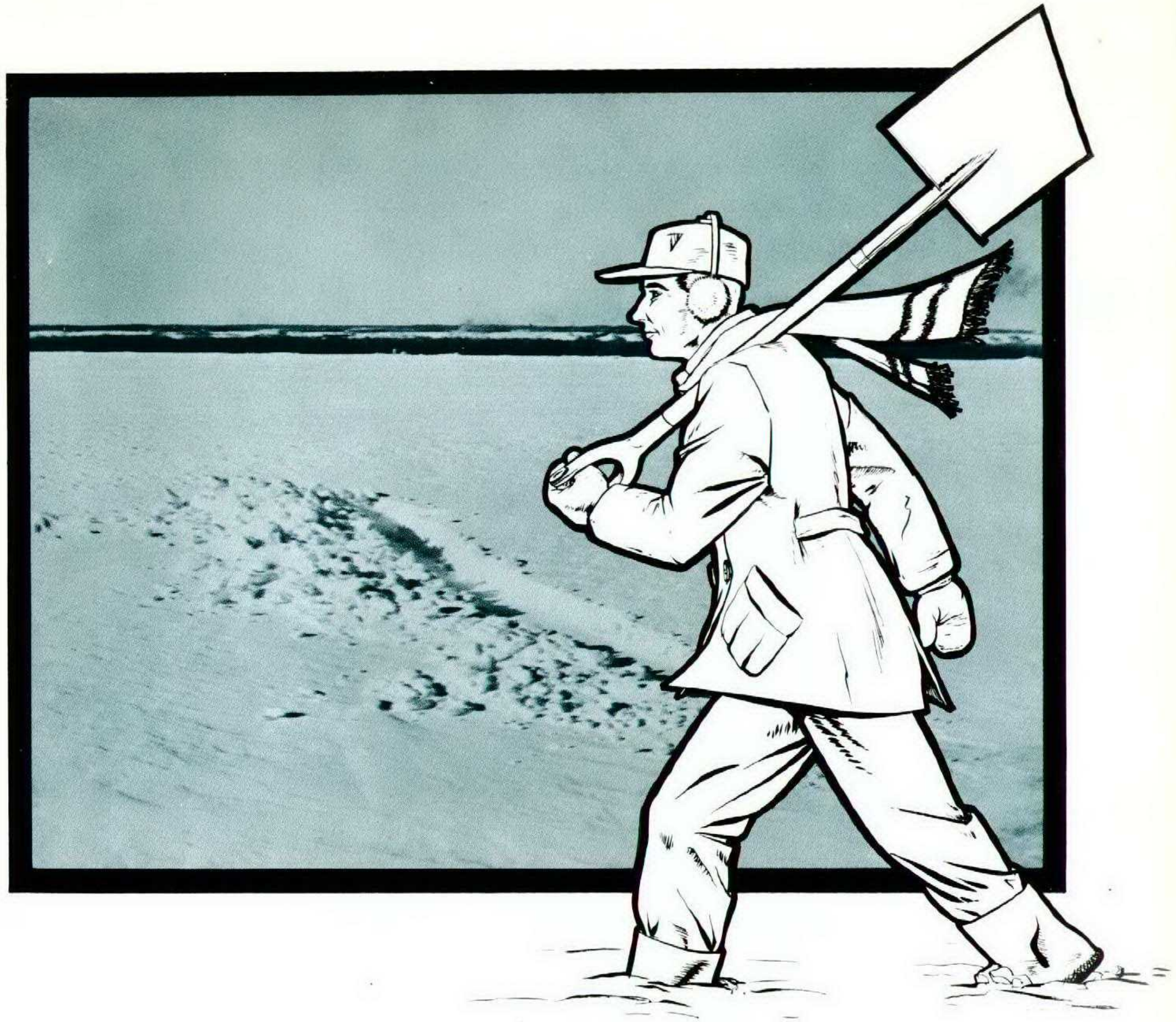
FLIGHT COMMENT

ROYAL CANADIAN AIR FORCE



HERE WE GO AGAIN

Cold, snowy, blowy winter is right around the corner—the season when the pre-flight walk-around tends to become the pre-flight run-around. Taxiing becomes more hazardous and airframe icing becomes a dangerous threat to flight.

An awareness of the hazards and the use of caution will reduce the problems of winter operations.

EDITORIAL

One advantage in publishing the year-end issue of Flight Comment on the first of November is that it gives the DFS staff the opportunity to be the first to send Christmas Greetings to the members of the RCAF throughout the world. Although the greetings are early, they are no less sincere.

