach seeds, apricot pits, or walnut shells to correct some bird disorders. This approved treatment is called carbo blast. It cleans the teeth and innards of birds and makes them feel good again.

These crazy birds will eat anything within reach, so let's be careful and keep them from eating things they can't digest. Take stock of the flock; keep a clean bowel in the fowl.

TAC ATTACK

Granny Knows Best!

An aircrew officer doing an administrative tour at AFHQ recently received a letter from Western Canada in which the following words appeared:

"Watch the weather; it is very changeable here—and so much fog."

That's sound advice from a lady of 94 who first crossed America in a covered wagon, to a jet pilot in today's RCAF. By the way, this lady is a Flight Comment reader!

THE NARROW PATH OF GOOD JUDGMENT

by LTJG Ralph Richter, Jr.

There was a time when "aviator" and "daredevil" were synonyms. A man who flew was, in the public mind, something of an oddity, a reckless gambler. Some of this old swashbuckling attitude still remains, but only as a gentle tradition, and only on the ground. The aviator of today is a professional man.

What caused the change of the aviator in the public mind from the daredevil to the professional? The answer lies in the path of good judgment. The aviator has by keeping on this path, proved to the world that he is able to stand side by side with other professionals as one of them. He knows that the path is a narrow groove which has no edges to prevent one from wandering out. He understands that the outline is not clearly defined, but is shadowy, hazy, and difficult to distinguish. Although the path is straight, he is fully conscious that it is, more often than not, clearer through hindsight than foresight.

Specialized training and experience help to give the skill to do the job after a decision has been made. Also through training and experience, the aviator is able to gauge his skill and know his own limitations. But the old stunt fliers had skill too; so there is something else needed to remain within the path of good judgment besides skill alone.

Responsibility: Certainly a doctor has responsibility; so does the aviator. He always has the responsibility for his own life, of course. The pilot of an aircraft with passengers has several lives in his care, and the single-engine pilot is expected to conduct his flight in such a manner as not to endanger the safety of others.

Aside from the human responsibility, there is also the very considerable expense of today's aircraft to think about. The improper decision of an aviator as young as 20-21 years could cost more than a million dollars. Responsibility, then, is a sobering element that tends to keep an aviator within the path of good judgment.

This element is not one that is suddenly thrown upon the shoulders of a young aviator. When a student has earned his medical degree, it is not because he has on some certain day become an expert in the field of medicine. It is simply that, in effect, learned men have said to him: "We trust your good judgment now. As you continue to learn, you now have the responsibility of making your own decisions."

Similarly, a new aviator is not an old pro because he may wear wings as of the date of his designation. He has merely reached a point where his decision can be trusted.

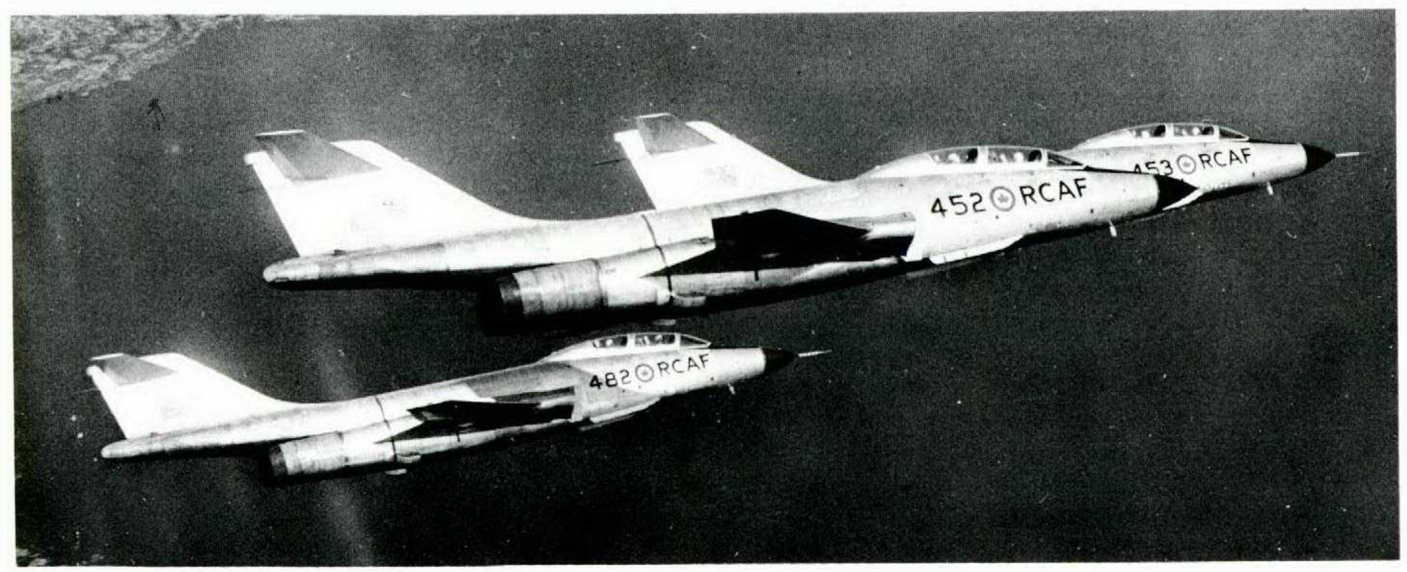
A professional cannot expect to remain on the path of good judgment for long by avoiding decisions. They must be made. An error of deliberate omission is not only cowardly, but can easily be as fatal as one of commission.

Because an error in judgment which may have been embarrassing in 1927 or even 1947 can be fatal in 1961, an aviator must also have courage. Flying under a bridge is not courage. It is foolishness. Nor is it courageous to attempt a forced landing with a damaged aircraft when the odds are stacked heavily against success. To succeed would be no more than luck. Courage is faith in one's own abilities and convictions, and the confidence to act positively upon them—positively and quickly.

A professional can never relax from his conscience when making decisions. His conscience is his personal guide. Through conscience, his training and all the elements that tend to keep him on the path of good judgment are held at their peaks of efficiency. The stimulus to go again when the right decision—as it seemed—failed, is backed by the man's own conscience. He must be able to say to himself that under the same conditions and having the same information available, the decision would still be the same.

Because the aircraft of the future will not be any slower or any less mechanically complicated, the professional aviator cannot afford to have a conscience that is satisfied with decisions which only require him to remain in the shadowy or hazy portion of the path. He must be clearly within its narrow boundaries. As a professional, he must continue to study and train. And he must realize that for him, the path of good judgment is not only narrow, it is continuously narrowing.

