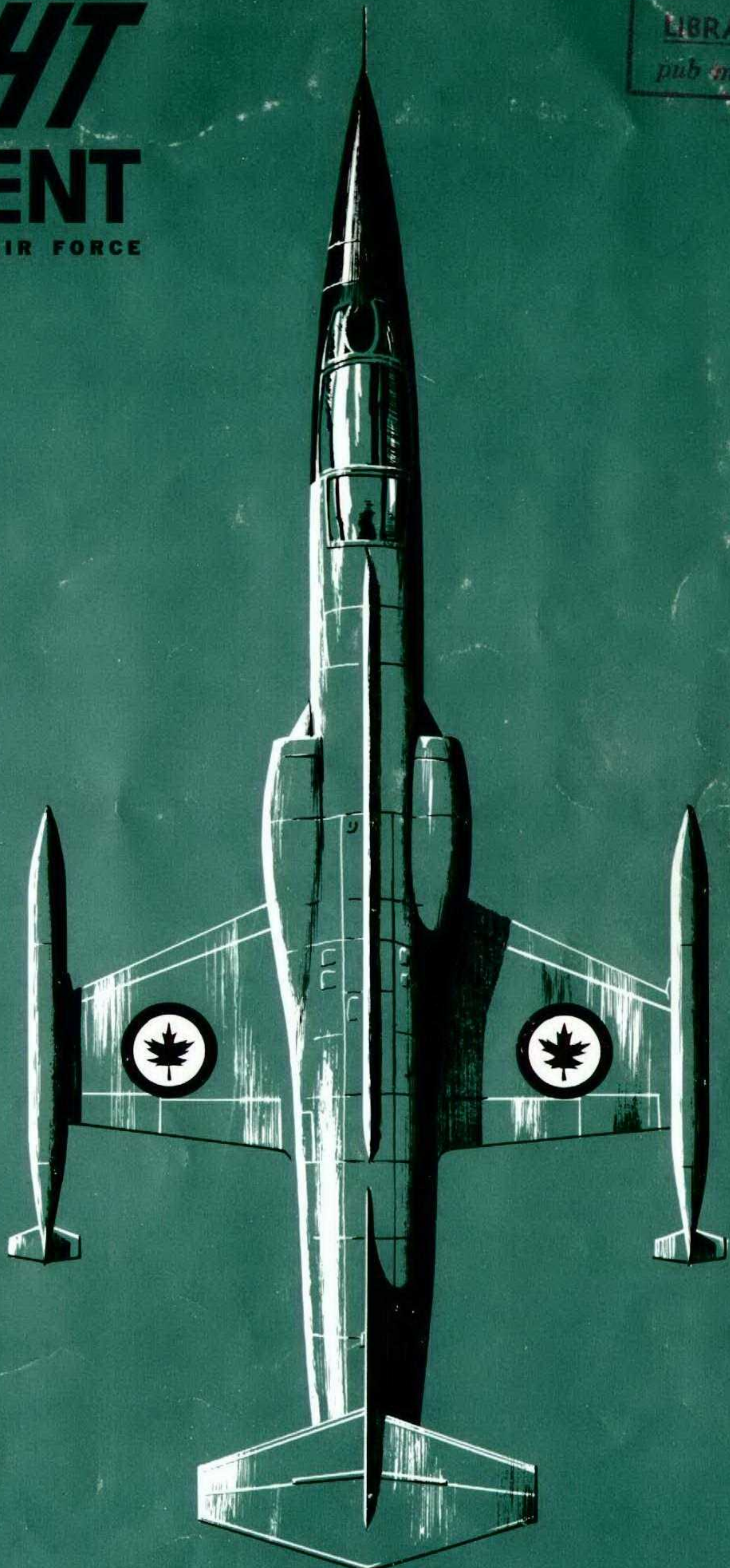
FLIGHT COMMENT

ROYAL CANADIAN AIR FORCE

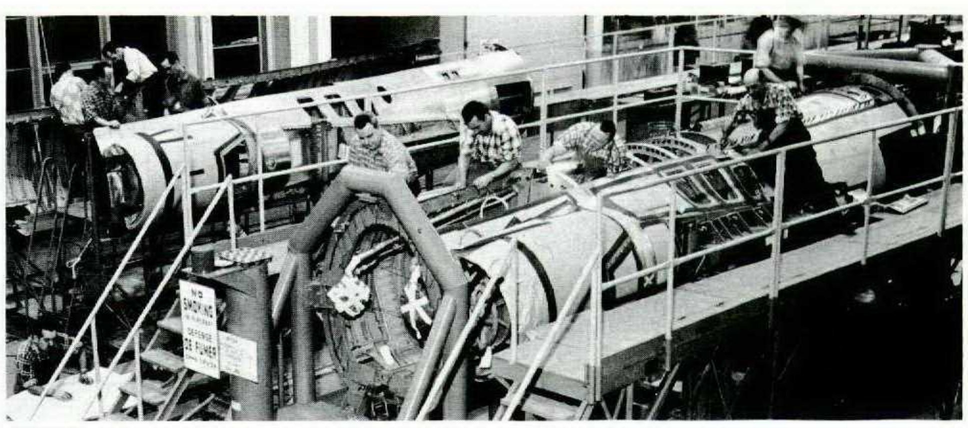


SEPTEMBER • OCTOBER • 1961

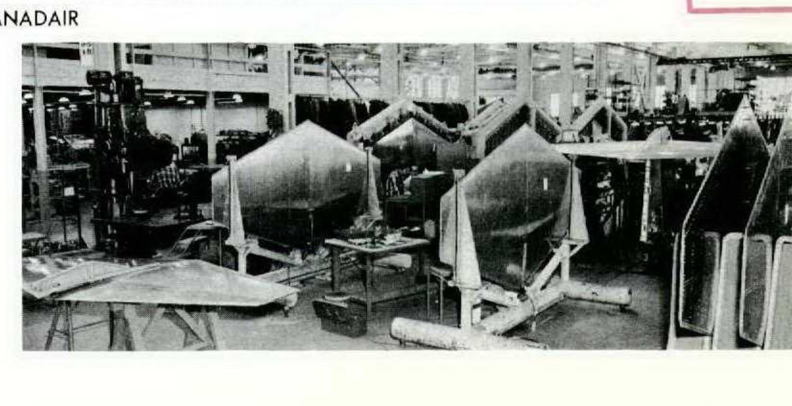
The CF104

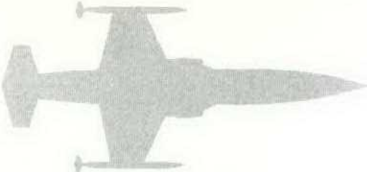
Based on the F-104 Starfighter interceptor, the CF104 strike-reconnaissance airplane is the Canadian version of the F-104G also on order for the West German, Belgian and Netherlands air forces. The CF104 will replace Canadair Sabre 6s in service with the Royal Canadian Air Force air division with NATO forces in Europe.

Like the F-104G, the CF104 can fly faster than twice the speed of sound. Its structure has been considerably strengthened to take the high loads imposed by the low-level flying in its new role. A number of new forgings are incorporated in the fuselage main frames, wing fittings and spars, fuselage longerons and joints, fuselage tail frames, tail unit spars and ribs. The vertical tail surfaces have been enlarged by 25%



PHOTOGRAPHS COURTESY OF CANADAIR





and a fully power-operated rudder has been added to give more precise control when aiming at ground targets. The horizontal stabilizer servomechanism has been modified to give increased hinge-moment.

Manoeuvring flaps have been added to provide an increase in the available load factor. This will reduce the turn radius by one-third at an altitude of 5000 feet, a significant advantage for ground-attack operations. The drag parachute diameter has been increased from 16 feet to 18 feet to reduce landing roll. To meet possible icing conditions in low-speed flight, electrical de-icing elements are fitted to the air intakes.

Maximum range for specific bombing missions is allowed for by provision for installing aluminum fuel tanks in the ammunition, gun and shell case compartments of the fuselage. This installation is interchangeable with the gun and increases the internal fuel capacity by 120 U.S. gallons.

As with other late marks of F-104G, the CF104 has a conventional upward ejection seat instead of the downward system used in early models.

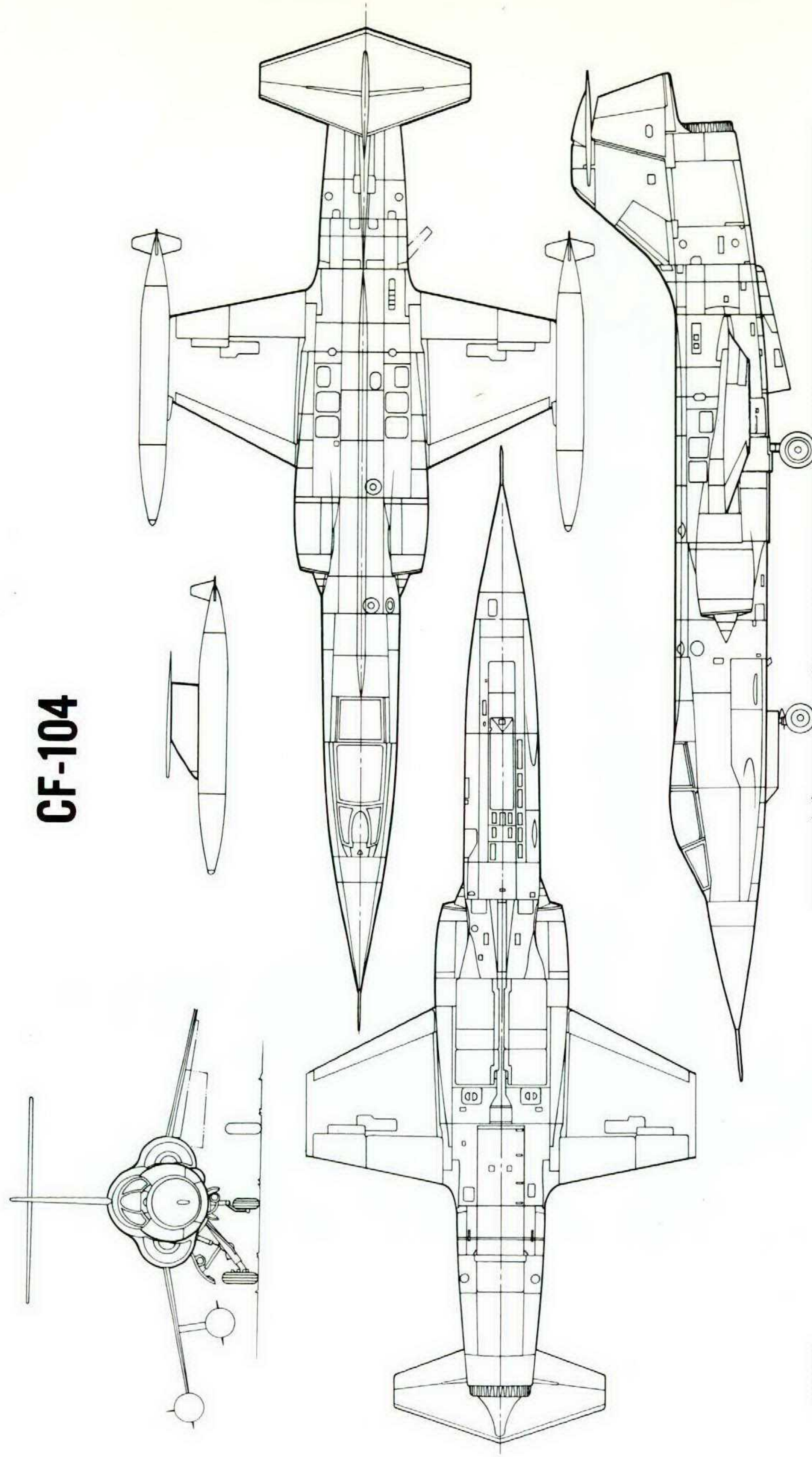
Other additions are anti-skid wheel brakes; provision for mounting guided weapons on launchers beneath the fuselage and at the wing tips, a large ordnance store on a mounting under the fuselage and for various armament stores carried under the wings in addition to fuel tanks; an autopilot with "stick steering", which includes modes for preselecting and holding altitude, speed, heading and a constant rate of turn; a multi-purpose radar system consisting of a radar set and fire-control computer; a fixed—reticle gunsight; a bomb computer; an air data computer; a dead-reckoning navigation device; the TACAN radio air navigation system; provision for a data link-time division set; UHF radio; a lightweight, fully automatic self-contained inertial navigation system; and provision for fitting a camera pod under the fuselage.