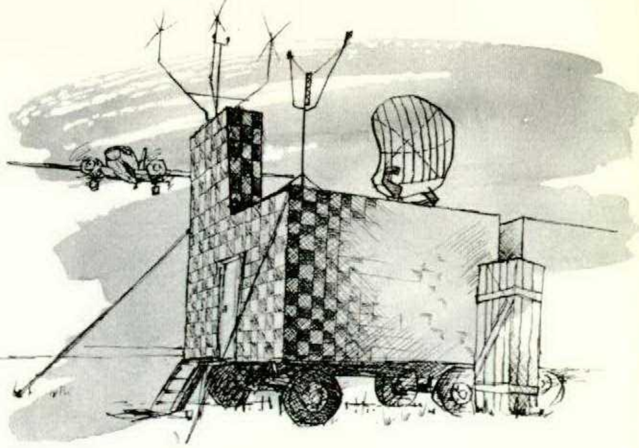
This is also the time of year when it pays to do an analysis of our actions and achievements over the past year. Have your actions and achievements helped to reduce the accident rate in the RCAF? Have you helped to reduce the awful waste in lives, man power, aircraft, and money, which is the direct result of aircraft and ground accidents?

So far this year the number of accidents has decreased and every one of you who expended that little extra effort to achieve this reduction is entitled to that inner feeling of satisfaction—that pride of achievement which is a just reward of the professional airman.

In keeping with the season we have pictured jolly old St. Nick performing his pre-flight inspection. Old Nick has complete trust in his elves, yet he meticulously carries out this inspection himself before taking off on his annual trans-world hop. We can all take a lesson from Santa Claus: he has never had an accident and has always completed his mission on time.

J. J. Jordan

J. J. JORDAN, GROUP CAPTAIN
DIRECTOR OF FLIGHT SAFETY



FLYING SAFETY AND GCA

Gilfillan Bros. Inc.

Occasionally we should realize that the MPN-1, CPN-4, MPN-11, etc., were not designed for supply people, maintenance people, preventive maintenance programs or on-the-job training.

They were designed to get aircraft from up there to down here.

GCA sets have only one purpose—and that's NOT landing aircraft—pilots land aircraft. The purpose of GCA is to control the approach of an aircraft until the pilot gains visual reference and can land visually.

Now, if we all have firmly in mind that the purpose of GCA is to control the approach of a big iron bird, let's examine what we on the ground are doing and what tolerances we are playing with.

What's the glide path angle? 2°? 3°? 10°? Where's touchdown? 750 feet? 1000 feet? 1500 feet? And how high in the air were his wheels when he crossed the end of the runway? 10 feet? 50 feet? or minus 5 feet?

To make this as complicated as possible let's use some figures I have left over from the crash of an Aluminum Cloud (C-124) and from those we can speculate on the Aluminum Overcasts being built.

Legally (then) touchdown was 750 feet from the end of the runway, the glide path was 2-1/2° and a C-124 measured 48 feet from Tipply Top tail to rubber bottom.

Since the C-124 was just about the biggest thing flying, we can assume that all other aircraft are affected to a lesser degree depending on their relative size. For the sake of this discussion, we'll eliminate all possible errors in the radar and human element. Let's say that there is no human error (imagine yourself as a pilot); no radar error; and that an aircraft with a vertical dimension of 48 feet is represented on the radar scope by a radar return representing 48 feet on the scope.

We now have our C-124 perfectly centered on the elevation cursor. Assume, as the controller must, that half the aircraft is above the glide path and half of it is below the glide path. This puts about 24 feet of a C-124 below the glide path. In this instance assume you fly this perfect glide path until you make contact with the concrete. The nose of the aircraft is aimed straight at the touchdown point, 750 feet from the approach end of the runway. But with 24 feet of aircraft below the glide path, the nose (we hope), will never touch the concrete. The lower portions, preferably the tires, must contact the concrete first.

Now, under these conditions, 750 foot touchdown, 2-1/2° glide path on a perfect approach, the tires will make contact with the runway 540 feet prior to reaching touchdown point. This is 210 feet in from the end of the runway and gave you a clearance between runway and rollers of about 8 feet as you crossed the runway boundary.

You have now completed a perfect glide path—but this is not a perfect approach. In actual practice the pilot gained Visual Reference at some point prior to runway contact and began the procedure known as flare out. Flare-out is the procedure designed to reduce air speed and put the craft in a "landing attitude". But this airspeed had now added a third variable to what we want—runway contact.