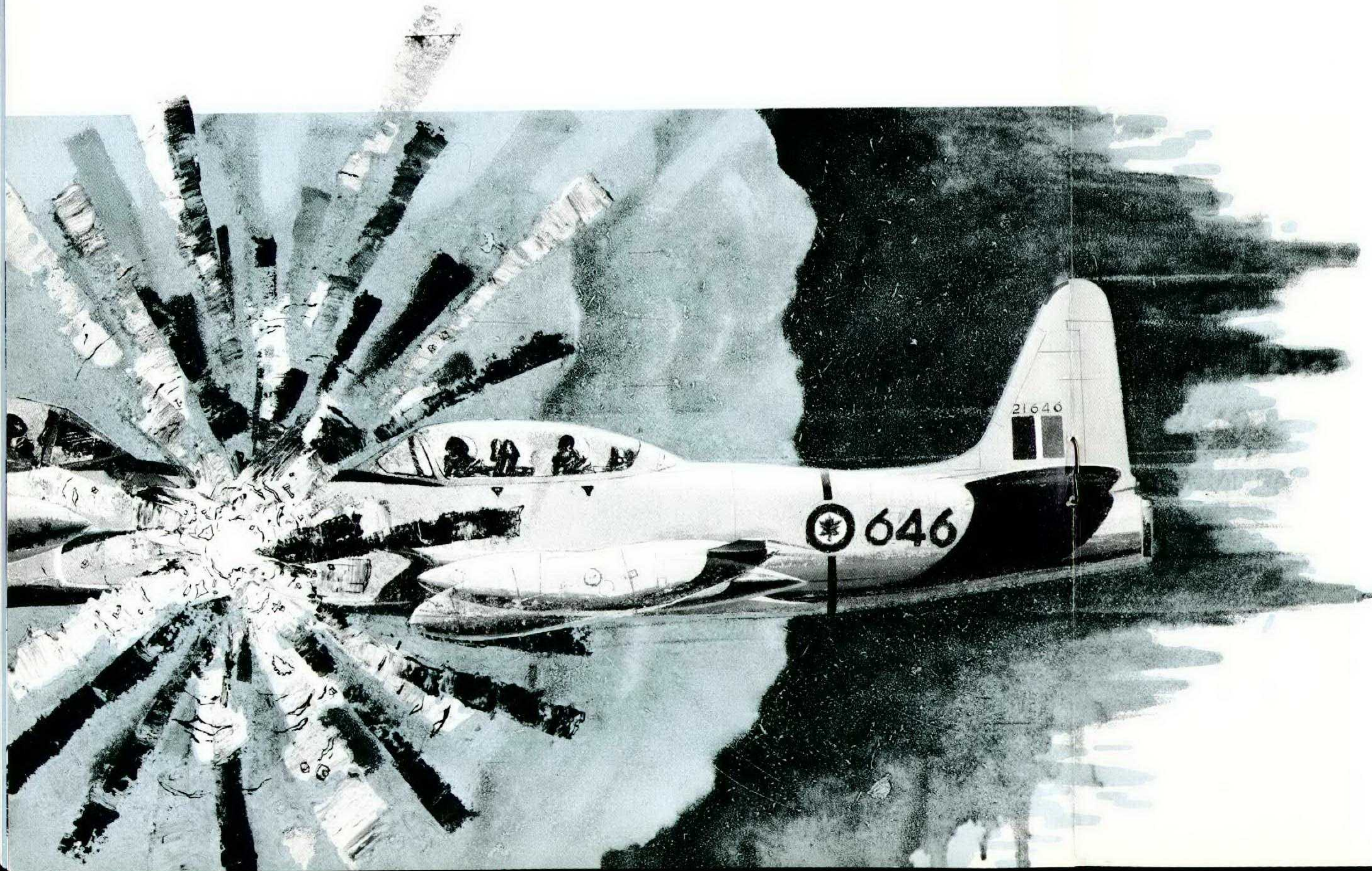
USN: Approach



by F/L J. J. B. MacDonald

...except for the confusion brought about by the unexpected disruption, the sudden darkness and the rapidly changing motion, I was no more than...

...ALL SHOOK UP



I was authorized for a round-robin in a T-bird; the flight was to be a four-legged, back-to-base, cross-country through German and French airspace. I was to do a drop "under the bag".

We were on the second leg, cruising at flight level 310, with myself at the controls, and had just finished PXing to Moselle radar, and were awaiting further instructions, when it happened.

Without warning, there was a stupendous crashing and smashing, followed immediately by violent out-of-control manoeuvres. Unknown to me at the time, we had just collided head-on with an American T-33 flying on a near-reciprocal course.

The sounds and sensations experienced during and just after impact are indescribable in terms of my previous experience, but were worthy of what might be expected when two aircraft, each weighing six tons, lock horns at a closing speed of 1,000 mph or so.

We found out later that on impact we lost our port wing, complete tail assembly, engine, and rear fuselage right up to the rear ejection rails. The starboard wing is believed to have come adrift following the main breakup. The explosion was big enough to be seen 65 miles away.

The collision and the wild gyrations that followed had thrown me about viciously. Fortunately, the safety harness was tight and locked, and—except for the confusion brought about by the unexpected disruption, the sudden darkness and the rapidly changing motion—I was no more than "all shook up". Short moments later I heard and felt the canopy being blasted off, and I knew instinctively the time had come for me to part company with the T-bird.

I grabbed frantically for the ejection handles, yanked them up, and squeezed the trigger. As I did I was conscious of either being inverted or experiencing negative "G" forces. There was a loud report and a strong surge outward. The jolt I received on ejection was considerably less forceful than I had been briefed to expect, compared to what hit me as I stepped out into self-induced winds of more than double hurricane force.

I hit the slipstream and immediately began a wild terror-stricken ride, during which I must have been forcibly separated from both the ejection seat and my seat pack. At any rate, I wasn't conscious of it. At one instant I was cartwheeling across the sky spreadeagled, unable to move; then I was rotating and gyrating like a rag in a Bendix washer, arms and legs thrashing about uncontrollably. Gradually—and none too soon—this tornado subsided—I opened my eyes to find myself tumbling end over end.

Streaks of starlight and the foreboding grayness of an undercast passed alternately before me. My breathing was rapid, heavy, and difficult; so I reached down for the "green apple" on my bailout bottle. To my horror, it was missing. I was uncertain of my altitude. The dread of unconsciousness from hypoxia, and the possible failure of the automatic barostatic chute-opening device—and the thought of becoming just a blend of the quaint German countryside—overcame me. I panicked, fumbled for the "D" ring, found it, and yanked it free. A momentary pause, a sharp tug—and with a "WHUMP" my headlong plunge was arrested. The deceleration to a more leisurely descent was welcome.

I glanced upwards; I could see, dimly, the outline of my parachute, beautifully deployed. The oxygen mask was still tight, so I reached up and undid one side of it. My breathing became less laboured, if no less rapid. I faltered through a few prayers of thanks.

A quick check on myself and my equipment showed no apparent injuries of any consequence. With the exception of my flashlight and the things I carried in the shin pockets of my flying suit, I had retained all of my personal equipment. Possible hypoxia was still my major worry, but I found myself thinking about the events of the past few minutes. Had we hit something or did she just blow up? Where was Harry? Did he succeed in getting out too? I was as lonely as God.

I began to fret; in rapid succession I considered the consequences of parachute landings—in trees, in hydro lines, in the middle of a city, on the Autobahn, in the Rhine. These reveries were interrupted periodically by frightening pendulum-like oscillations which initiated themselves mysteriously, and gradually dampened themselves out. Suddenly, and without warning, I entered cloud. It was disturbingly eerie. Turbulence oscillated the chute again, and I began to experience vertigo. Then I saw between my feet a faint rosy glow that slowly intensified and became whiter. I burst out of the bottom of the overcast quickly and recognized this glow as the lights of a village beneath me. From this and several other groups of lights I became conscious of a high rate of drift.

"Strong surface winds, 30 gusting 40, with high upper level winds, over the whole area", the forecaster had said. My drift was to the right and backwards. "I'd better try swinging around 50 or 60 degrees", I thought, "to be facing in a better direction for landing." I began to dredge my memory for some techniques of chute-handling. Some fragmentary information from a long-past "survival school" demonstration popped to the surface. "Yes, now I remember...cross your arms above you, grab a set of risers in each hand, hang on tightly, and uncross your arms."

I tried it. "You're turning in the wrong direction, stupid: try again with your other arm in front this time...that's better." When I was facing in the desired direction I released my grip only to swing back in the original direction. I tried reversing a few more times. No soap.

My confidence in my memory's retentive powers waned. "Maybe you turn by pulling on the downward riser and sideslipping around", I thought. I tried it but my rotation in the desired direction was nil. Instead, I now hung down in the harness at a nauseous angle, so I released my grip on the riser. In desperation I raised both legs stiff-kneed and waist-high, trying to change direction by applying "body english". A short session of thrashing about proved the futility of this manoeuver.

Then, abruptly, I saw that I was drifting rapidly towards only one group of village lights; the others were becoming more remote. My "arrival" was not far hence. I abandoned my efforts to alter direction, and concentrated on preparation for the landing.

I rotated the quick-release box to the "Hit to Release" position, and set myself up in a landing attitude--heels and toes together, knees slightly bent, hand gripping the risers overhead. I alternated between glancing under my arm at the village lights and looking down between my feet for the ground to get a clue about my height and a glimpse of what I was going to land on.

There was solid blackness beneath me. I thought to myself, "In another 15 or 20 seconds you should be--CRASH! without warning I struck the ground with bone-shattering force. I bounced and somersaulted backwards, stunned by the impact. When I got my bearings I saw that I was bumping along over a ploughed field on my back. I hit the quick-release box smartly; it snapped open; but my tumble on the landing had wrapped the shroud lines securely around me, and I was still being dragged along. I managed to roll over on my side and started to haul in the shroud lines hand over hand. After several lengths had been pulled in, the chute collapsed in a heap and I stopped. While I was disentangling myself I became painfully aware, from the angle at which my foot was set, that I had broken my ankle. A few cries of help went unanswered.

I took stock of my situation. I was injured. It was dark, cold, windy, and threatening to rain. I had somehow lost my seat pack. I had no flashlight, pyrotechnics, or matches. I considered wrapping myself in the parachute and waiting the twelve hours or so until dawn and almost-certain rescue. I also thought about the effects of shock and the agonizing pain that was sure to come when feeling returned to my injured ankle.

I had landed on the side of a hill. Down in the valley I could see the lights of the village. The nearest habitation was a farmhouse about a kilometer away at the bottom of the hill. If I only had those Roman-candle flares from the seat pack, I could sit here and practically set fire to the roof...they'd be sure to investigate, I mused. I gave another series of shouts for help. They were answered by silence.