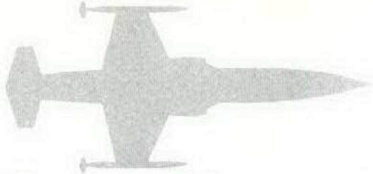
Powerplant of the CF104 is one General Electric J79-OEL-7 turbojet engine of 15,800 lb. thrust with afterburner in operation. Span of the CF104's stubby wings is only 21 feet 11 inches, sweepback at the quarter-chord line is 18.3°, and length of the slender fuselage is 54 feet 9 inches (16.69 m.)

The first of 200 Canadair CF104s for the RCAF was rolled out at Canadair on March 27.

CANADAIR

CF-104





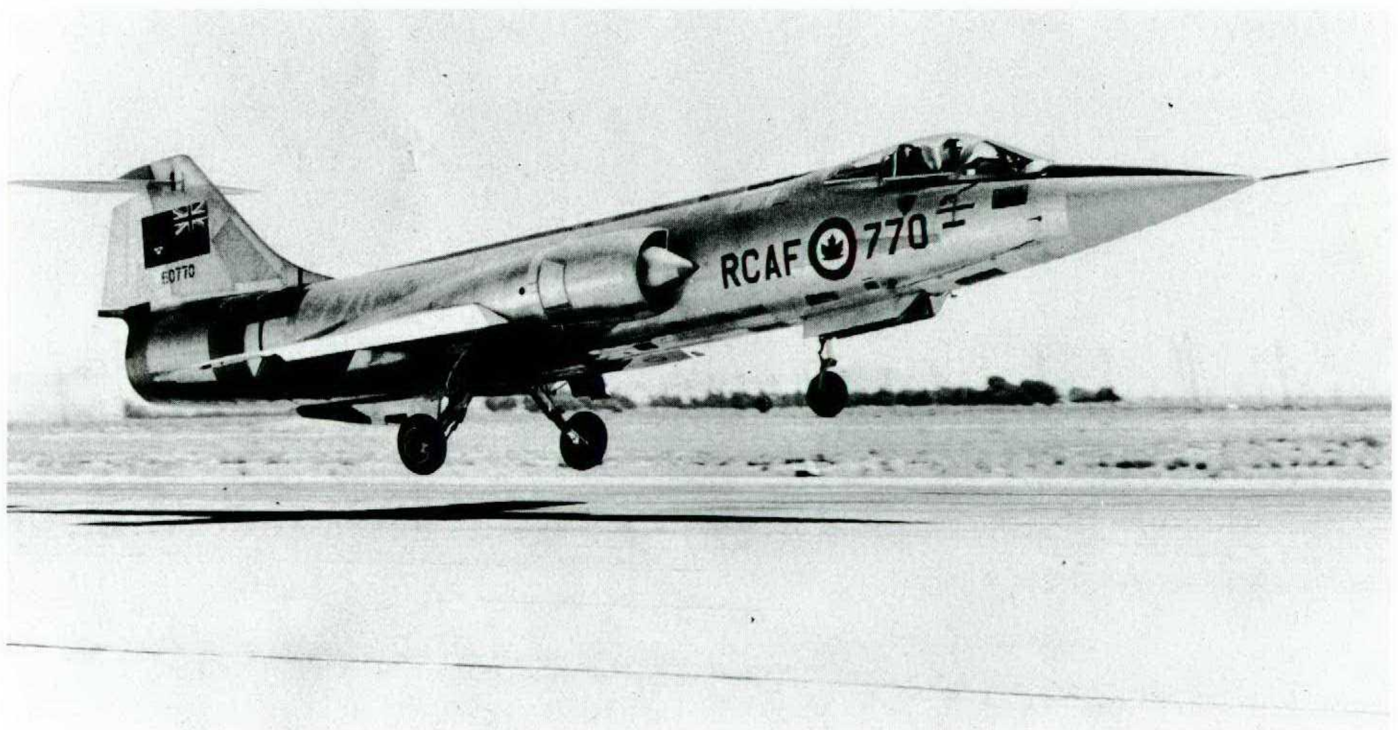
Know Your Aircraft and Equipment Before You Fly

by Roy E. Pryor, Manager
USAF Aircraft Programs
Marketing Operations
General Electric Company

During my years of flying experience which includes nine years in the Air Force and more than six of experimental test flying with the General Electric Company, I have had the opportunity to see first hand the development of many new aircraft systems. With this experience and background, the words of wisdom which seem most important to me are: "Know your aircraft and equipment before you step into the cockpit for the first flight".

There was a time when, if you referred to a fighter pilot as a good stick-and-rudder man, you paid him a great compliment. Many pilots enjoyed this compliment and developed a self-confidence which prompted them to fly many airplanes with a minimum of knowledge of each. They relied primarily upon "stick-and-rudder-experience"...betting against the odds that nothing would happen that they couldn't handle by jockeying the throttle to enable them to fly the aircraft safely back for a landing.

When you step into the cockpit of a Century Series fighter aircraft (no matter which one it happens to be), you'll be in for a completely new flying experience. You will no doubt be surprised during this first experience with how familiar you feel in the cockpit and the ease with which the aircraft handles. You'll probably say to yourself, as you step out of this aircraft with "no" wings and a radical design: "What's all this 'hubba-hubba' about flying a Century Series type? It flies just like any other airplane".



True, you have had a successful flight and no doubt a few new wonderful experiences and the odds are that you will have many more such flights in the aircraft. But, have you really flown it? Would you make the right decision if you had an abnormal indication in the cockpit? Were you looking at the right instrument to tell you that everything was normal when you lit the afterburner?

Those instruments in the cockpit can give you a complete story only if you know what they are trying to tell you.

When I am scheduled for a checkout in a new aircraft, regardless of whether it is the first flight in a new configuration or a routine checkout in an operational aircraft, I first make a complete study of the Pilot's Handbook. Next, I gather from other pilots and engineers as much information as possible on the aircraft and engine characteristics in flight. From this background information, I establish for myself a complete set of cards outlining operational procedures and characteristics of the particular aircraft and engine. With these procedures in mind it is easy to monitor all instruments in an orderly sequence in any situation.

For example, let's look at engine operating procedures from the starting sequence to shutdown to see what the instruments are trying to tell you and how you can use this information to best advantage. We are speaking of jet engines in general and no specific model.

Engine Operation

First, you can tell a great deal about the condition of an engine by the way it starts. The pilot must monitor closely the engine instruments during the starting sequence, for a maladjusted or malfunctioning fuel control or fuel regulator can cause damage or even ruin a $200,000 engine if the pilot is asleep at the switch.

Occasionally I've seen pilots hit the start switch, then begin to adjust their harness or helmet and mask while the engine is accelerating to idle RPM. The folly of this technique should be apparent to everyone. The pilot should know the starting characteristics of his engine and monitor the instruments in a manner which will tell him that all conditions are normal, or give him advance warning of impending difficulties. The normal sequence of events that he should monitor is: Start switch ON... RPM increase....Throttle advance....Fuel flow up to proper value....EGT within limits ....then oil pressure as you reach idle RPM. If any abnormal indication should occur at any point in the start sequence, the pilot can abort the start and prevent further difficulties.

For instance, say a certain engine requires 500 to 600 pounds fuel flow for a normal start, if the fuel flow is 900 pounds, a hot start will

more likely result.

On the other hand, if the fuel flow is low—say 350 to 400 pounds—it may start satisfactorily on the ground, but at altitude it is extremely likely that the fuel flow will be too low to accomplish an airstart should there be need for one.

Also on starting, if the engine fails to light within the specified time after fuel flow (increase in EGT is a sure sign of light), shut it down! You probably have faulty ignition; also a delayed light can cause overtemperature during the light-off.

If the engine instruments are not within limits during the starting sequence the pilot should refuse to accept the aircraft for flight until the trouble is corrected. And, by all means, DON'T attempt a second start when something goes wrong with the first start unless you are sure what the trouble was. Have the engine inspected and the malfunction corrected.

Further, if you are fortunate enough to fly the same airplane quite frequently, know what the normal oil pressure for that particular airplane is. On some engines, a high oil pressure indicates plugged lines or lube jets; similarly, a low pressure may indicate an oil leak.

Well, you have started and have taxied to takeoff position. As you hold the brakes and advance the throttle to military power, be sure to make a careful check of engine instruments, the EGT, the nozzle position, RPM, oil pressure, pressure ratio and fuel flow. Know what these instruments should be reading and you can make a positive check on the engine before releasing brakes.

Make it a habit to watch the nozzle position indicator and EGT when going in or out of afterburner. A nozzle which does not open after afterburner light can cause over-temperature of the engine.

Again, on engines with a fully modulating nozzle, if the situation occurs which requires you to come off afterburner shortly after takeoff (say the gear failed to come up), always monitor the nozzle indicator for proper closure as you reduce the throttle.

If the nozzle is not closing do not come off afterburner but use speed brakes or climb to hold the speed down. If you come off afterburner and have a wide open nozzle, you can not maintain flight speed with the gear down. The possibilities of getting an afterburner relight under these conditions are limited.

Emergencies

I hesitate to go into in-flight emergencies, for they vary so greatly with different airplanes. I can not place too much emphasis, however, on the importance of knowing the contents of those red-bordered pages in your Dash One Handbook. You should not only know WHAT to do, but also WHY you are doing it.