To review our three:

1. Glide path angle
2. Touchdown point (glide path intercept)
3. Air speed

In our example above, air speed had no relation to runway contact as we came straight in till we hit—however—flare will vary runway contact as a direct function of air speed. And after the pilot adds a few knots for his wife, his kids, and his mother-in-law, its a wonder that some don't go into orbit.

Essentially there are and have been only two types of GCA accidents, undershoots and overshoots and nearly all are called Pilot Error, (GCA error went out when GCA minimums came in) but let's examine our variables and see how close we are coming.

Let's take the glide path first. The allowable glide path tolerance is 1/2°. That is 1/4° high to 1/4° low. This means a 2-1/2° glide path can actually be anywhere from 2-1/4° to 2-3/4° and still be within allowable limits. What does this mean to you? This means that if the glide path is 2-1/4° and you are exactly on glide path you have 4 feet less clearance over the threshold than was originally provided with a 2-1/2° glide path.

Well, that doesn't seem so bad. Let's see what else might have an effect on the perfect glide path. First, we are controlling an aircraft with a vertical dimension of 48 feet. This aircraft presents a radar target which represents about 150 feet vertically on the precision radar scope. For greatest possible accuracy, the controller attempts to keep the centre of this return on the glide path. With practice, he can become pretty accurate.

Nevertheless, scope interpretation is subject to human error (more on this later) and to equipment limitations—scintillation or glint—that make position determination of less than about 17 feet impossible.

Here we have a theoretical clearance of 8 feet over the end of the runway and an equipment limitation of twice that plus an unknown amount of human error in scope alignment and interpretation.

An impossible situation? Not completely. Many controllers and many pilots have made 0-0 landings on GCA and many more will be made. But don't try except in emergencies and then bear the following in mind:

The radar target, as seen on the scope, does not represent the true vertical dimension of the aircraft. Due to the finite size of the beam and other considerations a C-124 radar scope target is about 150 feet vertically vis-a-vis an actual vertical height of 48 feet. Tests, performed by Gilfillan at Fontana, showed that the center of the target is very close to the center of the vertical dimension of the aircraft.

In other words, there is a target tail hanging about 50 feet below and extending about 50 feet above the true target return from the C-124. Tests were suggested and planned for smaller aircraft but never specifically made, however, it is demonstrable that all aircraft will have a tail of some length above and below the true vertical projection of the aircraft.

Consider this fact for a moment and then slowly add to it the fact that all ground obstructions targets must have a fringe or tail above the actual Tippy Top of the thing being painted.

Isn't this delightful? All these radar targets rushing around like a bunch of surreys with a fringe on top (and bottom).

But you can run surreys around all day—in all directions—and at any speed—and never have an accident if the fringes don't touch.

And you can fly aircraft at any altitude—any airspeed—and even inverted—and never have a ground contact AS LONG AS THE AIRCRAFT TARGET FRINGE NEVER MERGES WITH GROUND CLUTTER FRINGE.

Such a simple thought.

Now let's take another simple thought—GCA MINIMUMS. Originally these were designed to establish an altitude below which an aircraft would not descend without visual reference. And in the early days of GCA there were two GCA minimums—one promulgated by Air Force of 100 feet and the other in the mind of the pilot as his own personal minimums—sometimes as low as 100 feet (or in special cases 50 feet) but more normally 200-300 or 500 feet.

Weather reporting being what it is—almost any pilot—in the old days—would come on down—UNTIL he reached his own minimums and if not visual he would seek the better part of valour and head for an alternate.

Air Force regulations being what they are—it wasn't long before minimums began going up—200 feet to 300 feet—and away up over the personal minimums of any self-respecting pilot. Plus that—some real eager beavers managed to make—or brag about making 0-0 landings on GCA.

Here we have a dangerous situation. When minimums are unrealistic—and pilots are big and bold—nobody ever hears the transmission "you are now passing thru GCA minimums" (I've listened to sworn testimony—and the tape recorder).

With this psychological blockage on the part of the pilot, and no visual reference on the part of the final controller, the poor GCA operator can only "call them as he sees them" on the last quarter-mile of final. And, after doing this for years—and watching those fringes merge a half mile out (the pilot saw the runway and hearing that "thank you GCA, nice run")—he forgets that WHEN THE FRINGES MERGE—GROUND CONTACT IS INEVITABLE.

Let's make that ground contact on the runway!

This leaves us with two thoughts for the day. Inasmuch as all GCA accidents have been due to undershooting or overshooting, and as all overshoots are a produce of flare out and airspeed (over which the final controller has NO control), and as all undershots must start with a merging of aircraft radar target and ground clutter target; therefore:

Be It Resolved:

That the final controller will do all in his power (even screaming) to warn the pilot of a dangerous condition when the aircraft radar target starts to merge with ground clutter.