Anything was better than just waiting; I would try making my way towards the house. I tried crawling along on my hands and one leg, dragging my injured leg behind the best I could. Progress was slow and painful. There was a grating sensation in my ankle. I came to a vineyard fence, crossed under it, and decided to try one of the light fence posts as a crutch. It didn't work. The injured foot hung down and swung to and fro like the clapper of a bell, at every step accompanied by the ominous grinding.

I sat down, and after a few minutes of experimentation I evolved a satisfactory mode of locomotion. This involved forward movement of my hand and posterior in a semi-setting position, with my injured ankle cradled in the arch of my good foot. Progress was surprisingly rapid despite a series of vineyard fences and frequent short rest stops, during which I gave a few calls for help. I managed to make my way to within 300 feet of my objective in less than 1-1/2 hours. The occupants were finally aroused by my cries of help, and came looking for me with flashlights and lanterns.

What transpired when they found me, transported me to a nearby hospital (fortifying me with cognac enroute), and my subsequent chance-meeting with F/O Smith, who had landed safely several miles downwind and had "walked out", has much humour and human interest, but I am running out of space.

I have just returned from the hospital where, what I hope will be my final cast was put on the ankle. I am lucky to be alive.

(We acquire a great deal of our knowledge through experience, good and bad. Through F/L MacDonald's unpleasant, though interesting, experience, the cause of the loss of his seat pack has been investigated, and new connectors are on the way.)

Born in Alexandria, Ontario, F/L John Joseph Bernard MacDonald joined the RCAF in 1951, and served with 123 Rescue Unit in 1952. He was posted to 3 AW OTU in April 1960, and to 4 (F) Wing in September of that year.

BACK COPIES AVAILABLE

Back copies of Flight Comment from 1957 on are available without charge to RCAF units or personnel, or others who wish to complete their files. Orders will be filled on a first come, first served basis. Some safety posters are also available. Write direct to:

Directorate of Flight Safety
Air Force Headquarters
Ottawa 4, Ontario

Expeditor Fuel Management

All seats occupied (3T)	- Rear Tanks
(Take off on main tanks)	- Main Tanks to 1/4
	- Nose Tanks
	- Main Tanks
Pilot seats occupied (3T)	- Nose Tanks
(Take off on main tanks)	- Rear Tanks
	- Main Tanks

THUNDERSTORMS AHEAD!

by L. G. Tibbles
Special Projects Meteorologist, AFHQ

A thunderstorm can cram into one small space all the weather problems one would ever want to meet. The one ahead might be a comparative weakling, or a vigorous young monster which should be treated with great respect. The record of civil and military accidents directly attributable to thunderstorms emphasizes the importance of proper procedures and techniques when flying in thunderstorm areas.

FLIGHT IN THUNDERSTORMS IS TO BE AVOIDED. Isolated storms or groups of storms should always be circumnavigated.

If you have no alternative but to pass through a line of storms, flight below cloud is generally the best choice for piston-type aircraft. In jet and turboprop aircraft you may not be able to accept the fuel penalty of low-level flight; your best choice then is over the saddlebacks. Here some words of caution are in order:

- Your aircraft may not be able to top the IFR conditions;
- Turbulence in a thunderstorm normally increases with altitude in the developing stages of a cumulonimbus cloud; and
- Hail is frequently encountered above the freezing level.

If your aircraft is equipped with airborne weather radar you will be familiar with the techniques and procedures which have been developed to avoid areas of heavy turbulence and hail. Full use should be made of this equipment to keep well clear of the more active areas within the thunderstorm.

If your aircraft is not equipped with weather radar, don't overlook the possibility of having ground radars vector you around or between the worst of the activity.

When planning your flight, remember that overland thunderstorms tend to reach their maximum activity in late afternoon, and that their intensities can change quite rapidly.

Aircraft should neither take off nor land when a thunderstorm or heavy shower is advancing across the airfield, for disaster threatens in the violent turbulence, strong gusty surface winds and rapid windshifts associated with cumulonimbus clouds overhead.

From time to time, in aircraft not equipped with airborne weather radar, you may not be able to avoid flying through a thunderstorm; it may be that you are faced with the necessity of penetrating a line of storms; or you may even find yourself in one unexpectedly. You may be on instruments, and your first indication of thunderstorm activity is the rapid build-up of static or the appearance of St. Elmo's fire. If you have elected to press on, the following rules should see you through.

GET READY

Prepare yourself and the aircraft for the worst. Without weather radar, assessing the severity of turbulence or the presence of hail within the cell will be impossible until the penetration has been made. Conditions may not be severe; but if you are ready and the going does get tough, you won't feel that everything is happening to you at once.

- Penetrate through a break in the cloud if possible.
- Select an altitude to avoid the worst of the turbulence.

In a piston aircraft this will be at as low an altitude as possible—at or near the base of the cloud—but at an adequate height above terrain obstacles. In a jet aircraft it will be as high as possible.

- Choose a heading at right angles to the front or terrain feature which is responsible for the line of storms, in order to keep your passage time to a minimum.
- Slow your aircraft down to its best turbulence flying speed and check for: cockpit lights on full bright; earphones forward of the ears, or volume turned down if wearing a helmet; safety belts fastened, crew and passengers warned; mixture, rpm and manifold pressure at optimum settings for turbulence flying; de-icing and oxygen equipment readied for use; and trailing aerial grounded and in.

For aircraft with weather radar operating, penetration at slow speed and at either minimum or maximum altitude is not nearly as effective as simply giving a wide berth to all moderate or strong echo areas, and particularly echoes showing a strong echo gradient.

IN THE STORM

Expect turbulence, precipitation and lightning—but don't let them distract you. Devote your full attention to flying the aircraft.

Maintain a level attitude, relying on the gyro instruments for guidance. Your pressure instruments may be affected by pressure changes within the storm.

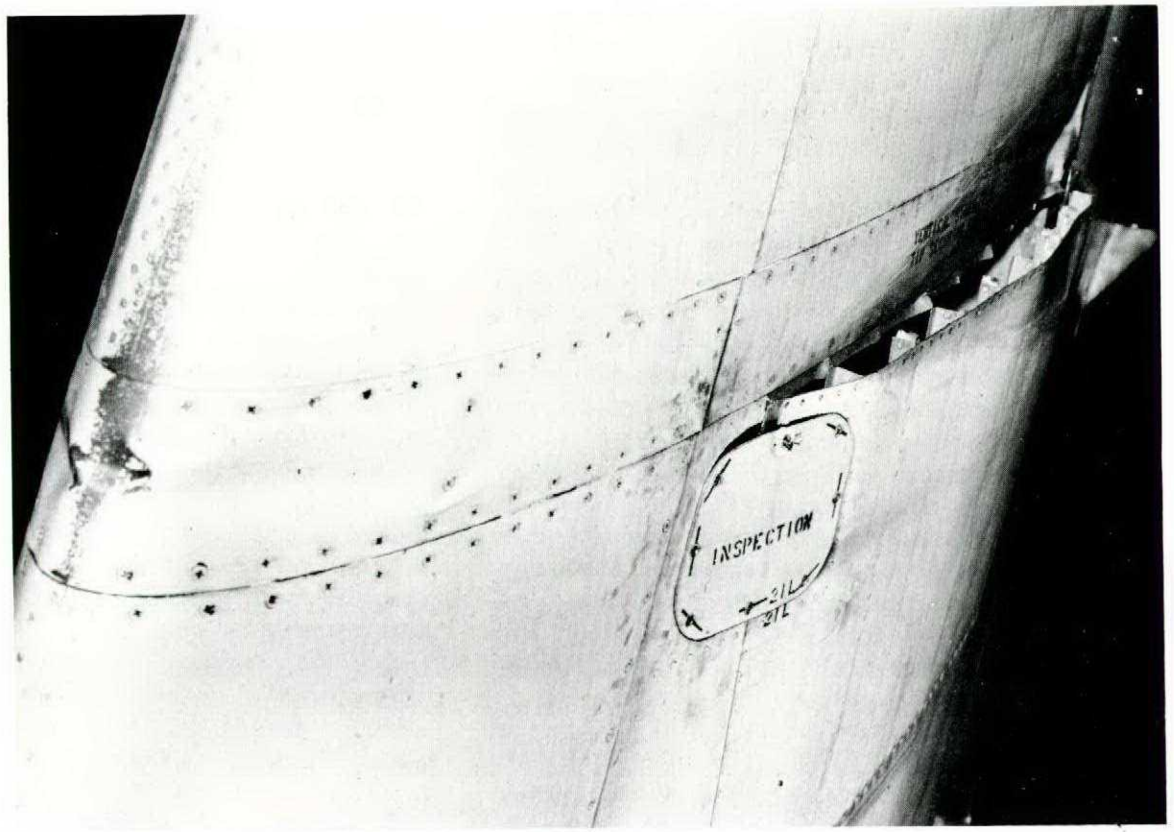
Ride the storm. Attempts to maintain altitude in a severe updraft or downdraft may be the first step on the way to real trouble. Get off the airways if traffic is a problem.