Let's assume you have the airplane back on the ground and are ready to shut it down. This phase is important too, even if the flight is over!

Shutdown

Here at General Electric, we shut down from the minimum EGT (usually a point slightly above idle). Again, before chopping the throttle, check the oil pressure. When the EGT has stabilized, chop the throttle and check the engine coast down time. Be ACCURATE on this time to the nearest second, then log it in the Form 781.

While the engine is coasting down, we have one or more individuals stationed around the aircraft to check for any unusual noises and to check for engine roll-back. Lack of engine roll-back and reduced coast down time are indications of possible engine difficulties.

These individuals also check for fuel drainage when the throttle is stop-cocked. If it doesn't drain, we are prepared to plug in an APU and motor the engine to prevent a fire in event the drain valve is malfunctioning or the drain is plugged.

I feel that there are many things that pilots can do to ease the maintenance load. Too many pilots often do not have enough regard for the equipment. It's one thing to get maximum performance out of an aircraft but you shouldn't abuse the aircraft and engine while doing it.

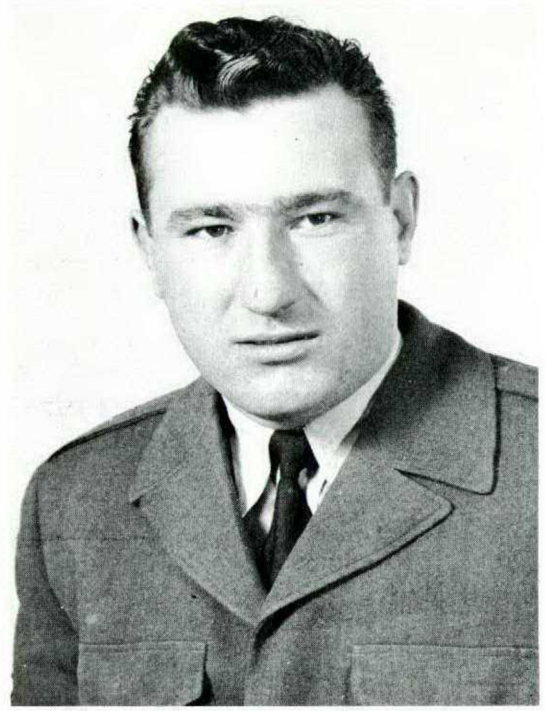
The pilot must also have an honest desire to keep the airplane in the best of condition. During accelerated service tests on an F-86H our pilots flew one aircraft and one engine over 500 hours in 16 weeks. During that time we attained an average of 62 landings on a set of tires and had practically no brake troubles, simply because the pilots handled the aircraft with care.

They wrote up discrepancies which were actually corrected as they occurred, rather than waiting until a large number of small items ganged up on the maintenance section.

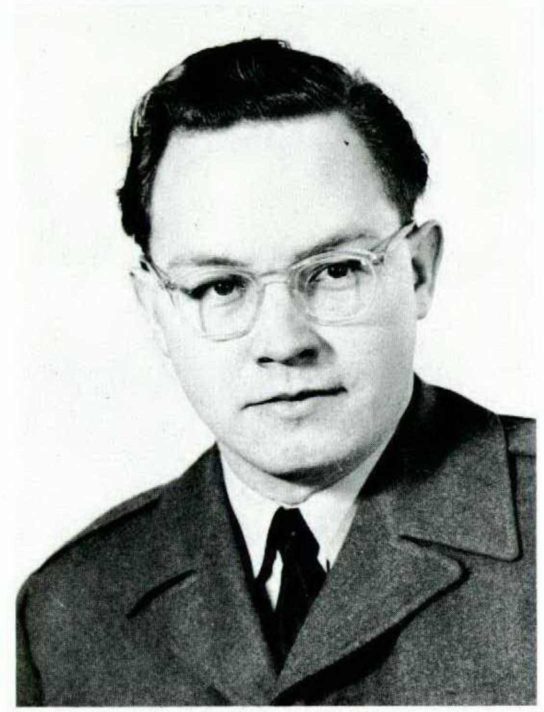
One word on the relationship of the pilot-to-maintenance crew. Today's type of operations and equipment requires a close-knit team. Pilots and maintenance crews must work together and tell each other all they know about the peculiarities and characteristics of the individual airplane.

Responsibility should be properly delegated, even down to the most junior man working on the airplane. Don't look to the maintenance boys as scapegoats when things go haywire. Make each man feel that he is part of the airplane and his efforts are needed to keep it flying.

Knowing your airplane and equipment will mean the difference between success and failure of many missions, whether it be that final effort to get on the target or to make the right decision that will get you and your aircraft safely home when something doesn't work—as it always has before.



LAC S. PREMECH



LAC L.H. BERGLUND

A good maintenance record is not just luck. A record is achieved by every technician, every supervisor, and all concerned doing a conscientious job at all times. Two recent occurrences at RCAF Stn Saskatoon bring out this point clearly.

Case 1: While carrying out a BFI on a visiting USAF T-33, LAC S Premech noticed what appeared to be a corner missing off a turbine blade. To get a closer look at the spot he climbed up the tail section and found that a small piece of one of the blades had been broken off. He reported his findings and the engine was removed for closer examination.

Case 2: On another visiting T-33, LAC LH Berglund was examining the turbine blades during the BFI. During the examination he noticed a shiny spot on the metal at the base of one of the turbine blades. He crawled up the tail pipe and he found that the spot of light that caught his attention, was caused by a turbine blade that could be moved forward and rearward in its fir tree slot. The engine was removed for repairs.

The distance from the end of the tail pipe to the turbine blades is approximately 11 feet. At this distance it is difficult to detect a minor failure. LAC Premech and LAC Berglund conducted complete inspections of their aircraft and discovered obscure malfunctions which could have resulted in serious accidents to both aircraft. These are examples of preventative maintenance at its best. By their conscientious application to the job at hand, these airmen are most deserving of a Good Show from Flight Comment.

NEAR MISS

UNCLEAR CLEARANCE

While still on the ground at Vancouver, a T-bird pilot was given a short, accurate, concise, and explicit AT clearance for a flight to Winnipeg.

Airborne a moment later—at about 300-500 feet above terrain—he received a new, long, and complicated clearance which was impossible to copy, let alone comply with and fly the aircraft safely. Neither clearance conformed to the type-written copy of the jet departure clearance which the pilot procured at Vancouver.

It is inconceivable that such a change in flying conditions and air traffic could occur in the Vancouver area within one or two minutes. Issuance of a second, complicated clearance immediately after takeoff is dangerous and unreasonable. It has had fatal consequences in the past; if continued it could very well cause more lives.

(A recent FAA modification of the United States Standard Manual of Radar Air Traffic Control Procedures directs the controller to bear in mind that the pilot is preoccupied by cockpit duties immediately after takeoff, and to delay "contact departure control (frequency) instructions until the departing aircraft is at least one-half mile beyond the departure end of the runway...."—ED)

FLIRTING

Two recent Near Miss reports, both involving C119s, show that some people just insist on flirting with disaster.

The first Boxcar was on a routine transport flight, cruising at 9000 feet on an IFR clearance in a controlled airspace. Shortly after passing Jacksonville low frequency range on a heading of 003 degrees, a T-33 passed to starboard at less than half a mile, climbing rapidly through 9000 feet, wings waggling. The Boxcar was skimming the tops of a broken layer, with variable amounts of scattered cloud below that layer, and a higher overcast at about 11,000 feet. Jacksonville centre stated that there was no other IFR traffic.

The second Boxcar, also flying IFR, was at an assigned altitude of 8000 feet on R1. Another aircraft was noticed cutting across in front at about the same altitude. Air Traffic Control was notified immediately.

Needless to say, both Boxcar pilots wished the offending aircraft had done their flirting in the age-old, and infinitely safer, manner. Disaster is a moll to be avoided.

A LITTLE WASHER

After a normal flight in a T33, the engine could not be shut down by retarding the high-pressure cock lever in the cockpit. The ground-crew was summoned and the engine was shut down by removing the lower engine access panel and closing the high-pressure cock on the engine. It was determined that the linkage between the lever in the cockpit and the high-pressure cock had become disconnected in the engine area.

Investigation revealed that the threaded part of the link assembly of the high-pressure cock had loosened and had become disconnected. Checking the component parts of the assembly, it was discovered that the tabs of lock-washer Pt. KB7107 had not been bent over enough to lie hard against the faces of the hexagon surface on the rod end, Pt. RE4F5—Index 44 in EO 05-50C-4 Pt. 2 Section 5 Page 341 Fig. 86 Detail 'G'. This was a result of installation of modification 05-50C-6A/360.

The link assembly is located in an area where it is difficult to install the tab washers, and make sure that they are locked properly. A local SI was instituted to make sure that the same fault did not threaten other aircraft. None was found.

Although this unserviceability did not cause any damage, it might have, because the high-pressure cock is retarded for a practice air-start. Needless to say, if this had occurred, a serious accident might have resulted.

MORE CHANNELS INDEED

In Expeditor aircraft equipped with ICA 67 10-channel VHF radios, it is impossible for the pilot to reach agencies concerned with Air Traffic Control during instrument Flight Rules conditions.

On an IFR flight from Trenton to Ottawa, for example, five frequencies are necessary even before leaving the Trenton area. These are: 121.9 (Ground Control), 126.2 (Tower), 137.7 (Terminal Control), 134.1 (GCA), 121.5 (Emergency). After leaving Trenton, 126.7 (DOT Radio Range) is necessary. We have now a requirement for six separate frequencies, all within 12 miles of Trenton. Proceeding via Red 1 to Ottawa, the following are required: 119.5 (Terminal Control), 120.4 (Arrival Control), and 118.3 (Tower). In the event of a missed approach, 120.6 (Departure Control) is required. This is a total of 10 frequencies!

It is obvious that flying under IFR conditions with the existing communication equipment in Expeditors, is dangerous. Lack of communication between pilot and control results in the abuse of secondary frequencies; abuse of emergency frequency 121.5; and long, unplanned holdings (an Expeditor was number 11 on approach at Ottawa recently)—with consequent fuel shortage and frustration for all concerned.

Study of GPH 240 will reveal that at least a 48-frequency capability is required to fly IFR throughout Canada, as made necessary by the role of 129 Acceptance and Ferry Flight. A study of DOT "Air Naviation Radio Aids" reveals that more and more frequencies are required in the VHF band. For example, peripheral communication facilities Toronto/Wiarton 125.4 came into use in April 61. International air-ground frequency 126.9 was installed Moncton/Yarmouth in May 61. Installations are planned using 123.6, 124.8, 123.9, 125.8, 124.3, and 126.0. These are only a few of many examples.

It is recommended that a Dial-type VHF radio (similar to that installed in the SA16 aircraft), and which is in common use in civil aircraft utilizing the same airspace, be installed in Expeditor aircraft.