(This is a 50% improvement).

Our second thought for the day must be given to the pilot.

Watch the airspeed.

And about the only way to do that is at flying safety meetings and in practice approaches (until auto trackers giving rate are available).

Flying Safety is an interesting and simple subject as applied to single aircraft on final approach. The objective is to achieve ground contact on an area 100-150 feet wide and, on most runways, about 2000 feet long and nowhere else.

Remember: Merge your targets in that 300,000 square feet and you'll never spell FINAL as FUNERAL.

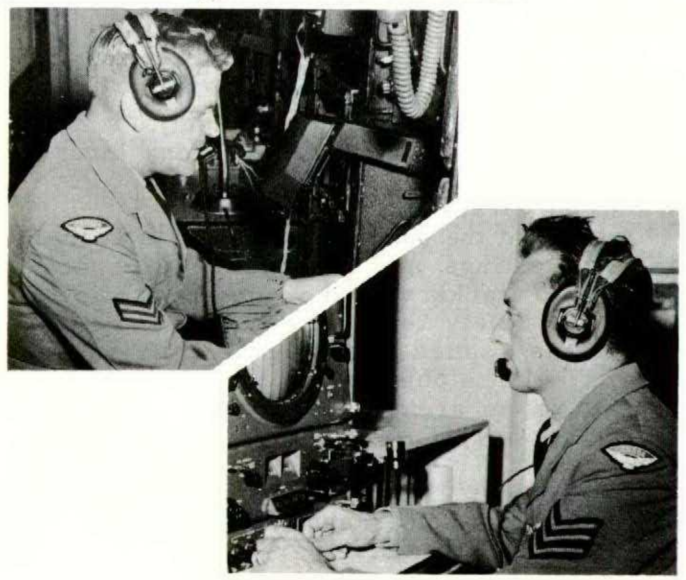
F/O A.W. Wilford

F/O Wilford was flying lead in a formation of four Sabres. At 30,000 feet a rumble and vibration not unlike a severe compressor stall was experienced. Fumes entered the cockpit. The JPT began to increase and rpm to decrease accompanied by a grinding noise, so the pilot declared a PAN emergency to Zweibrucken Approach Control. No. 4 took up a position to accompany F/O Wilford home and Nos. 2 and 3 proceeded home together.

After a descent of 8000 feet was made it became obvious that the engine was seriously damaged. MAYDAY was declared. As the aircraft was descending a compressor stall recovery was attempted without success, so the engine was flamed out and relit on emergency fuel. The rpm and JPT were constant at 34% but when the throttle was advanced to 75% the JPT rose to 800°C. The engine was flamed out again. At 6000 indicated and 11 miles from base the engine was relit and the JPT stabilized at 795°C with 60% rpm. The aircraft entered cloud at 5000 feet, broke out of cloud at about 2000 feet, and was landed without further incident. The compressor had been severely damaged by a foreign object—a low alloy steel bolt of unknown origin.

F/O Wilford with the assistance of No. 4, S/L Knight, handled this emergency skilfully and successfully. The ground staff, especially Zweibrucken GCA, also contributed to the success. GCA had the aircraft in position for a visual approach before minimum altitude forced F/O Wilford to eject. Throughout the emergency F/O Wilford was prepared to abandon his aircraft if at any time the situation became too critical or if GCA was unable to position him properly. Altogether a Good Show of planning, skill and co-operation.

Cpl H.W. Russell
Sgt J.S. Bedard



On 28 Apr 60, an F86 on a night flying mission out of 3 (F) Wing carried out a beacon-GCA approach on return to base. The weather at the time was 1400 overcast, 2-1/2 miles in light rain and fog. Although the aircraft was visible from the tower at approximately 1-1/2 miles, the pilot overshot his approach and requested a square pattern GCA, advising that he could not divert to alternate due to his low fuel state. Sgt Bedard, the GCA Controller who had carried out the initial run, directed the aircraft around into position again and commenced the final approach. At two miles on final, Sgt Bedard's precision scope suddenly went unserviceable. Cpl Russell, his crew partner, immediately took over at his scope and completed a successful approach. Investigation of the reason for the initial missed approach and the pilot's remarks regarding diversion revealed that his windscreen was completely iced up and he had no forward visibility. This led him to believe that visibility conditions were far worse than the weather sequence indicated. His second approach and landing was carried out blind with the exception of the indistinct and blurred runway lights as he touched down.