Don't chase your airspeed; stick to the power and pitch settings you selected prior to entry into the storm. Throttles should be varied only when it appears that high or low airspeed limits are about to be exceeded. And remember: heavy rain may block the pitot head partially, and cause a drop in IAS.

Maintain your original heading. It is normally the quickest way out of a storm. Of course, if you have weather radar operating, or can get a vector from a ground-based radar, you should conduct your flight around the weather echoes, and thus avoid the worst of the storm.

TURBULENCE

Turbulence is serious with thunderstorm flying because, when severe, it is possible for major structural damage to result from the stresses exerted on the aircraft. The air-



Electrical discharge damaged this vertical stabilizer while the Argus was flying in CuNim.

craft's reaction will depend on gust intensity, the sequence and spacing of gusts and drafts — and pilot technique. The pilot plays a significant role in determining the total load to which the aircraft will be subjected. The effects of turbulence can be minimized if you attempt to fly at a constant altitude with a minimum of control movement.

Trying to maintain altitude in vigorous drafts can lead to flighting the aircraft, and may result in a dangerous increase in stress loads. Since turbulence increases with altitude, the lower the flight can be made the better — provided, of course, that adequate clearance of terrain obstacles is maintained, and the flight is carried out above the surface friction layer.

The possibility of a downdraft forcing an aircraft into the ground is unlikely, because the draft tends to flatten out as it nears the ground. But gusts can cause a low-flying aircraft to stall.

Aircraft with weather radar should avoid areas of strong echo gradient, because they are associated with areas of strong vertical shear.

HAIL

Hail is most likely in cells with greater-than-average updrafts. It is met most frequently near the freezing level, but large hail has been encountered at altitudes up to 40,000 feet. Occasionally, it falls in the clear air from overhanging cloud ledges. There is no reliable method of knowing prior to entry whether hail is occurring in a precipitation area. The best means of avoiding it is to keep well away from overrunning cloud ledges associated with cumulonimbus cloud, and to keep out of the precipitation areas associated with thunderstorms.

It is well to remember that, because of your high speed, even a little hail can be serious to a jet aircraft.

If hail is encountered, it is doubtful that evasive action is worthwhile unless the edge of the hail area is obvious. Turning is just as likely to prolong as to shorten the length of the time you will spend in the hail.

ICING

Heavy icing is possible incumulonimbus cloud, because the vertical currents have sufficient force to carry large water droplets above the freezing level. In fact, during the "Thunderstorm Project", an aircraft reported heavy rain at an altitude of 26,000 feet on one traverse.

Carburettor icing is also serious because of the high water content of cumulonimbus clouds. Be sure that carburettor heat is "full on" prior to entry into the cloud or precipitation area.

LIGHTNING

Lightning is not usually considered a serious problem for an all-metal aircraft, but strikes can cause considerable damage to instruments and radar or radio equipment. During prolonged flights in an area of cumulonimbus activity, lightning strikes have broken down the bonding between non-metal parts of the aircraft, and, subsequent strikes caused considerable structural damage to these parts. One should be prepared for lightning when static builds up, or when you see St. Elmo's fire.

The possibility of a strike can be minimized by reducing airspeed, by avoiding the region where temperatures are between +5 °C and -5 °C, and, if applicable, by grounding and reeling-in the trailing aerial. The chance of being temporarily blinded by the flash can be reduced by turning up the cockpit lights to "full bright". To reduce the possibility of acoustic shock, ensure that earphones are not too close to your ears, or that the volume is turned down if you are wearing a helmet.

THE MENTAL HAZARD

The problems encountered in thunderstorm flying are generally listed as turbulence, hail, lightning and icing. But remember too that the mental hazard is perhaps equally serious. When panic takes over, turbulence, precipitation and lightning will all appear to get worse. Relax. Concentrate on your plan of action. If you and your aircraft are prepared, a thunderstorm can normally be traversed without undue difficulty. A calm, sensible attitude which permits you to think clearly and act skilfully will be your biggest aid.

Never venture needlessly into thunderstorms; if a penetration cannot be avoided, keep in mind the techniques and procedures outlined above. With common sense and an intelligent outlook, they will carry you through.

Students in B flight constructed a papier mâché mold of a T33 nose to emphasize taxi accident hazards. F/L R. M. O'Bryan (left), the SFSO, and F/C J. M. G. Nadon look on.

Gimli's Safety Program Pays Off

Flight Comment for November - December last year carried an article, "Promoting Safety in the Field", which outlined the safety program and competitions at 3AFS, Gimli.

Everybody knows where the proof of the pudding is, so taste this: Gimli has had over 22 thousand hours, or 14 months, or 471 days — in other words, WELL OVER A YEAR, without an accident.

Only four incidents were reported in that period.

That's a record to be admired. How did Gimli set it? In the words of F/L RM O'Bryan, the SFSO, "It is difficult to say just who or what group of people were responsible for this fine achievement... it can possibly be put down to 100 per cent co-operation between ground and air personnel.

"Supervision also played an important part; it was supported wholeheartedly by the CO, G/C HR Studer, down through the CTSO, S/L JL Dennison, and the OC AFS, W/C LJ Liggett, to the various flying and ground sections on the station."

The 22 thousand-plus accident-free flying hours at Gimli include normal training (jet advanced), airshows, and NORAD exercises. It was carried out in all weather, through all seasons, and all over the country.

"We are, of course, very proud of this achievement, and, because we have completed one year accident-free, we intend to try for two", F/L O'Bryan says. "The unforeseen is always present but we shall nevertheless make the attempt."

Here's a record for the entire RCAF to be proud of, and for other stations to aim at. Has YOUR station an unusual accident-prevention program? A good safety record? Let Flight Comment know; we'll print your story, so other units can find out the best ways to reduce the accident toll.

by S/L R. M. Bauman
AIB—1 Air Division Field Inspector

ARE YOU LISTENING?

Every day thousands of mysterious and unintelligible signals from outer space bombard our planet. Scientists speculating on the possibility of other life are excited at the thought that in this vast disarray of signals may be some that will provide proof that some intelligent "beings" from outer space are trying to establish communication with earth.

If this is so, then one can only feel a quick sympathy with these "beings" somewhere in the cosmos, for their task is a formidable one indeed. Formidable, because here on earth our own attempts to communicate with each other often meet with little success.

The term "communication" implies the exchange of words (spoken, written, cabled, or the like), or meaningful signals of some sort. To establish communication, however, this exchange must take place with no error in transmission, translation, or interpretation.

Unfortunately, our efforts at communication are often doomed to failure. We fail because sometimes the author uses an ambiguous term or signal which makes the correct interpretation of his meaning difficult, if not impossible.

Perhaps a simple time-worn example will suffice to illustrate this. The captain of a North Star intending to overshoot from a low approach called, "Takeoff power", whereupon the flight engineer promptly closed the throttles and the aircraft struck the ground short of the runway. The cause of this accident was not difficult to determine. The pilot's command was ambiguous, so the engineer misinterpreted the pilot's meaning—a problem of communication.

Even though the signal or message is unambiguous and clear, the transmission and translation exact, and the interpretation precise, communication fails because the supervisor or pilot or technician refuses to listen.

According to Webster, the term "listen" means not only to hear but also thoughtful consideration or yielding to an argument, a proposal, an appeal or the like, whether it has been advanced orally or in writing or by signal, sign, etc.

Many unnecessary accidents occur because individuals choose to ignore, or refuse to listen to, the message. Let there be no misunderstanding: an unusual noise in an engine is just as much an attempt to communicate something to the pilot or technician as a direct order from a supervisor. Here's an example:

It was January, and the pilot was proposing a night trip from his home base to a station in western Canada. The weather was marginal, but both the destination and the alternate (which was home base) were forecast to remain above IFR limits. The upper winds were westerly and quite strong, but a careful calculation of fuel indicated that the pilot could fly to destination and return to home base, and still meet the fuel requirements for IFR flight.

The pilot checked the Notams for his destination and noted two entries. First, the permanent approach-lighting to runway 23 was not yet completed; second, GCA was reported unreliable because of an intermittent power supply.

The flight plan was completed and thirty minutes later the sleek Silver Star burst out of the ominous clouds into the brilliant moonlight. Continuing the climb to his assigned flight level of 350, the pilot pointed the nose of the aircraft towards destination and destruction. The first warning signals had been sounded but the pilot was not listening.