(Air Traffic Control is changing. To take advantage of the changes, more radio channels are a must.—ED.)

PENLIGHT BATTERIES AND BULBS

On a trip which touched at Trenton, Winnipeg, and Vancouver, the only place that penlight batteries could be obtained was at Vancouver. Bulbs were unavailable. The obvious way to avoid this operational hazard is to maintain a supply of flashlight and penlight batteries and bulbs in the flight planning section of each unit with planning facilities.

(Flight planning centres should requisition these supplies from the unit supply section in accordance with CAP 16 Vol.1 Art. 2.2.03.—Ed.

QUOTABLE QUOTE

EXTRACT FROM D14

A check of aircraft records shows that EO 10B-10-6A/69 was embodied on subject engine at the time of the incident. Hence the stickiness which was attributed to "Materiel" was in fact, due to a Maintenance error in that the pilot in question should not have been lubricated.

HOW FAR TO GO

On takeoff in a twin—engine aircraft a check pilot cut an engine at approximately 50 feet by cutting off the fuel. The pilot in the left seat could not maintain heading or altitude and before the engine could be restarted the aircraft went out of control and crashed. The two pilots were killed.

How far should we go when carrying out practicing in-flight emergencies? Do we want a pilot's training to cover a certain type of in-flight emergency, or do we set up a situation that is so unrealistic as to confuse the pilot and rather than observing his ability to cope with the situation his normal reaction compounds the emergency to the point where safety of flight is jeopardized. The latter is true particularly when a second emergency condition is set up before the first emergency is under control.

There are times during a proficiency check or an instrument check ride when it is difficult to determine if the check pilot is checking your ability to fly the airplane on simulated instruments, or if he is testing your fortitude in overcoming every conceivable emergency in the book. The value gained from such a check ride is questionable. There is no doubt that an experienced check pilot can fail any pilot during a check ride by imposing simulated emergencies to create a situation that is so complex that it is humanly impossible to handle it.

It is important that an in-flight emergency must be as realistic as possible, but it is ridiculous to create a situation that presents a hazard to flight in the process.

To prepare a pilot to handle an in-flight emergency, he is given practical demonstrations of what to expect when faced with a sudden power loss or systems malfunction. During the initial stages of flying training in a light single-engined aircraft, the neophyte is told what to do about an engine failure. This is taught under the guise of a PFL. The QFI simply closes the throttle, and the hunt is on to find a suitable field. With repetition and practice, the average pilot gets fairly proficient and can set up a glide to cross the fence at a respectable speed and altitude. In this way the pilot gains confidence in the aircraft, and in his own ability to fly an airplane, and is able to cope with an unexpected engine failure.

The emergency procedures required to handle in-flight emergencies in an elementary training plane are few. The aircraft does not have complicated electrical or hydraulically-operated systems, so we would not expect safety of flight to be jeopardized during the practice of these emergencies. This is not true: many times it was found that when the throttle was advanced as the aircraft crossed the fence, the engine was too cold to pick up—and what was to be a PFL ended up as a prang in a meadow occupied by a resentful bull. A compromise was worked out. During the descent, the throttle was opened and the engine kept warm. The value of the PFL was decreased, but the number of accidents that occurred during PFL practice dropped to zero.

At the squadron level the nature of the beast that is to be flown depends to a large extent upon the role of the particular squadron. But with every squadron or type of aircraft that you are going to fly your duties now assume a more productive role. You are no longer a trainee but you are a trained pilot—but certainly are not an experienced one. The experience you will acquire in time, and the effort that you put into the flying and the type of supervision that you receive, will determine what kind of an operational pilot you become.

During operational flying, in-flight emergencies become more important. Air force operational pilots of multi-engined aircraft with a tremendous weight-carrying capability may be confronted with any number of emergencies at any time when they are at the controls. It is imperative that these pilots be given the opportunity to practice every in-flight emergency frequently enough that they feel confident should the real thing happen.

The problem of setting up a simulated emergency in the air in such a way that real benefit is derived from the practice, is a hard one to solve. As with the elementary trainer, a compromise must be reached.

It is ridiculous to send a new crew on a solo mission in a helicopter to practise landings in a confined area, and have it carry out the practice in a confined area. This has happened; the result was damaged rotors. The result could have been a write-off. This kind of training with no supervision is dangerous, and of questionable value. When necessary, however, it should be carried out under direct supervision.

A final—and a most serious—example: During the past five years, one type of accident occurred 12 times under simulated emergency conditions, and 12 times "for real"—and the simulated instances caused more damage than the real emergencies did! Obviously, there was something wrong with our training procedures if a five-year span produced these results. The avoidance of accidents during the simulation in flight of emergencies required large doses of common sense—because it is common sense that still helps you to decide "how far to go".

Accidents Looking for a place to happen

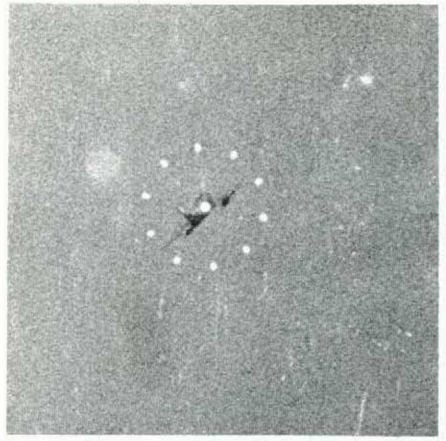
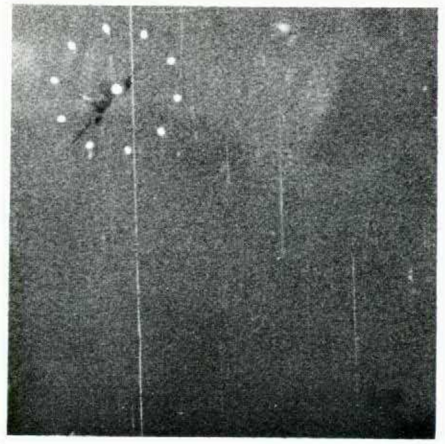
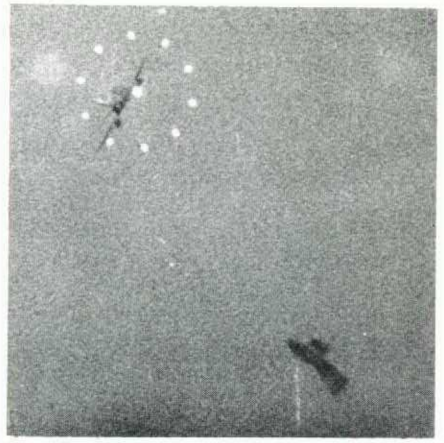
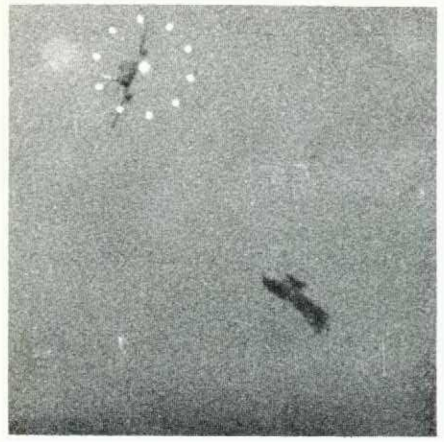
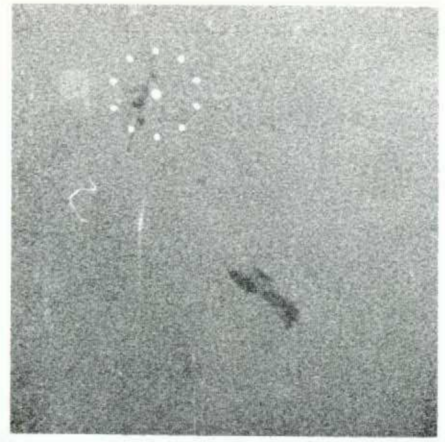
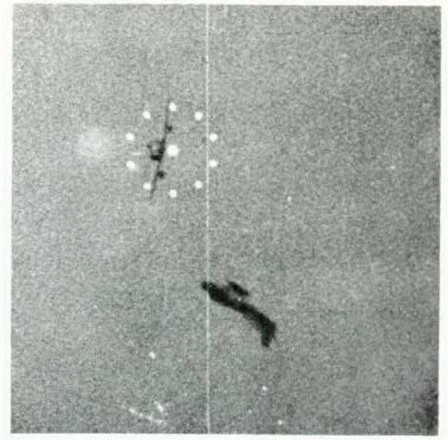
Believe it or not, the following incidents occurred during the past year. The cause is not important and has not been indicated. But the airmanship—or lack of it—is important; we leave you to draw your own conclusions. Our only comment is, "Could these aircraft have been flown by professional RCAF pilots?"

Incident 1—On an air test, after placing the CF100 in inverted flight and applying negative G, the navigator reported that when the negative G was applied he could hear a noise coming from behind him which sounded as if a loose article was striking the top of the aircraft. Further experiments involving negative G showed that this noise still persisted, but finally, after about a dozen of these manoeuvres, the noise "went away and would not come back".

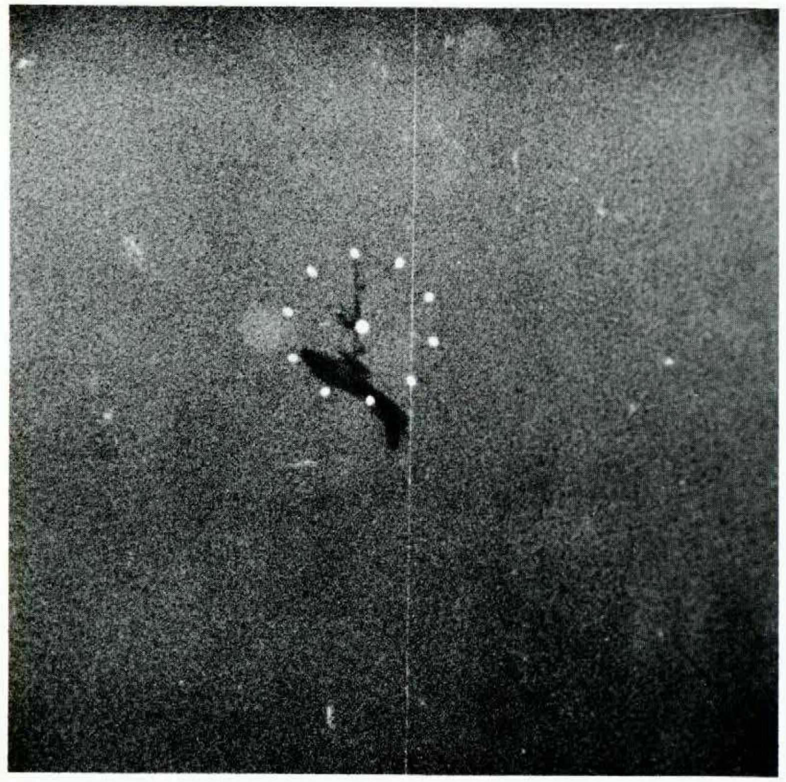
Incident 2—Shortly after takeoff in a Sabre, at an airspeed of 300-350 knots, a "thud" was both felt and heard. Subsequently, the aircraft was noticed to be badly out of trim. But the exercise was continued and on landing the starboard elevator was found missing.