Cpl Russell is commended for his close attention in following through on the approach even though he himself was not concerned, and for being able to take over so smoothly that all the pilot noticed was a change of voice. Cpl Russell saved the run and prevented a second missed approach when the aircraft was low on fuel.

The successful conclusion of this incident was due to the excellent team-work displayed by this GCA crew. Sgt Bedard, as crew chief, is to be complimented for maintaining the type of discipline that makes such team-work possible.

Sgt L.J. Duggan

The following is an extract from the RCAF Lakehead GCA log:

1705L Call out to assist VC535 (an Expeditor) low on fuel (20 min).
1721L WX P12X 1S BS W/V NW40 to 70. GCA controlled aircraft from approximately 10NM low approach runway 25. Aircraft broke left at 1/2m to land runway 30. GCA gave the wind every ten seconds while on final for 30. Landed OK.

LJ Duggan, Cpl

Sgt Duggan (promoted since this entry was made) demonstrated his ability as a GCA Controller in compensating for the wind which was between 20 to 30 degrees off the runway heading. Because Mt. McKay, 1600 feet, is near the approach to runway 30, this runway cannot be used for GCA approaches. In this case, the pilot could use runway 30 once he had broken clear of the overcast.

Flight Comment commends Sgt Duggan for an excellent job of controlling and offers belated congratulations on the occasion of his promotion.

Cpl Fox
F/L G.A. Saull

When the undercarriage of a Neptune was selected "DOWN", the main wheels showed down and locked and the nosewheel indicator showed an up indication. The FE, who was under training, was sent to investigate. He found the nosewheel was, in fact, locked in the up position. The pilot tried all emergency procedures for lowering the nosewheel, but it would not lower even though it was obvious that hydraulic pressure was reaching the lowering mechanism. The FE was then instructed to put on his parachute and try to discover the fault and, if possible, correct it. The FE noticed that the micro switch up-lock bar was jammed. He pried it loose with a screwdriver and the nosewheel dropped to the half-down position. He pried again and the nosewheel completed the down cycle and locked into position. The Neptune was landed safely.

Subsequent investigation revealed that the lock switch adjustment was incorrect and that the jury strut latch rocker fork end was fouling on the micro switch roller.

The student flight engineer, Cpl Fox, is commended for finding the trouble and releasing the nosewheel while exposing himself to considerable personal danger. He is largely responsible for saving the aircraft from serious damage.

Directorate of Maintenance Engineering

FOR PISTON ENGINE PILOTS ONLY

To some people, anything concerning electricity is an open book; to others, it is a dark and gloomy mystery. The ignition system of your engine is electric, but as far as you, the pilot, is concerned, Ohm's law and the theory of electronics can be thrown out the window. The only thing you are interested in is—Is it working properly or isn't it? The way to find out is detailed in AOIs so we won't even mention that. Instead, let's try to dispel some of the gloom and be informative and interesting.

In the very early days of aviation, all engines were equipped with single ignition. It was usually a magneto but occasionally battery-operated systems were used. The early magnetos were generally unreliable, and it was not long until engine manufacturers began to duplicate the system, so that if one should fail the engine would continue to run on the other.

The early engines were so inefficient and produced so little power, that there was no appreciable difference in power output when the engine was operating on one or both systems. As late as 1947, possibly later, some aircraft were still powered by engines equipped with a single magneto; the Aeronca Champion with the Continental A-65 engine was one example. The great increase in home-built aircraft during recent years, especially in Europe, has seen some aircraft powered by converted Volkswagen and Porsche engines, or one of several other makes, with either single or twin ignition systems.

As engine design developed, cylinder size, rotational speed, and compression were increased, and supercharging was added. Some time during this process of development it was found that dual ignition produced a significant increase in power output—the exact amount, of course, varying with the particular engine. It was not long until this increase of power, or the lack thereof, became recognized as a quick and convenient means of verifying the satisfactory operation of the ignition systems. Any excessive loss of power (rpm) while running on one magneto gave almost unfailing indication of some fault in that half of the ignition system. Similarly, any appreciable difference in rpm while operating on each magneto in turn was cause for suspicion. Then the mechanic took over to rectify the imbalance.

The mechanic sometimes had quite a problem localizing the trouble. The magneto check indicated only that something was wrong, but gave no clue as to the source—sparkplugs, magneto, or wiring. He had to find the offending part by a hit-or-miss process, combined with the voice of experience and the whispering of intuition. The usual process was to start by changing all the affected sparkplugs, as plugs are relatively easy to get at. On radial engines such as the Pratt & Whitney R985 or R1340, the right magneto fires the front sparkplugs, while the left magneto fires all the rear plugs. On Vee-type engines (Merlin) the right magneto fires the intake plugs—plugs nearest to the intake valves, or nearest to the center of the V, and the left magneto fires the exhaust plugs, which are on the outside of the V.