Shortly after establishing course and altitude, the pilot noticed that it was necessary to keep trimming to compensate for a port wing heavy condition. He concluded rightly that the port tip tank was not feeding, but he was not alarmed unduly because this had happened to him many times before, and always the fuel had eventually fed. As the slim jet knifed its way through the clear, cold winter air, the face of the pilot was bathed in the reddish glow of the cockpit lighting, revealing a countenance of peace, contentment, and confidence.

And why should he not be confident? He had calculated a point-of-no-return, in the unlikely event that the port tip tank did not feed; the weather at destination had dropped 100 feet but was still holding above limits; he was familiar with the single-beacon approach procedure, and, because its pattern and that of GCA were almost coincident, it would be a simple transition from one to the other in case GCA became inoperative. No sweat? Another signal had failed to impart its vital message to the pilot. He heard, but he didn't listen.

The point-of-no-return was reached. A decision had to be made. The pilot thought he had detected a slight change in lateral trim; he rationalized that the tip tank must be starting to feed. The weather at destination had not deteriorated further since the previous report. Finally, a sweep around the cockpit revealed that temperatures, pressures, oxygen, etc, were all okay. The decision was made to go. The pilot was now committed to a landing at destination.

On and on droned the jet; closer to doom. The tip tank light suddenly winked a warning to the pilot, who immediately switched on the wing tanks. A check on the fuel counter showed that approximately 125 gallons remained in the obstinate tip. He made a mental note to increase his approach speed by a few knots to assist lateral control.

Five minutes out the pilot established communication with approach control, who cleared him to descend to FL 270, with instructions to call outbound. The weather now was indefinite ceiling 400 feet, visibility 3/4 mile variable in snow and blowing snow, wind from 270° 20 gusting to 30, altimeter 29:74. The runway in use was 23.

The pilot PX'd outbound, and was cleared for an approach to call GCA on channel 4. GCA instructed him to begin a penetration turn at 16,000 feet, and to continue descent to 5,000 feet, rolling out on a heading of 280°. GCA advised that its power supply was not yet completely reliable, and that if contact was lost he was to maintain 5,000, home to the beacon, and contact the tower for further instructions.

The pilot acknowledged, but said that if GCA went off the air, he was prepared to continue the approach on radio compass. Almost immediately after levelling at 5,000 on a heading of 280°, the pilot noted that the radio compass was reading 320. He had not heard from GCA for at least a minute, so he decided to continue with the approach as planned.

Passing the beacon, the pilot dropped the gear, lowered half flap, and began the descent to the minimum altitude of 3,700 feet. Only three minutes from touchdown; but now it was quite turbulent, forcing the pilot to concentrate on altitude and heading. The strong crosswind made it difficult to get established on the inbound track, and the snow beating against the windscreen obscured forward vision to such a degree that although he had reached minimum altitude, the pilot could not orient himself. Perhaps if he went a little lower....

In the tower the operator peered anxiously into the night. He knew that communication between the pilot and GCA had been lost, and he tried several times to contact the pilot. He was still trying when suddenly a brilliant orange ball illuminated the approach to runway

23. The operator muttered a prayer as he pressed the crash alarm button.

The Board of Inquiry was convened the following day and went about the methodical business of gathering evidence. A week passed, and although the Board was practically finished, it was not until ten days later that the pilot was able to give evidence, and the story was completed.

Lost in the whiteout, battling with the turbulence, strong crosswind, and marginal lateral control, and unable to orient himself with the temporary dim approach lighting, the pilot was disoriented, lost control, and the aircraft struck the ground a half mile short of the runway. The pilot lived, but he will never fly again.

Many factors contributed to this accident, but they can all be lumped under the term "failure to communicate". The weather, flying control, the aircraft all had attempted to establish communication with the pilot. The warning signals they sent were explicit and clear. The pilot heard the signals, but he refused to listen.

To the people engaged in the flight safety business, communication is the problem. Through the medium of Flight Comment, posters, Flight Safety Notes, Accident Summaries, and flight safety lectures, we try to communicate to the commanders, supervisors, pilots, and technicians, ideas and information which, if given thoughtful and reflective consideration, and acted upon, would greatly reduce our accident rate.

The question is, ARE YOU LISTENING?

THIS FLAMING LANGUAGE!

FLAMMABLE } **both mean "easily set on fire".**
INFLAMMABLE }

NON-FLAMMABLE means "NOT easily set on fire".

Containers may be marked with any of these terms. Make sure you're sure—unless you're looking for a fast burn!

Submitted by Cpl RH Shaw

ARRIVALS and DEPARTURES

NOT ALL FALSE

A Sabre was being test-flown after a major inspection; the engine performed normally until the aircraft was put into a steep dive at 40 thousand feet. At Mach .98 and 37 thousand feet, the aft fire-warning light flickered; it came on steadily at 35 thousand.

The pilot maintained power at 100 per cent, with 715° TPT, for 10 seconds after the light became steady, then reduced power to idle. After another 15 or 20 seconds the light went out. After the throttle was retarded, the aircraft was eased out of the dive; airspeed when the light went off was .9 Mach. The pilot landed the Sabre without further incident.

The fire warning light came on because the tailpipe was split at the center seam, allowing blow-by adjacent to the fire-warning probe. The cracked portion of the seam is covered by the tailpipe suspension ring, and can't be seen from the outside. This materiel failure was evidenced by soot around the suspension turnbuckles (EO 05-5E-4, page 538, items 13 and 14 and 27-32).

WHERE THERE'S SMOKE...?

The pilot's cockpit began to fill with smoke as the CF100 climbed through twenty thousand feet; the captain retarded throttles right away, and notified his navigator. The pilot selected his oxygen to normal for a moment, to confirm by smell that it was smoke, and then started immediate recovery to base, with both crewmen on 100 per cent oxygen all the way back.

The smoking stopped about a minute after it started. No further difficulties were encountered.

One motor of the dual blower assembly had an electrical short, and the automatic circuit-breaker (#7), figure 7-9-2 of EO 05-25F-2, part 7, section 9, was open. The electrical contacts on this circuit-breaker had burned off. All electrical equipment on the aircraft was inspected, and a ground run carried out, but no evidence of the smoke or its source was found.

On the next flight, however, smoke again filled the cockpit for a minute after a climb through ten thousand feet. The engine and equipment were inspected again without tracking down the origin of the smoke.

The incident was assessed Materiel because the circuit-breaker was replaced. The aircraft has since been test-flown with no evidence of smoke.

HELP STAMP OUT MURPHYS

A CF100 pilot was leading a two-plane Bravo section on a GCI exercise with Boxcar control. No. 2 was briefed for a lock-on takeoff.

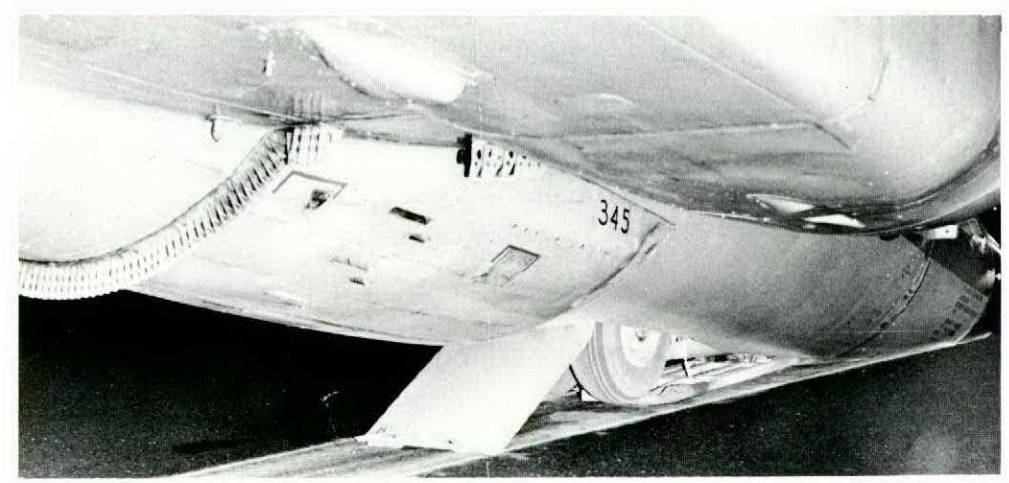
No. 1 had a normal takeoff roll; on becoming airborne he raised his undercarriage as usual and the indicator (all red lights out) said that the gear had retracted. The pilot then raised flaps and put the auxiliary tank and yaw damper on while allowing the air—speed to build.