Incident 3—During an AI exercise in a CF100, starboard aileron movement was not possible with normal pressure, but it broke free when extreme pressure on the control column was exerted. The exercise was continued; the malfunction did not reappear.

Incident 4—As the aircraft passed over the drone there was a loud report and the starboard drone operator reported the dinghy had blown out and broken his window. It was also reported that the leading edge of the starboard horizontal stabilizer was dented. Since there was no adverse effects to the handling characteristics of the aircraft the exercise was completed and a normal landing carried out on return to base.

The photos appearing on this and the facing page are printed as a reminder of the ever-present danger of mid-air collision. Knowledge of regulations and procedures, and adherence to them, are necessary if we are to reduce the danger. Deviation from standard manoeuvres is dangerous. The closure rate of aircraft increases with increased speed. This puts greater demands on aircrew; they must be continuously on the alert for other aircraft.








The Big WHEELS Go Around

The pilot was flying a CF100 on an air test. As part of the test, the aircraft was subjected to one negative G. When the negative G was applied, an object was heard and felt banging around in the fuselage. The pilot called up for a chase aircraft who reported that nothing was loose or missing from the aircraft. The pilot landed the aircraft safely.

The aircraft was turned over to maintenance. Upon inspection it was found that the gun-bay fairing and the oxygen filler cap was slightly loose. The gun-bay fairing and the filler cap were tightened, and the aircraft was declared serviceable for a further test flight. The aircraft was test flown the following day and the banging sound was still there. The aircraft was landed safely again.

Once again, the aircraft was turned over to maintenance. This time the investigation revealed a buckled arch-type former located directly above the ballast load. The cherry rivets holding the capping strip had failed in tension, allowing the ballast-weight assembly to move about the nose section during aircraft manoeuvres, causing random damage to the adjacent structures. In this case the damage was minor compared to what could have happened under a higher negative G loading.

Following discovery of the damage, the other seven aircraft in the unit were inspected; five of seven had rivets pulled from the capping strip. To repair the aircraft and to strengthen the attachment of the capping plate to the ballast mounting diaphragm, bolts and nuts were used in place of rivets. This particular fix was outlined in the manufacturer's bulletin A383 dated 17 Jun 57.

The weakness in the ballast-mounting in the Mk3 CF100 was recognized in Feb 56 and an engineering change proposal (ECP) was raised by AVRO and processed through AMC. The ECP after going the rounds of AMC and AFHQ was approved. A prototype modification was manufactured by the company and AVRO Mod 1157 dated 28 Nov 56 was forwarded to the RCAF. From AVRO Mod 1157 dated 28 Nov 56, the RCAF issued EO 05-25DA-6A/44 dated 4 Jul 57. After installing the prototype Mod kits in the aircraft, AVRO issued Service Bulletin SB A383 recommending that bolts and nuts be used to secure the capping strip, in place of rivets. AMC agreed to this recommendation and authorized all users to comply with AVRO bulletin A383 by message dated 17 Jun 57. In the authorizing signal there was no reference to the forthcoming Mod 6A/44 to strengthen the ballast mounting.

There are two possible reasons why the rivets were still installed at the time of this accident. In the first place, it is possible that, upon receipt of the AMC message, which authorized the use of Service Bulletin A383 pending revision of 05-25D-3, the maintenance personnel did not act on this authority, because it referred to a repair scheme—and unless the unit realized that a problem existed in that area, they would not know that action was necessary. Again, it is possible that the Service Bulletin was not available. The tone of the Log message would indicate that units were not on an automatic distribution list for bulletins. Further, the bulletin refers to Mod 1157, and, according to the date that 05-25DA-6A/44 (Mod 1157) was issued, the Mod leaflet was not yet available on the unit.

It is also possible that the units carried out the instructions contained in the AMC message, and changed the rivets in the capping plate to bolts. While the date of Mod 6A/44 is the 4 Jul 57, there is no way of knowing when it reached the units. At any rate Mod 6A/44 was sent to the units after they had received the instructions to comply with the AVRO bulletin A383. When the Mod was carried out and the ballast mounting strengthened, rivets would be used to secure the capping plate as outlined in this Mod.

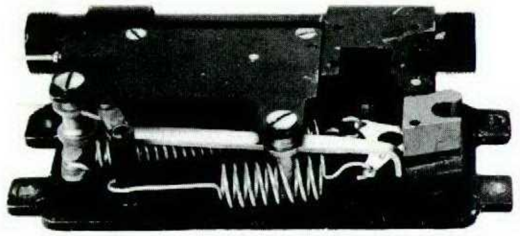
It is common practice for AMC to issue a 6A Mod to follow up a Log message authorizing compliance to any company bulletin, which applied to a Mod being processed. In this case this was not done. While not condoned, a slip-up in a big organization does happen and can be understood. The units, on the other hand, must have found it rather strange to be instructed to change the rivets in the existing mounting to bolts and nuts and then receive Mod 6A/44 which beefs-up the entire mount, and then reverts back to the old system of using rivets. Surely we have not reached the stage where we blindly follow instructions like robots when there has been a mistake made by a higher echelon.

This has been reported for many reasons. First, our system of processing Mods appears unwieldy and very time-consuming. A check of the dates confirms this. Secondly, when so many people are involved, an error can creep into the instructions. Third, if and when an error is made, the technicians in the field can help by pointing out the error. Finally, if an error such as this one can rear its head, it can happen again. Let's get together and prevent it from causing an accident!

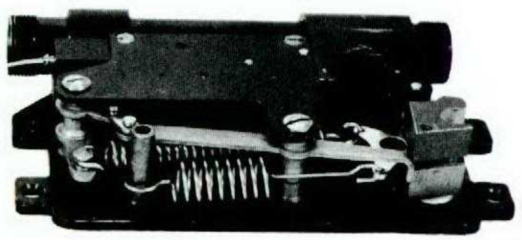
During a GCA letdown in a Sabre, the pilot was instructed to do a 360° turn to allow a Zulu scramble to get airborne. In the turn at 2500 feet, in broken cloud, the low pressure fuel warning light came on, and the engine flamed out. The pilot levelled the wings, raised the nose of the aircraft and ejected. On ejection he attempted to kick free of the seat but was unable to do so. He checked the seat harness and discovered that the automatic harness release mechanism had not operated. He reached down and released the lap strap manually. He kicked free from the seat and the parachute opened immediately. He landed safely.

Why did the automatic release mechanism malfunction? The mechanism was dismantled and it was found that the supplementary spring had been inserted incorrectly.

INCORRECTLY INSTALLED SUPPLEMENTARY SPRING



CORRECTLY INSTALLED SUPPLEMENTARY SPRING



MURPHY'S LAW: If an aircraft part can be installed incorrectly, someone will install it that way.

BARRIER ENGAGEMENT

Obviously, it demands a lot of self-discipline on the part of the pilot to remain cool, calm and collected for an impending barrier engagement. This is apparent by the number of accidents that occur between the point where a barrier engagement becomes imminent and before the barrier is ever reached.

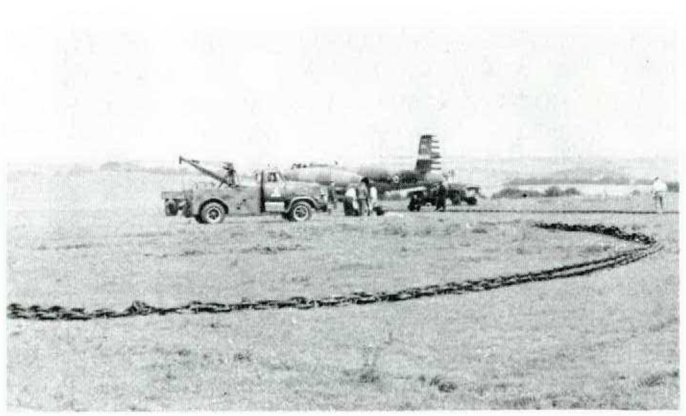
Many of the mishaps in this category follow a definite pattern. Touchdown point is generally within the first 500 feet of the runway but with excessively high airspeed. Some extra airspeed (i.e., above normal) may be dictated by the situation and prescribed by the Flight Manual—no quarrels here. It's the extra, extra five knots for the wife, five knots for each child, five knots for longevity, and ten knots just in case you forgot to add in something, that breaks the camel's back. Next step? —the drag chute (if fitted to your particular aircraft) is deployed at excessive speed and separates from the aircraft.

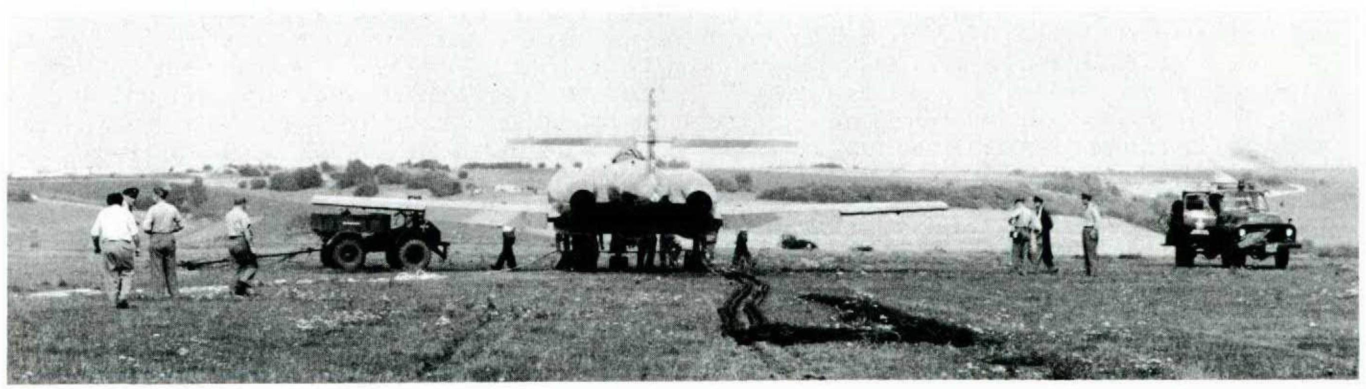
With the aircraft still ticking off the knots and runway markers whistling by, on come the binders. Heavy footprint pressure is applied to the brake pedals in the cockpit, but the footprint pressure (which really counts for good braking action) of the tires on the runway is ineffective owing to the excessive airspeed and aircraft riding lightly on the gear.