After the sparkplugs had been changed, the mechanic started up the engine and did another magneto check, keeping his fingers crossed. If the check was satisfactory, he sighed with relief, put all the engine cowlings back on and gathered up his tools. If the engine still showed a definite loss of power on one magneto, further investigation was necessary—cleaning or replacing the breaker points, replacing the condenser, checking the wiring for breaks with a continuity tester, checking the insulation on the wiring with a "megger", checking synchronization of the two magnetos, checking all the terminals and connections, and various other steps. Of course, the engine had to be started and a magneto check carried out between steps. Altogether, a long, laborious, frustrating, and expensive process. Naturally there were short cuts. A good mechanic could tell from the degree of power loss, or from the mag drop, and from the amount of vibration, whether one cylinder only was affected or whether several, or all, cylinders were not firing. One cylinder only indicated a faulty sparkplug or wire; several cylinders commonly indicated breaker point or condenser trouble. Still, the process was a long and tedious affair.

This procedure was acceptable—since there was no alternative—on the smaller engines. However, the larger engines containing 14, 18, 24, even 28 cylinders posed a different problem. Such a haphazard method of finding and curing a relatively common fault could not be tolerated. Imagine, if you will, an Airline Company informing one hundred or more passengers of a six hour delay while a mechanic changes a sparkplug! Accordingly, the Ignition Analyser was born. This is another of those familiar "black boxes", complete with cathode-ray tube and tangle of wiring, which are scattered through complex present-day aircraft. In effect, the Ignition Analyser is a TV screen which can show the spark at each sparkplug, and the action of the breaker points, condenser, wiring, etc. Since the analyser is fairly large, and requires a trained operater, it is installed only in the larger aircraft; however, a portable model is available and can be used on any aircraft if the necessary wiring and connections have been installed. The permanently-installed model can be operated continuously, or it can be used for periodic checks every hour or so during a long flight. Defects discovered during flight can then be rectified immediately after landing, with certain knowledge of the location and identity of the faulty part.

The ignition system is essentially unchanged from that used fifty years ago, except for improvements in detail and material. One relatively new system is the "Low-tension Ignition" as used on the Wright R3350 engines. This system uses a low-voltage magneto and, to fire the plugs, a coil (or high-voltage transformer) mounted on the cylinder head. The main advantage of the low-tension system is that only low voltage is carried through the wiring, decreasing the possibility of a breakdown in the magneto and wiring. A man named Henry Ford (you may have heard of him) used the same system on all cars bearing his name from 1910 to 1927. Such is technical progress.

There we have it. A reasonably simple and generally reliable system which, as with all machinery, has its faults and failures. The next time you cancel a flight because of a "mag drop" don't curse the poor mechanic because he couldn't put his finger on the right plug. His crystal ball may not be working.

(During a recent staff tour by DFS, the policy regarding the testing of magnetos in the air was discussed. There was a difference of opinion, so experts from the Directorate of Maintenance Engineering were asked to comment. The following is their answer to whether magnetos should or should not be checked in the air.)

Magneto Testing In The Air

There has been considerable discussion as to the advisability or otherwise of conducting magneto checks while airborne. The following pros and cons may help to clarify the reasons why this procedure is not recommended.

Pros

The pilot is made aware of a malfunction. This would be of value in the event that high engine power was subsequently needed, such as an overshoot.

The maintenance staff may be informed of a malfunction so that remedial action could be taken immediately.

Cons

An engine may be extensively damaged by running on a defective ignition system during the magneto check. A back-fire can seriously damage superchargers, carburettors and intake ducts.

If a magneto is completely dead, switching to that magneto will cause a complete loss of power. The propeller would immediately move toward Full Fine pitch, and when the operative magneto is switched back on, an overspeed may occur. Also, while no ignition is taking place, all sparkplugs may be fouled by unburnt fuel and oil resulting in severe back-firing, mis-firing and vibration when the magneto is switched on.

If, as above, one magneto is dead, the sudden deceleration and acceleration of the engine imposes severe strains on all parts of the engine which may result in mechanical failure at once or some time later.

A magneto check carried out at normal cruising speed and power is useless. The Constant Speed Unit and the windmill effect make an accurate assessment of rpm drop impossible.