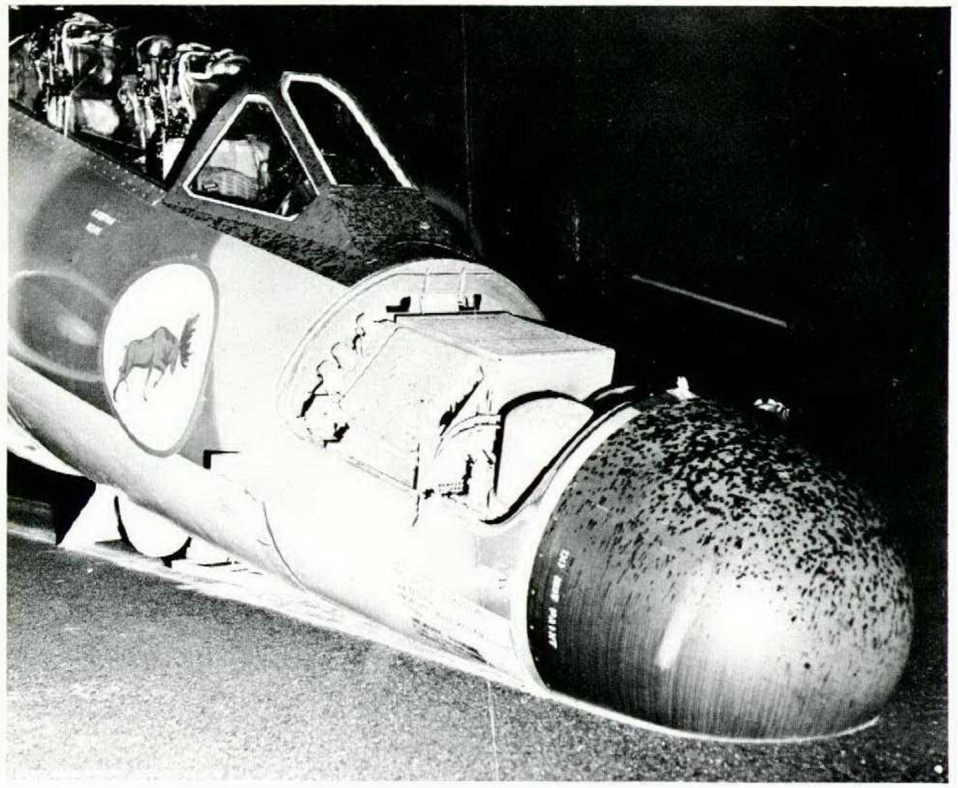
At about 230 knots a slight buffeting made the pilot suspect that the nosewheel was still down; but the indicator did not show this. The airspeed gained to about 250 knots while the aircraft was climbing through 3,000 feet. It was obvious from the buffeting that something was wrong, so the pilot decided to abort the climb through cloud.

He told Departure he was VMC, and to take No. 2, who was 20 seconds behind, on up to Yellowjack control. Once out of No. 2's flight path, he throttled back and opened the speed brakes. Immediately there was a harder-than-usual "clunk" in the area of the wheel well and the nosewheel and port main wheel undercarriage red warning lights came on. The main wheel light went out shortly after but the nosewheel light stayed on.

The pilot decreased speed to 140 knots and selected the undercarriage down with no change in warning lights. He then selected wheels up, but the nosewheel indicator stayed red.

In between these selections, hydraulic pressure remained normal at about 2000 psi, as it did throughout the remainder of the flight, but there were abnormal grating sounds during





selections. The pilot decided that the undercarriage system itself was fouled, and that it would be better not to do any more selections—and at least be sure of the mains being useable. He made a final down selection, getting two green lights for the main wheels and a red for the nosewheel.

The pilot told the tower of his difficulty, and that he would have to remain local to burn off fuel. He asked the tower to recall the Alpha section and Bravo two before he had to land. He also declared an emergency for the landing; the tower told him to jettison the canopy just before touchdown.

The pilot tried to lock the nosewheel down by using the hydraulic test pump to 2800 psi, but it didn't work. The air was not used, because it is less than that pressure. Some "G" was applied, but with the same result.

Several flypasts were made in an attempt to have the tower observe the nosewheel position, one blacked out, several with landing light on, and several over the cloud-base projector light, but the tower could not be certain of the nosewheel's position. Finally, a low pass over the fully bright approach light was done with an Ops observer at the button. He was able to observe that the nosewheel was partially extended.

The pilot also decided that the canopy would be blown off by the Obs/AI on orders from the pilot on roundout, to avoid the possibility of dirt fouling the eyes during the full circuit and approach.

The final approach and landing were made after the other aircraft had landed and the fuel load was down to about 800 pounds. The Obs/AI noted that the canopy lever required a very forceful movement to actuate it, and also that there is a loud bang when it goes. The canopy cleared the tail; the rush of air at that speed and the little dirt that did arise were not significant enough to bother the pilot, although the Obs/AI got more of it.

The high and low pressure cocks were shut off almost simultaneously with the canopy going, and touchdown on the mains. The nose was not held off and went down quickly; as it was going, the ground flight switch was switched off.

As the nose touched, sheets of white flame appeared at once on both sides of the cockpit. They didn't affect the pilot's forward view too much and were more noticeable to the Obs/AI. After stop-cocking the fuel, the pilot braced himself against the gunsight with his left hand. Although the nose was still down, he was mentally prepared for a more acute angle.

Once the nose was on the runway he applied gentle hand brake, found that it was stopping the forward movement effectively, and applied it more fully. The aircraft had landed in the centre of the runway, but began a slow veer to the right. The pilot corrected by releasing the hand brake and touched the left brake. Hand brake was again applied until the aircraft came to rest; there was no flame at this time.

The pilot made sure that the Obs/AI had climbed off the wing and was away from the aircraft. By this time the crash crew had arrived and had the situation under control.

What was the cause of this very experienced pilot's close call? Another case of "Murphy's Law"—the incorrect installation of mod 05-25E-6A/426, which was designed to prevent damage from hydraulic surge in the nose gear system. By reversing the restrictor and union, the modification was, in effect, nullified and failure occurred in this previously weak area.

A check of all CF100 aircraft on the unit disclosed other faulty installations. A technical investigation indicated that all had been made by the same crew, which in the meantime had been repatriated.

The accident was assessed Maintenance, with a contributing factor of Briefing—inadequate supervision (technical). A special Command inspection of the installation of this modification was effected to prevent further instances. Once again, Murphy was almost a killer.

OLD SHELL GAME?

The Neptune was on a ferry flight; the radar equipment had been removed. During descent, at about 250 knots, severe vibration was felt; on landing it was found that the radome had disintegrated. The aircraft was returned to base without further incident.

A combination of shell softening and thinning of the shell is suspected as the cause; the accident was assessed Materiel pending the results of a report from an AMC specialist, who is examining radomes and reviewing inspection and repair procedures.

BOLT IN THE WORKS

A pilot assigned to do a taxi-test on a Dakota, following repair of a faulty brake, obtained permission to use a runway for a runup. As the throttles were opened, he noticed that the starboard RPM was lagging at about 20" MP.

The taxi run was aborted; the aircraft was returned to the tarmac. Another runup there resulted in a deficiency of about 200 RPM from the referenced RPM at field barometric pressure. The aircraft was declared unserviceable.

A motorstat check resulted in Nos. 6 and 8 cylinders being classified "nil compression". A loose bolt was found in the No. 8 induction pipe. There was indication that the bolt had entered Nos. 6 and 8 cylinders via the intake valves, apparently damaging the cylinders, pistons, and spark plugs. Origin of the bolt was not determined, but it was believed that it had entered during previous checks on the engine, when Nos. 2 and 12 cylinders had been removed.

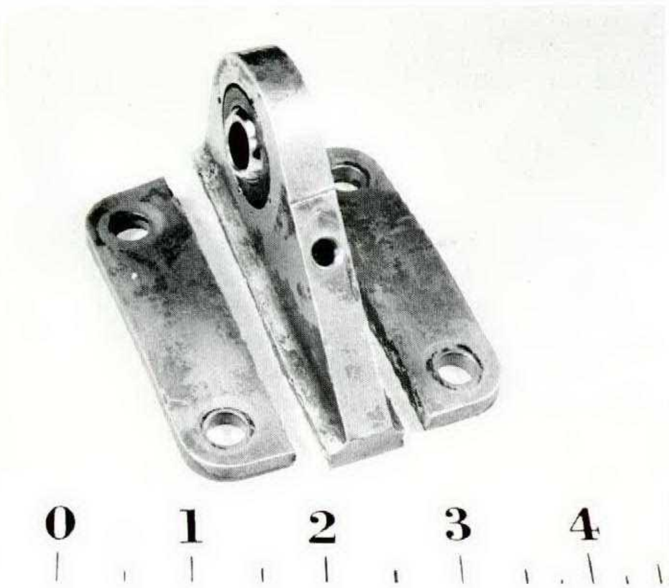
The overhaul contractor found that the crowns of Nos. 6 and 8 pistons were badly hammered, and that the internal surfaces of these cylinder heads were similarly damaged. The impellor was not damaged. A complete dismantling of the engine didn't turn up any evidence of a mechanical defect.