Next step? —you're right: the wheels lock, at least one tire blows, and the aircraft begins to veer. In an attempt to hold the bird straight, the other tire blows. With no means for directional control, the aircraft is footloose and fancy-free to head for the boondocks. Somewhere short of the barrier or off to the side, the aircraft will come to a grinding halt. Major damage, no doubt!

The moral: why not give the barrier a fair shake if the situation dictates an engagement? Advance planning is essential. Know the status of the barrier, know the aircraft configuration for an engagement, and maneuver the aircraft judiciously for an engagement.

AFSC Safety News Letter
and Intercom





THE FOUR "A"s OF EJECTION

by
S/L G. K. Murray
RCAF Staff School

(The following was submitted as a result of the feature "Don't Wait Too Long", which appeared in the March-April issue of Flight Comment. This article expands on the human factor involved in ejection—ED.)

Three elements must be considered in abandoning an aircraft: airspeed, altitude and attitude. The engineers have devised the best equipment possible to deal with various combinations of these factors. There is, however, a fourth factor over which they have no control. It too can be described as "attitude"—the attitude of the crew towards the use of ejection equipment.

A number of individuals will confess extreme reluctance towards the use of ejection seats. Some crews have devised the most amazing agreements to postpone or avoid a decision to leave the aircraft. Forced landings under the most adverse circumstances seem, to some, to be preferably to bailing out. Many aircrew flying today would not readily use their escape equipment if the situation demanded it.

By the end of operational training, a crew has a good knowledge of the aircraft and its ejection equipment, but some crews seem to have very haphazard and vague ideas about when this equipment should be used. The prevailing attitude is summed up in the ascertion that "It won't happen to me".

This is not only a natural reaction, but also an accurate forecast for about 99% of the time. A touch of pessimism, however, is not without value.

To everyone who straps on an ejection seat should come the realization that it may have to be used. This mental preparation must come BEFORE an actual emergency arises—and it goes much further than the mechanics of a good ejection drill. There must be a careful examination of personal attitude to make sure that there is no reluctance toward the use of the ejection equipment. To wait until the emergency arises is merely reducing the chances for a successful escape.

Many of the aversions grow from a variety of "statistics" and impressions picked during training. One young officer confessed that he doesn't want to use his emergency oxygen equipment because of "all that pressure in the face". Another was convinced that the G-forces of an ejection would lead invariably to injury—and hence, had made his plans accordingly. Many can recall a comparison between the explosive force of the seat and a particular calibre of cannonshell.

These seeds of doubt, sown quite unknowingly during training, take root in various individuals with one common result. Too often, there is an unspoken, often unrecognized, reluctance to consider to the D-ring as an acceptable solution to an emergency situation.

Clarification of these doubts and the objective examination of our own attitudes would not result in a rash of ejections, with aircrew popping out at the least provocation. A bailout is not the most desirable way out of a situation, but often, it is the only logical way. Decisions of this nature are made on the basis of training and experience, applied to the circumstances at the time.

To reach an objective decision under emergency conditions and to ensure that a decision to eject will be carried out quickly, there must be no doubts about the equipment. Too often, there is precious-little time for the normal procedures, without wasting a portion of it in needless anticipation.

This problem needs study as long as there is a single incident in which a crew could have and should have got out—and yet didn't. When each individual is certain that there would be immediate reaction to the decision to get out—that the action would be carried out as instinctively as any other movement in the cockpit—then the problem has ceased to exist. We have in the service today some of the finest ejection equipment in the world. But to do the job for which it was designed it must be used—and here, the individual is still very much on his own.

More FOD Means More Vigilance Needed

The prevention of Foreign Object Damage requires continual vigilance. Three recent accidents and a Near Miss report point this out more clearly than a general sermon could, so let's take a look at what happened in each instance.

A CF100 was on a day rocket-firing exercise at 16,000 feet. A loud grinding was heard, and a severe vibration felt, while the aircraft was turning in on the second pass. The port RPM gauge was fluctuating; port oil pressure had dropped to zero. On flameout, the RPM immediately dropped to zero. A single-engine approach and landing was carried out successfully.

A centre bearing failure was first suspected, but an Orenda Engines representative determined that the incident was caused by failure of the main oil pump, which had seized because of ingestion of an AN960-3 flat washer, which in turn resulted in failure of the nylon gear P/N73781.

During a pre-inspection run on a Sabre, the downlock installed had a warning flag attached by a cable about four inches long onto the downlock. The wind was blowing from aft to forward and caught the flag, blowing it up towards the intake. The end of the flag went in; the engine was running at 100%.

Investigation revealed that all warning flags had been replaced a short time before. The streamer, usually attached directly to the downlock, was attached to a cable which forms part of the downlock assembly, thus increasing the length of the streamer sufficiently to allow the end to reach the edge of the inlet duct.

Moreover, the streamer was not attached securely, in accordance with EO 5-1-2AS. The attaching device, a locking clip, failed with the engine at full power and a tail-wind blowing. A quick shutdown resulted in only approximately half the streamer passing directly into the compressor. Although visual evidence of damage was a slight nick on one inlet guide vane, the engine was removed for a partial strip and complete check of the compressor assembly. The accident was assessed Briefing—lack of supervision.

Another Sabre was being prepared for post-inspection runup. A pre-run check for chocks, chains and foreign objects in the vicinity of the aircraft was carried out; the tailpipe was checked for segmentations and foreign objects. Three groundcrew members, using a flashlight, checked the air intake visually, and found it clear of foreign objects.

A complete post-inspection runup revealed no indication of malfunction, or unusual noise or vibration. On completion of the ground run, the rundown time of the engine was checked, and the compressor was observed to determine the rundown time, which was well within limits. The aircraft was then put up for PIs.

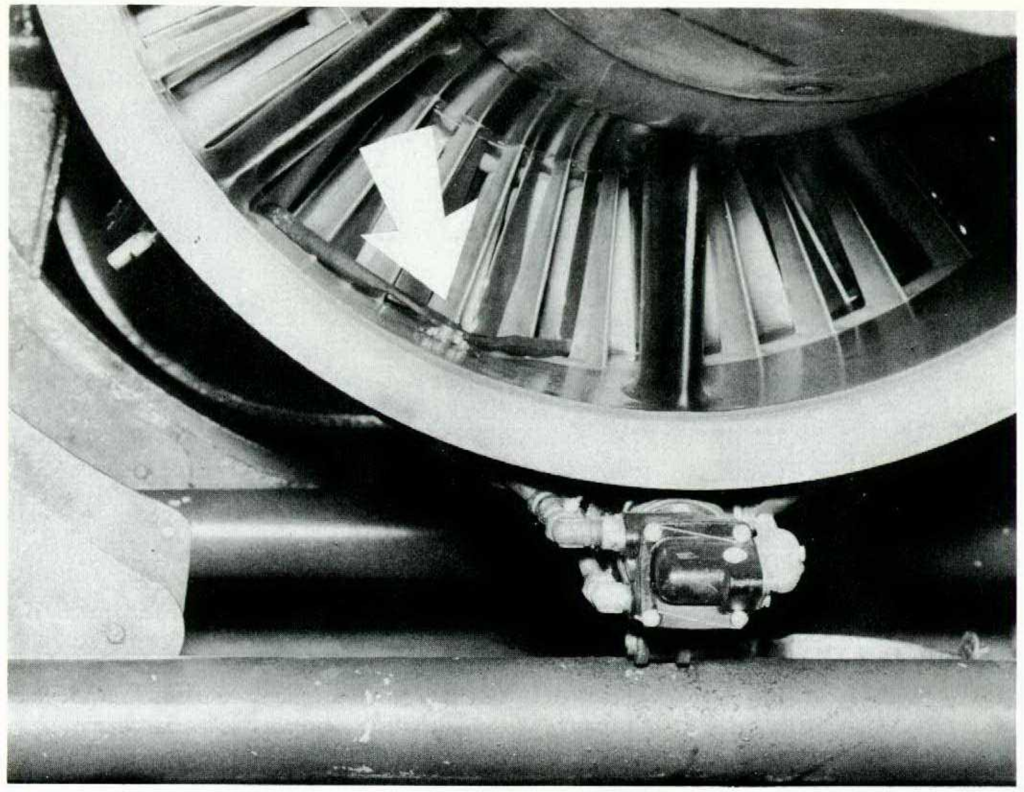
While carrying out the AE primary inspection, it was found that the first stage compressor blades had been damaged by a pair of stak-on-pliers which were found resting against the guide vanes and protruding into the first stage compressor area. The incident was assessed Personnel—negligence.

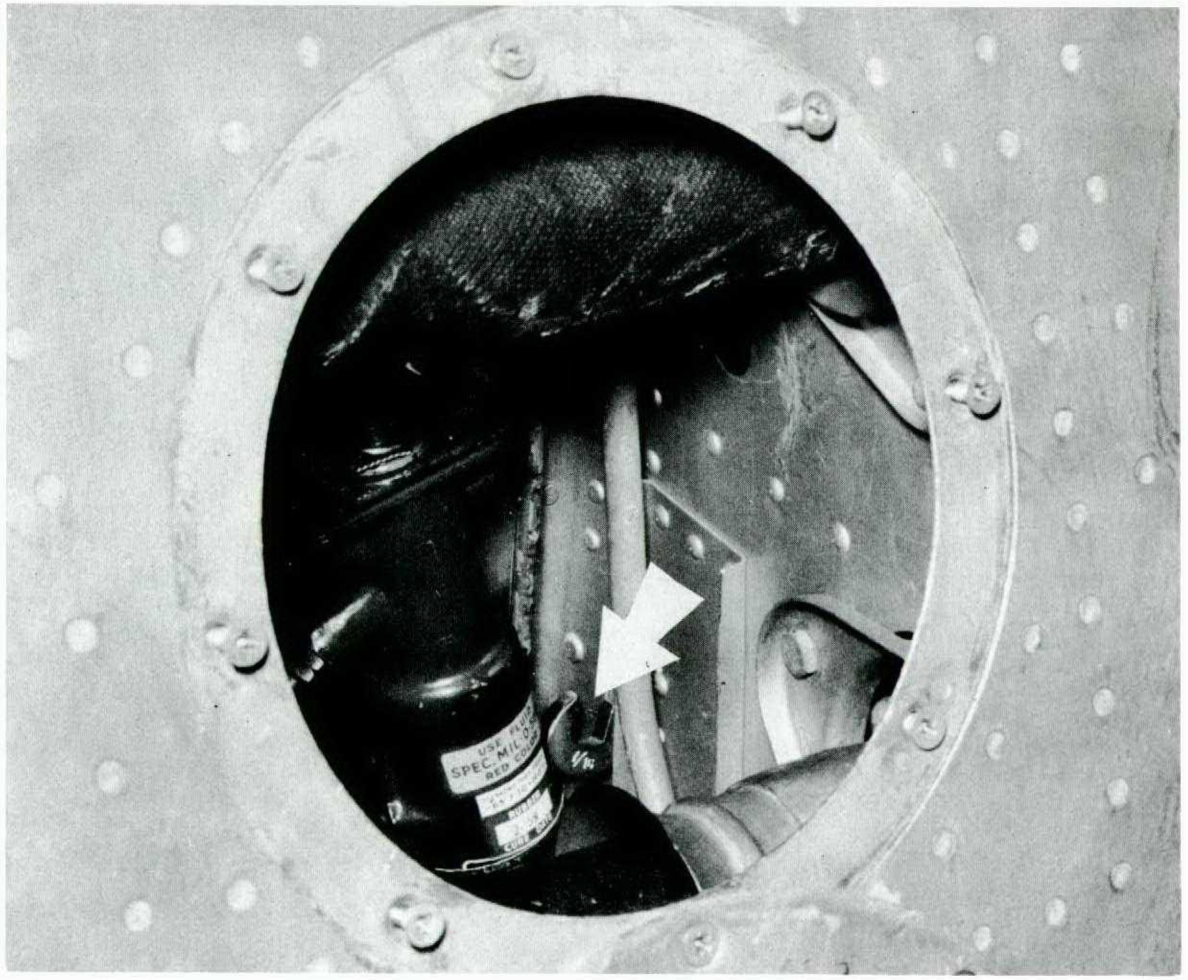
The fourth instance was a Near Miss rather than an accident, but the moral is just as obvious. It was a spanner wrench rather than a monkey wrench in the "works"—but it might have spelled disaster just the same.