Most cases of ignition trouble are accompanied by engine vibration. Vibration, however may be a symptom of many other technical difficulties, such as cylinder, piston or valve failures, faulty carburetion or fuel injection, or internal failure of the engine. A magneto check to attempt to isolate the cause may aggravate the situation.

A satisfactory magneto check is no guarantee that the ignition system will be fully serviceable later. A check may be satisfactory at altitude, but a low power descent, landing and taxiing may, and sometimes does, result in sparkplugs being fouled. This is especially likely when an engine is nearing the end of its authorized flying time.

Conclusions

No Aircraft Operating Instructions contain any reference to airborne magneto checks except EO 05-1-1. The applicable part is on page 69 of pt 2, sec 8, and is para 17.

It is strongly recommended that NO magneto checks be carried out while airborne. If a pilot wishes to carry out a magneto check before stopping the engines, the check should be made after the aircraft is parked; if the parking area is crowded the aircraft may be stopped on the taxi strip for the few seconds necessary to carry out the check. There would then be a reasonable expectation of having a satisfactory ignition system the next time the engines are started.

STATISTICS

The following is an excerpt from an article by Dr. Linus Pauling titled "Observations on Aging and Death" which was printed in the magazine "Engineering and Science", May, 1960.

The Dangers of Air Travel

"While considering the effect of automobile accidents on life expectancy, I decided to make a somewhat similar calculation about airplane travel. In 1959 there were 0.67 deaths per 100,000,000 passenger miles on American commercial planes, and in 1958 there were 0.34. The average of these is 0.50 per 100,000,000 passenger miles. I am not sure how many passenger miles were flown by Americans, but I believe that it was approximately 3×10^{10}. A simple calculation indicates that travel by commercial airlines is associated with a mortality at the present time such as to lead to about one day decrease in life expectancy for Americans. Moreover, it is found that, per mile travelled, travel by commercial airlines is about five times as safe as travel by automobile.

"How much chance of decreasing your life expectancy do you take when you decide to make a trip by air? A jet plane now travels about 500 miles per hour. The number of deaths in commercial air travel leads at once to the conclusion that the decrease in life expectancy resulting from the decision to make the trip by air is about 1 hour per hour travelled. On the other hand, smoking a pack of cigarettes per day for 40 years decreases life expectancy by 8 years; smoking one pack accordingly decreases life expectancy by one fifth of a day, 4.8 hours—which is 14.4 minutes per cigarette smoked. I have measured the length of time required to smoke a cigarette, and have found it to be about 4.8 minutes. Accordingly the process of smoking a cigarette involves a decrease in life expectancy for the smoker which is three times the time required to smoke the cigarette: smoking cigarettes is three times as dangerous as travelling in a jet plane. Travelling in a jet plane while smoking a cigarette is four times as dangerous as travelling in a jet plane and not smoking. If you fly in an airplane and don't smoke cigarettes you are three times as safe as if you stay at home and smoke cigarettes, or four times as safe as if you fly in an airplane and also smoke. I think that this is a very interesting comparison, which all people—all young people especially—ought to know: for whatever length of time they devote to smoking cigarettes they are losing three times that much time from their life."

1959 AIRCRAFT GROUND ACCIDENTS

On 1 Aug 60, aircraft ground accidents came within the purview of the Directorate of Flight Safety. As a start, we looked at the 1959 reports. There seemed to be nine general groups into which the accidents could be divided: towing; collision; damage while parked; and while undergoing maintenance, jettison systems; fires; undercarriage collapse or retract; jacking or lifting; runup; and inevitably miscellaneous. A number of these accidents have been reported in the "Arrivals and Departure" section of Flight Comment; but a quiet review might be useful.

Ten little aircraft were towed to the "line",
One had no brakeman, now there are nine.

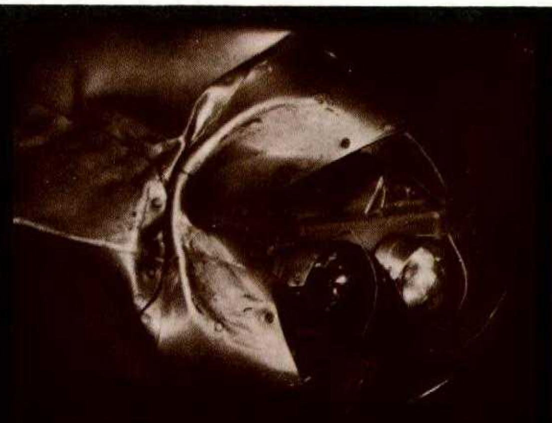
In 1959, twenty-eight aircraft were damaged in towing accidents. In 17 of these accidents there was a full crew! Here are some examples: The port rudder of an Expeditor hit a snow bank—two of the crew had stayed behind to close the hangar doors, the wingman was riding on the tractor. While an Argus was being pushed backwards, the wing tip hit an engine tent—the Cpl i/c spoke to the brakeman and the driver thought that the Cpl had spoken to him. A C119 was being pushed out of the hangar when it collided with another C119—there was only a driver and a brakeman. Three accidents occurred when aircraft were towed without a man on the brakes!!