The contractor thought the damage could have been caused by a bolt—but no bolt had been sent along to him. Since no fault or failure was found in the engine during strip, he concluded that the bolt must have entered externally, presumably via the air intake.

The accident was assessed Maintenance—poor technique. Origin of the bolt was not discovered.

The latest estimate has the new T33 AOIs in the field around 1 August, instead of 1 May.

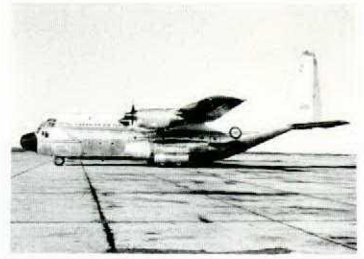
STOP



A crew detailed to move four aircraft from one end of a hangar to the other, shifted three successfully. The fourth, an Otter, was being pushed by a D6 tractor hooked by its front-mounted hitch to the tailwheel tow-bar. The NCO i/c was positioned at the Otter's nose; there were also two wing men, a mule driver, and a man on the Otter's brakes.

When the crew chief decided that the aircraft had been moved far enough, he shouted "Brakes". The man in the Otter hit the brakes immediately. The man on the tractor had to move his foot from the accelerator to the brake pedal, which took a minute longer. It was, however, long enough to fracture the tailwheel fork lug assembly.

The NCO should have given the hand signal for "Stop" instead of shouting "Brakes". He should also have been in a position to see all his crew members and the wing tips, or else he should have stopped the operation and re-positioned the crew. The tractor driver should have stopped when he was unable to see the NCO. Finally, the cockpit man wasn't keeping a sharp lookout. The damage was minor, but proper procedures would have prevented it.



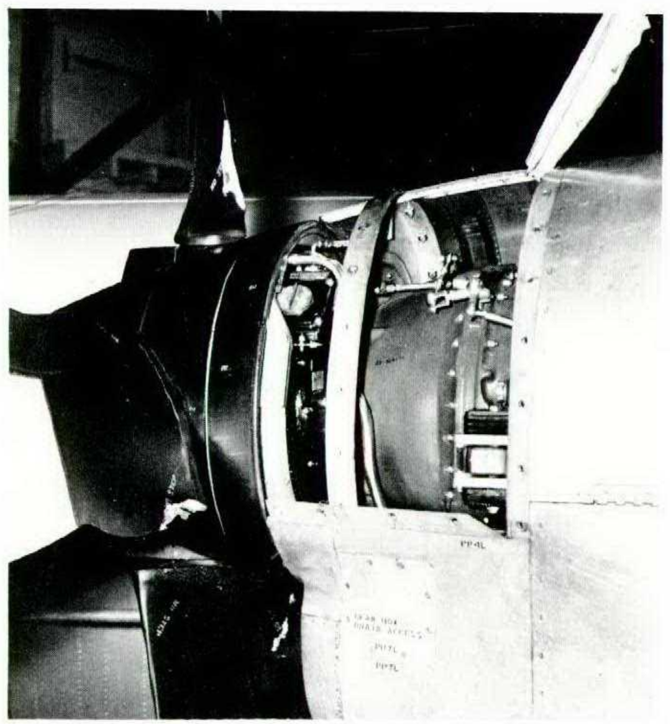
UNFASTENED

During a local training flight in a C130B, the forward access panel on the left-hand side of No. 2 engine broke loose, damaging the propellor and the forward cowling. The panel was lost. Nothing unusual was noticed by the crew during flight, and the accident wasn't discovered until after the aircraft was on the ground.

Officers investigating assumed that the panel had been secured at the top, but not the bottom, and that air flow entering under the loose lower part caused the panel to tear off and damage the propellor blades.

An aircraft technician, who admitted working on the No. 2 engine and failing to secure the panel correctly, was disciplined. Charges were also laid against the flight engineer, who is required to carry out a thorough visual inspection during his pre-flight check.

The accident was assessed Maintenance—faulty workmanship, with a contributing factor of Briefing—inadequate supervision.



IT'S STILL SIMPLE

While cruising at 23 thousand feet, the Yukon's #1 engine oil pressure fluctuated erratically, and the warning light on the annunciator panel came on for a moment. Power for that engine was reduced to flight idle to check for a possible faulty pressure gauge—but the pressure then dropped to 30 psi, and the warning light stayed on.

The captain feathered the engine, advanced power fully, and reversed course. On the return flight, the prop unfeathered gradually, the LPRPM increased to seven per cent, and airframe vibrations also increased.

The pilot reduced speed from 220 to 165 kts IAS and altitude from 23 thousand to 10 thousand feet. Further attempts to feather didn't work. A visual check of the engine indicated that a large quantity of engine oil was lost overboard.

The captain decided to land as soon as possible to avoid further increases in LPRPM and airframe vibration—and a possible engine seizure.

When the aircraft was on the ground, it was found that the oil filler cap and dip stick had not been locked properly; as a result, the oil siphoned overboard.

The man who signed the L14 said he'd secured those items, but his memory must have been at fault. The accident was assessed Maintenance — personnel — carelessness, and disciplinary action is being taken.

Despite the fine new equipment, the same old mistakes seem to crop up. When you sign that L14, are you SURE that everything's right?

WORD OF ADVICE

Line Chief: "Briefing my men on safety and other technical matters during the morning muster has been most effective—it gives me an opportunity to know my men better and to conduct maintenance and safety briefings personally."

Letters to and from the Editor are not official RCAF correspondence, and need not be directed through official channels. Unless otherwise stated, statements in letters and replies should not be construed as regulations, orders or directives.

Reference is made to the article entitled "Maintenance" in the July - August 61 issue of Flight Comment. Although the writer is now in quality control work, there are a couple of points I wish to raise concerning this article.

It is certainly difficult for Engineering Officers to get away from their desks as much as most of them would like. One of the chief offenders here, I believe, is Personnel Assessments and for two reasons. First, there are too many. It would seem to be a step in the right direction to have one yearly report on each person instead of our present R211s and Promotion Narratives. This report could fulfil both purposes and should be sufficient especially in view of the paucity of promotions.

Second, the personnel reports should be staggered over the whole year. One suggestion is that it be compiled on the anniversary of the man's birthday or date of enlistment. The way the system works now, just about all other activity has to cease when R211s or Promotion Narrative come down to a maintenance section. Under the suggested system, this work load would be spread out over the whole year.

I know this is only part of the problem but it could be a start if it was accepted. Flight Comment continues to be one of my favourite service magazines.

(J. Woodrow) S/L
Det Cmdr—1205 TSD
Orenda Engines

The dates of submission of officer and Sr NCO R211s and airmen R211As were selected with two objects in mind:

(a) to spread the workload at units; and
(b) to fit into AFHQ routines and procedures.

The selection of personnel for career advancement is based on the R211 or R211A rating and assessment. To ensure that only the best qualified are promoted, it is necessary that these career assessments be accurate and complete. However, it must also be appreciated that in fairness to personnel being assessed, the board must be provided with the most up-to-date information possible. The present submission dates of R211As and promotion narrative reports achieve this aim.

DACP is always interested in ideas concerning the improvement of the assessment system, and the proposal submitted by S/L Woodrow is appreciated. As he is probably aware the promotion narrative has already been deleted for officers and consideration is now being given to its deletion for Sr NCOs. In addition, a study is being made to determine whether it is feasible to change the dates of submission of the R211 to spread the workload more evenly throughout the year.

(W. W. Gilmour) W/C
Acting DAPC

Reference is made to your article in the January - February, 1962, issue of Flight Comment concerning a broken priming switch in a Mitchell.

It implies that the pilot was not familiar with the aircraft systems because he did not pull the primer circuit-breaker in the navigator's compartment.

If a check is made, I believe it will be found that the primer circuit-breaker in B-25 #5230 (pilot trainer) is a push-to-reset type only, and the circuit can therefore not be disconnected from within the aircraft while flying it.

Your comments pertaining to remedial action in such a case would be appreciated.

(W. A. McKenzie)
Flight Lieutenant
RCAF Stn Summerside

Your letter concerning the starter-primer C/B in Mitchell 5230 has been reviewed at DFS.

EO 05-55-4, pages 584 and 585, indicates a C/B type 20A, which is the push/pull type. Further, in case some modification has been done, Mitchell 5230 was physically examined to ensure the C/B was a type 20A. This check was made at Lincoln Park where the aircraft is at present.

It would thus appear that your information was in error and that our original remarks are valid.