A pilot recently accepted a Sabre at Gimli for a ferry flight to No. 6 Repair Depot for ARC 552 installation. Before accepting the aircraft, he had checked that a PI and a BFI were carried out, and that there were no major unserviceabilities in the L141.

The flight was planned Gimli—Winnipeg—Lakehead—Trenton. Landing at Winnipeg, a brake malfunction occurred; air in the brake hydraulic lines was suspected as the cause. Winnipeg maintenance, inspecting the master brake cylinder area, found a 7/16 spanner wrench lodged beside the cylinder. Although the brake malfunction was not caused by the wrench, the tool was definitely left in a most dangerous position. It could possible have caused a brake failure by jamming the master brake cylinder in its normal movement.

Much has been said and written in the past about FOD, and the results of the educational program have been gratifying. The number of accidents attributed to FOD had decreased, but that doesn't mean that we can relax our vigilance—as the four instances above demonstrate clearly.





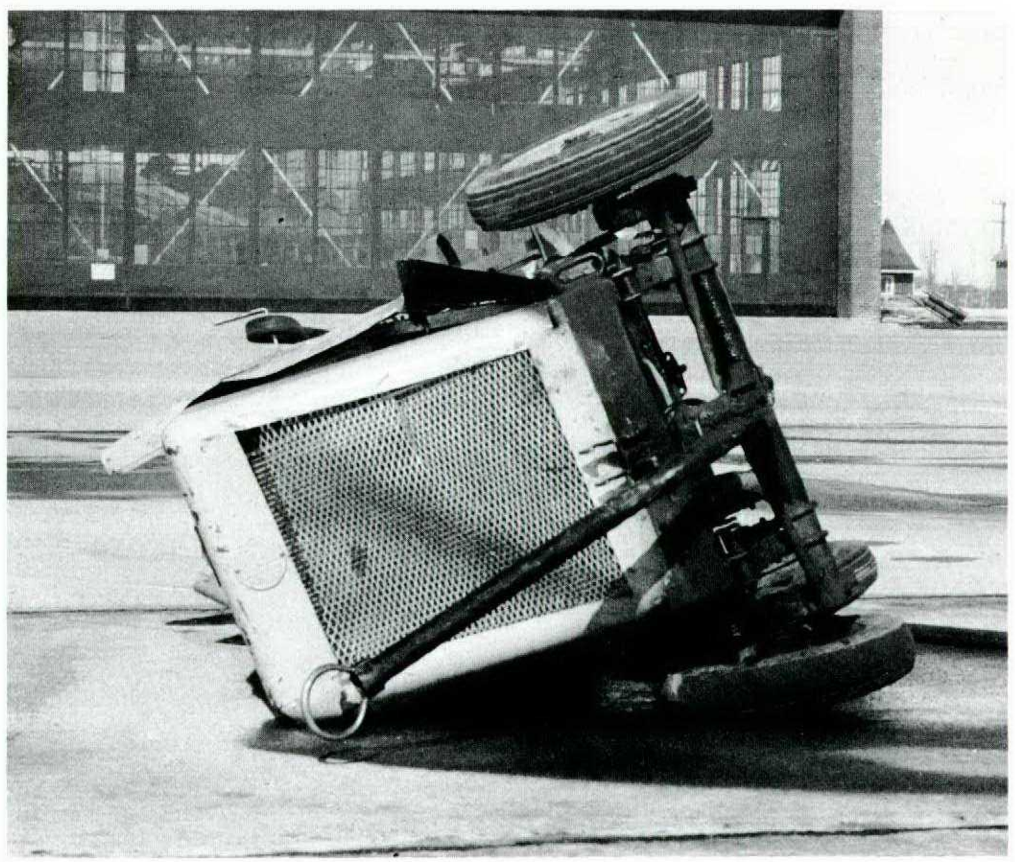
ARRIVALS and DEPARTURES

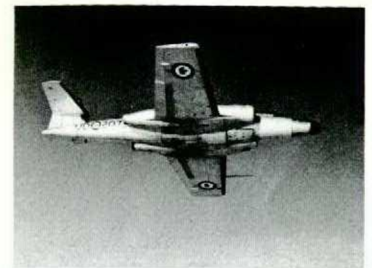
BLAST THE ENERGIZER

The groundcrew started the T-bird, and moved the tractor and energizer from behind the aircraft back to the servicing shack, without waiting for a flap or dive brake check, or indicating to the pilot that chocks were removed.

He applied power to move from the line; the nosewheel cocked. An attempt was made to realign it, using power and "bouncing" the nose with brake application. The groundcrew finally came to straighten the nosewheel; the pilot proceeded on his way—without noticing that his jet blast had blown the energizer off the ground and rolled it over two or three times. Ladder and chocks also went flying in the air.

As the unit commander said, "It is quite apparent that excessive throttle was used in a congested area, without an adequate lookout by the pilot".





WHICH WAY IS UP?

During an AI exercise, the pilot of a CF100 found himself too close to the aircraft ahead. He estimated the distance at about 4000 yards.

In an effort to obtain the correct separation (10 miles), he carried out a series of dog-legs and 'S' turns; while so engaged, he turned his head hard left to look at the No. 3 aircraft, and at the same time completed a VHF channel change.

The pilot because disorientated, control was lost, and the aircraft entered cloud. Realizing the situation, the pilot retarded power, extended the speed brakes, went on to instruments, and solicited the help of his navigator. While the navigator called out altitudes and airspeeds, the pilot rolled the aircraft onto an even keel and pulled out from the ensuing dive at 8000 to 10,000 feet.

The pilot is to be commended for his actions following disorientation. Undoubtedly, by believing his instruments and utilizing the help of his navigator, he prevented what could have been an "Obscure Fatal". At the same time, the combination of carrying out 'S' turns, turning his head hard left, and effecting a VHF change, contain all the movement necessary for disorientation. If you must turn your head at a time like this, turn it slowly...and think about what you are doing.

OXYGEN SYSTEM LEAKS

Before taxiing out on a four-plane section training mission, a Sabre pilot checked his oxygen system; pressure 450 psi, regulator setting 100%; press-to-test, and blinker action. The regulator was reset to Normal when airborne. Fifteen minutes after takeoff, while climbing through 35,000 feet (about 15,000 feet cabin altitude), the pilot noticed difficulty in breathing in. A quick check of the oxygen pressure gauge showed 0 psi so the pilot correctly pulled the emergency oxygen bottle, descended rapidly to 10,000 feet cabin altitude, and landed safely after burning off fuel. Other than the restricted breathing owing to the depletion of the oxygen supply, no symptoms were noted by the pilot at any time.

Unit investigation revealed no significant abnormality in the oxygen system, other than the supply depletion. On re-filling, no leakage showed on overnight stand or subsequent test flights. It is assumed that the system was charged prior to the incident, but the cause of the leakage remains obscure. The incident report, however, suggested that the oxygen may have leaked away because the "emergency-press-to-test" lever on the D2 regulator may have been inadvertently selected to safety (emergency) pressure. This could happen if the lever is deflected forward or back while doing the press-to-test check. The pilot might not notice the very slight pressure in the mask. This time, he was not certain of the lever position, nor was it noted after the flight. In order for a full system to be depleted in 15 to 25 minutes, however, the outflow from the aircraft oxygen tubing would have to be unrestrained, i.e., not plugged into a mask assembly—and/or the mask worn very loosely.

Whether or not this is an adequate explanation of this incident, it does remind us that, although the safety pressure selection provides a means of outboard flushing of known or suspected leaks and so prevents inboard leakage of air, it may allow the lesser evil of wasteful spillage of oxygen if used incautiously. With a large leak (which should never go undetected with routine oxygen checks) the system could be depleted in 15 to 20 minutes on safety pressure. Even with a leak-proof system, oxygen consumption would be very high because on safety pressure the regulator delivers nearly 100% regardless of the Normal—100% selection. Let us also be reminded again of the most vulnerable point in the demand oxygen system—the mask fit. Sabre drivers in particular may get careless because of the security normally provided by their high cabin pressurization.

The best prevention of system leaks is a thorough checking of oxygen systems before and during flights—particularly by the use of mask testing manometers and press-to-test buttons on regulators. Safety pressure and/or 100% selections should be used only when indicated (e.g., oxygen emergency or cockpit fumes), and not as a routine cover for leakages. If you don't understand the need and operation of these regulator controls, find out about them. A safety pressure lever is being added to the A20 regulator in the CF100 and T-33.

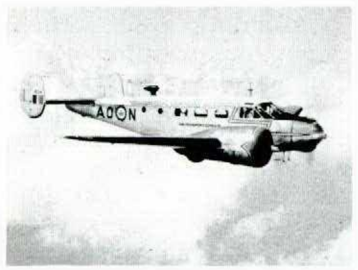
SUPERVISION ?

Because of weather conditions the aircraft was towed part-way into a hangar to fix an oil leak in one of the engines. Planned renovations were being carried out in the hangar by a contractor's crew under CE supervision, and the equipment and scaffolding precluded towing the aircraft completely into the hangar.

Sometime after, a hole was noticed in the starboard drop tank; on investigation, it was found to have been damaged by a tool dropped from one of the working platforms used for the renovations.

This unit was working under adverse conditions. The hangar was being renovated, and space was at a premium—nevertheless, it is a poor idea to position an aircraft under a workman working overhead. We all drop tools, and this chap did. The result: an accident.

Further investigation revealed that this contractor was throwing tools and equipment from the floor up to the stand and scaffolds, with about a .005 catching average. The security of equipment and tools on the stand was also poor. Yet nothing was done until after the accident.



HYDRAULIC LOCK

An Expeditor needed a compass swing and was placed on the line. The pilot was accompanied by an instrument technician and a member of the line crew. A quick external examination showed no faults in the aircraft. The pilot then entered and proceeded with a normal start. The port engine was started first and behaved properly. The starboard engine was then selected—but what started out to be a very routine compass swing almost ended in the ruination of one Pratt & Whitney Junior Wasp.

The pilot depressed the starter switch; the engine turned about half a blade and stopped cold. The pilot pondered for a moment, and decided that he had apparently not made a proper engagement with the starter switch. A further start attempt ended with the same results; the engine just would not turn.

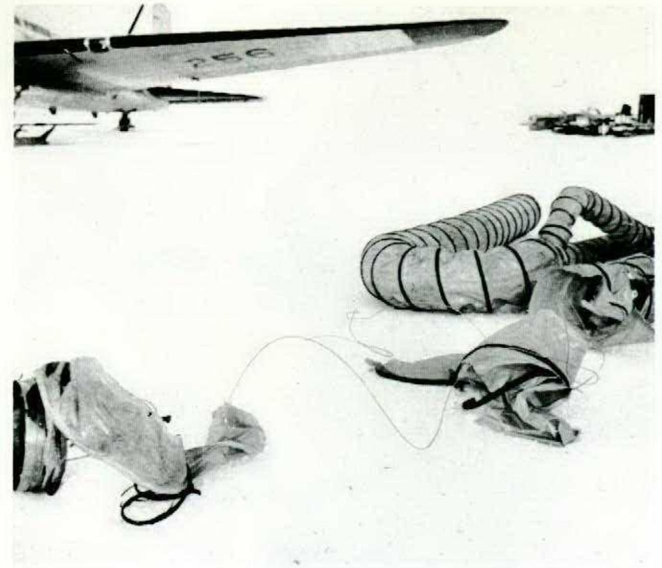
At this point the aircraft was shut down and an attempt was made to pull the engine through by hand. It was impossible to move the engine forward, and several reverse turns were needed before it cleared sufficiently to be pulled through in the correct manner. The clearing of the engine was accompanied by the issuance of great quantities of oil. A complete and thorough examination of the engine revealed—fortunately—that no damage had been done. Needless to say, had there been a power impulse, the engine would have been ruined.

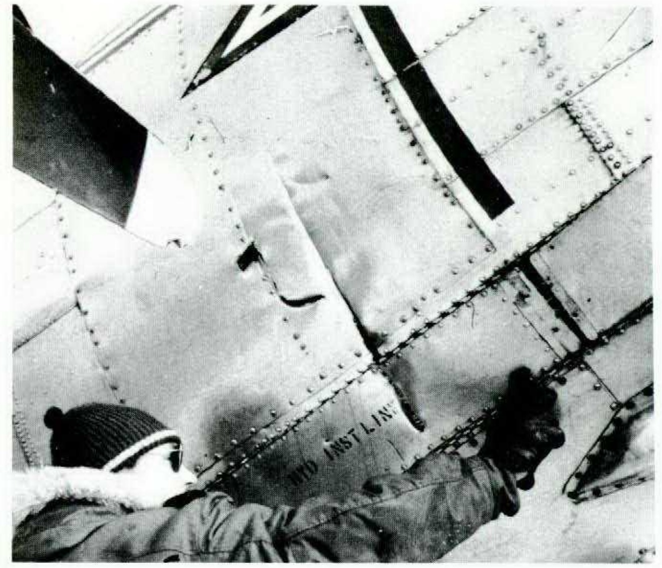
Who was to blame? EO 10A-1-1J states that personnel will ensure that a piston engine is pulled through before a starting attempt is made. This statement puts the onus on everyone connected with the starting and towing of the aircraft. You can be sure that the necessity of pulling a piston engine through before a starting attempt, has been firmly imprinted on several minds.

Hydraulic locks can be costly. Luckily this one wasn't.

UNTIDY HOUSEKEEPING

The groundcrew finished changing all the spark plugs on the starboard engine of the Dakota, and replaced the cowlings. While some of the crew removed the stands and the Herman Nelson, one man went to the left seat for a runup. Two other members of the crew also entered the aircraft, closing the door behind them. The man in the left seat opened the port window and asked the Cpl on the ground if all was clear; on the go-ahead, he started the starboard, and then the port, engine. While he was carrying out a mag check and concentrating on the instruments, the aircraft moved ahead without him noticing it. As he pulled the throttles back, a noise like a back-fire was heard; almost at the same





time, he saw pieces of yellow canvas flying by the window. By then, both engines were at idle.

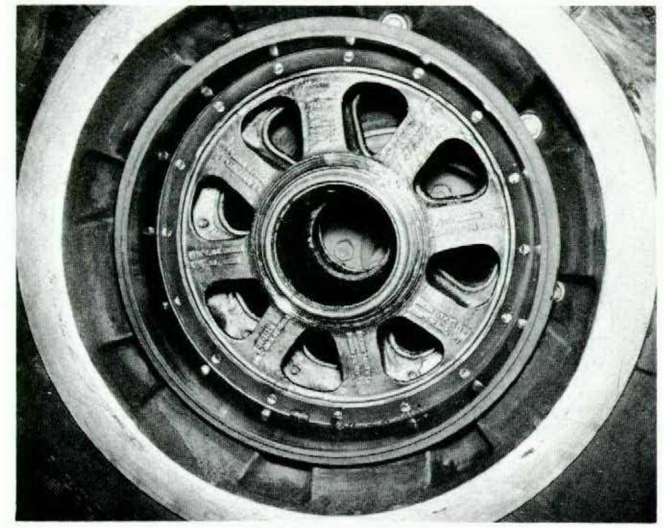
Although the Herman Nelson blower hose had been sucked into the prop, the Herman Nelson itself was not close to the engine. There was no apparent damage to the aircraft, so the crewman decided to let the engines cool before stopping them. After a couple of minutes, another crewman noticed no hydraulic pressure on the gauge. The Cpl was outside waving his arms and giving the sign to stop.

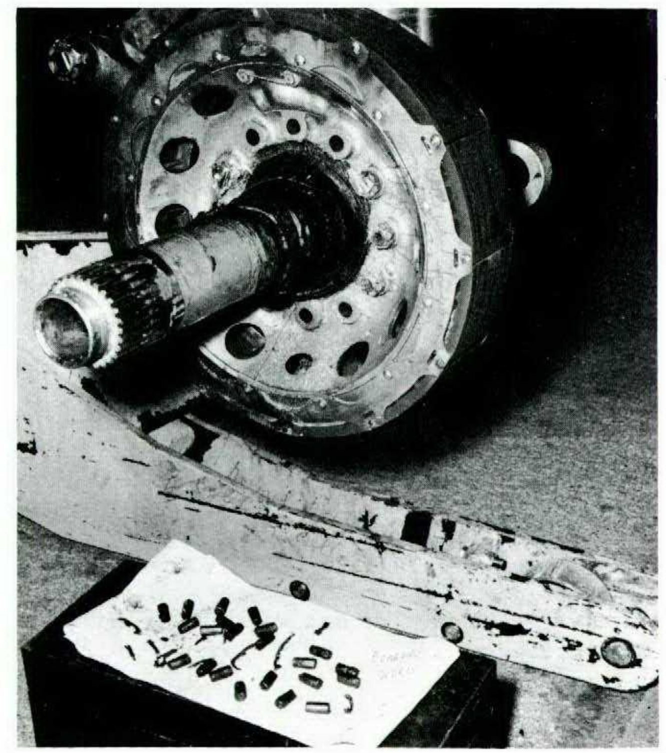
When the crewmen emerged from the aircraft, they saw a hydraulic leak coming from the side of the fuselage; there was a hole in the metal, and a few hydraulic lines had been cut. Three blades of the starboard prop had been dented.

The blower hose had become disconnected from the Herman Nelson, and the combined wind and prop effect drew it into the prop. The whole show was avoidable. Untidy housekeeping practices were to blame.

NO COLLAR

After an airborne test lasting an hour and 30 minutes, the Neptune was being taxied into line on the ramp. About 1200 to 1500 RPM was required to keep it rolling; usually 900 RPM is quite sufficient. On shutdown metal particles were discovered in and around the starboard brake drum.





Investigation revealed that the starboard main wheel was canted at a slight angle in relation to the main oleo leg. This was caused by the failure of the inner bearing, Pt.No. 275/10248, which allowed the wheel to tilt, and the brake drum to ride on the brake block assembly.

This, in turn, had been caused by the omission of Pt. No. 144251, the collar main landing gear axle, during installation of the main wheel assembly. This allowed the bearing to move away from its proper position in the main wheel.

The aircraft had just been given a No.8 check, at which time both main wheel assemblies were removed. The fault lies with the man who signed as installing starboard wheel, and the Cpl who signed as inspecting and passing the work. Two men failed to do their jobs.

WITHIN HAILING DISTANCE

While on a routine training flight approaching Washington DC, a CC109 flew through hail, suffering damage to the airframe and leading edges.

All pertinent weather reports and forecasts had been checked and noted, correct procedures employed, and radar utilized to avoid the worst areas. Despite all this, the aircraft briefly encountered enough hail to cause the damage; it is concluded that the aircraft was flown too close to an active storm cell.

Radar in itself is a valuable aid to avoid active storm cells and areas of heavy precipitation, but pilots should be aware that hail, literally thrown out of a storm cell by strong updrafts, can be encountered as far as five miles from the cell itself.

This hail can be of sufficiently low intensity as to be virtually insignificant on a radar scope, particularly when concentrating on the more active areas.

Review your storm flying techniques now, and remember to give those active cells a wide berth. Even in clear air, hail damage can happen if you're in close proximity to an active storm cell.

FLIGHT COMMENT

ISSUED BY

DIRECTORATE OF FLIGHT SAFETY

R.C.A.F. HEADQUARTERS • OTTAWA • CANADA

September • October 1961

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

BIRD WATCHERS' CORNER

THE NIT-PICKING NUTHATCH

The Nit-Picking Nuthatch is a small creeping bird that feeds on nuts. It is related to the Common Nuthatch and is a species intermediate in character between Titmice and Creepers. Only one major flock have been observed in the field, usually near a large hole in the ground. In the field they are easily identified by their pompous, self-righteous manner and shrill, derisive call, usually directed at lesser birds who, though strong flyers, they consider dull and clumsy. The Nuthatch is difficult to control, because of its tendency to occupy unassailable vantage points, from which it observes and chirps about the well-meaning actions of other birds. Scientific investigation has determined that this aloofness is caused by the habit of being wise after the event, and their persistent attempts to lock the door after the horse has run away.

This bird is reputed to have a variety of calls, but there are no confirmed reports of any call other than:

PILOTERROR PILOTERROR PILOTERROR

WARNING FLAGS PREVENT ACCIDENTS

USE THEM