Nevertheless, we welcome your interest in this matter, and the research involved enabled me to become familiar with a small part of the B25's system.

Please write again on this subject, or any other in the flight safety field. We welcome correspondence.

(D. Warren)
Squadron Leader
Editor-in-Chief, Flight Comment

STATIC-ELECTRICITY HAZARD

Static electricity is an ever-present hazard, particularly acute during dry, cold, winter weather. It is easy to predict the circumstances under which static electricity will occur, but much more difficult to control it. The accident potential is especially critical in areas where storing, loading, or transferring of fuel and other petroleum products takes place.

Continuing study is being given to the problem of control methods; meanwhile, every possible care must be taken to prevent the fires and explosions which threaten when static electricity is discharged in a petroleum vapor laden atmosphere, or in close proximity to flammable materials.

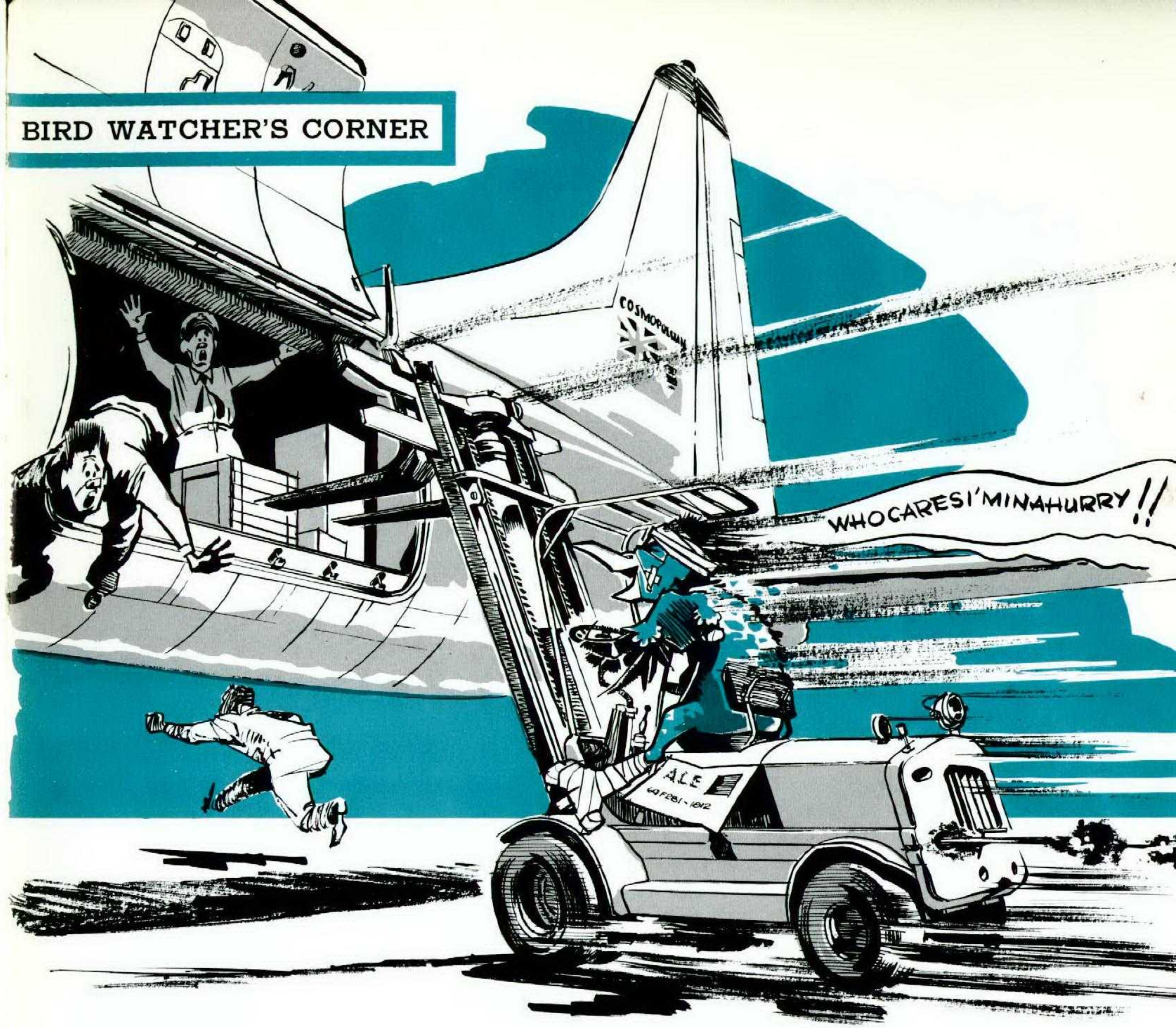
The most effective known controls center around proper bonding, grounding, and humidification.

By now, it should be just a matter of checking since these necessary precautions should have been taken long ago. If any doubt exists, the supply and maintenance teams, as well as the supervisor, should refamiliarize themselves with directives cited above, to assure that no destructive accident results from lack of knowledge of proper procedures.

Special orientation of personnel most immediately concerned will also contribute to that alert attitude that eliminates laxity, carelessness, and accidents.

Tig Briefs
Approach

BIRD WATCHER'S CORNER



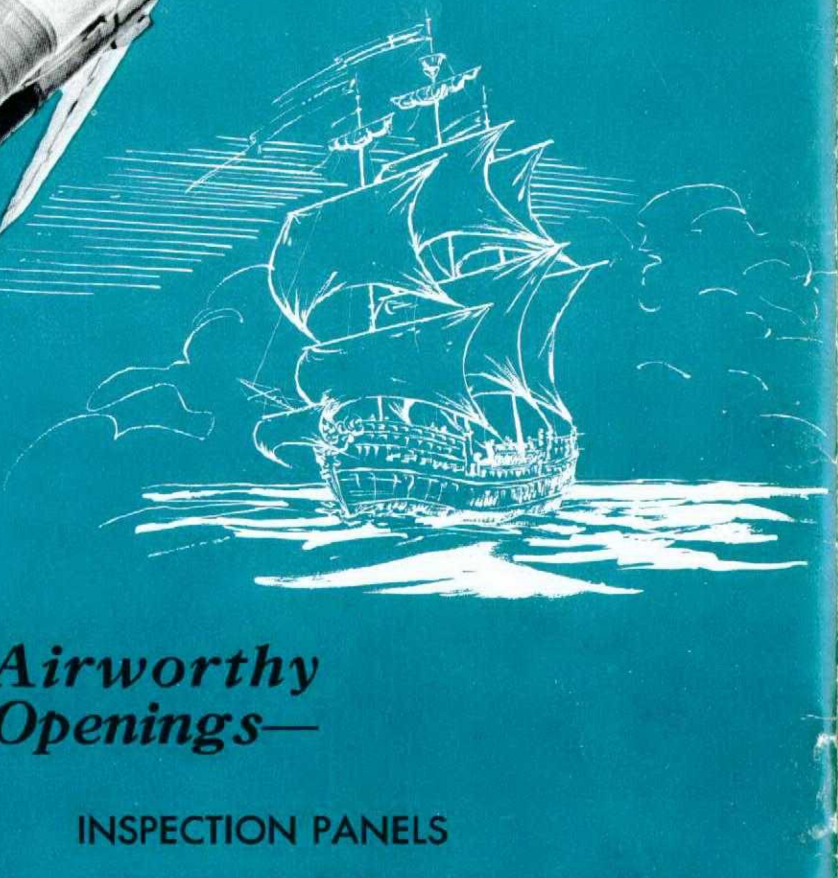
OBLIQUE OBLIVIOUS OSTRICH

Cousin of the Mad Myopic Mangler. Constantly misjudges clearances, assuming more space than he has. Is disdainful of reasonable speeds to ensure avoidance of obstacles. Sight is poor, being blind in one eye and unable to see well out of the other. Normal habitat is on the ground. Can be seen careening about on its powerful legs, demonstrating a "brute force and bloomin' ignorance" philosophy while hacking at harmless aircraft, vehicles, fences, and other objects. Often suffers damage itself which it appears to ignore. Should be shot on sight—an open season prevails.

CALL: WHOCARESI'MINAHURRY and THEREAWTABEROOMENUF

ROGER DUHAMEL, F.R.S.C., Queen's Printer and Controller of Stationery, Ottawa, 1962

BATTEN THE HATCHES!



To be Shipshape and Airworthy Requires Securing All Openings—

INSPECTION PANELS

ACCESS COVERS AND COWLINGS

ARMAMENT DOORS

DZUS FASTENERS

A modern aircraft has many openings in its outer surface; for example, a CF101B "Voodoo" has 125 of these potential trouble-spots. It's even more important now than it was for Captain Vancouver to secure all hatches and doors.