For accidents in this group it is much easier to find excuses than reasons (only four listed hazardous conditions). Perhaps this is because there is very little reason for a towing accident. EOs and locally issued instructions must be followed. Take your time. Know where you are going. And go safely.

Nine little aircraft in the "ready state",
One stopped a tractor, now there are eight.

Twenty-eight stationary aircraft were damaged by collision in 1959. Yes, the same number as for towing accidents; but the cost of repairs

A T-33 was damaged when it was towed over a chock which fell from the mule.



Insufficient brake pressure. Damage to the rear of a CF100 which was struck by another CF100 that broke away from its tow vehicle.

The canopy of a T-33 was closed with the seat arming lever raised.

was five times greater and required approximately three times as many man-hours as repairs for accidents to towed aircraft. Twelve of the twenty-eight were hit by tractors! Some examples: An untrained driver damaged the starboard horizontal stabilizer and aileron of a T-33—said his foot slipped off the brake. The elevator trim tab of an Argus was hit by a giraffe—the driver put the Unitow into third gear instead of reverse. A Sabre was damaged when two energizers in a train of three being towed by a Unimog came unhitched and ran wild. A photographer on hangar guard duty started a D12 and ran it into a Neptune and an energizer! An L19 was hit by a fuel tender—the driver was backing up without a guide.

The cause of many of these accidents was carelessness—too much speed, putting tow vehicles in the wrong gear, not securely hooked up. One was caused by an unauthorized civilian truck roaring about in a hangar. An Argus is approximately 128 feet long, 142 feet wide, 39 feet high, and weighs about 74 tons; an L19 is 21 feet long, 36 feet wide, 7 feet high, and weighs just over 1 ton. One is too big and the other is too small, as are all the types between, to get out of your way. Know what direction your going to go when you let the clutch out. Watch where you are going. Go around a parked aircraft—you can't go through one, not safely anyway.

Eight little aircraft faced the wrath of heaven,
One had no gust locks, now there are seven.

Eleven aircraft were damaged while parked where collision was not the cause. In this group five of the accidents were caused by thoughtlessness: one damaged by the slipstream of another aircraft on runup, one hatch came off during runup and struck the propeller, and three were caused by bashing parts of aircraft with stands. One accident was caused by a short circuit in an energizer. Five accidents were caused by high winds.

In all these cases, except the short circuit and wind cases, the damage was caused because the technician concerned didn't use his eyes. An item in the Sep-Oct issue of Flight Comment suggests that many of our wind damage cases could be avoided by closer liaison between the "Met Section" and Servicing. Look, and be sure you SEE what you are looking at. Then exercise your own good judgement.

Seven little aircraft waiting for a "fix",
One blew its canopy, now there are six.

This group, jettison systems, is the largest of the lot—40 cases! It also brings us around to the errors made by technicians while actually working on aircraft. Twenty-five of the forty were CF100 canopy links, eight were rocket pods or tanks, five were canopies; one a seat initiator, and one a canopy initiator. The largest single cause was "inadvertent operation of the switch". Twenty-six cases! All the CF100 canopy links and the drop tanks of a Sabre were 'switch accidents'. The classic case of carelessness in this group is that of a blown Sabre canopy—an airman pulled the wrong handle! True, the emergency canopy and emergency undercarriage handles are close to one another but there the similarity ends. They are different in shape and in markings.

Sir Edmund Hillary climbed mount Everest because it was there, one step at a time. Maintenance operations must be performed in a like manner, because the work is there and one deliberate step at a time. A slip could ruin the whole show.

Six little aircraft with several circuits "live",
One caught on fire, now there are five.

Twelve aircraft, 3 Expeditors, 2 Sabres, 2 CF100s, and one Argus, C119, Dakota, Harvard, and Neptune, were damaged by fire. There was a flash fire in another Argus which did not cause any damage. Here are some examples: During an electrical inspection on a Sabre, a clamp was allowed to touch the primary bus when a cable bundle was pulled out to check the terminals. A Sabre starter lead was left disconnected and burnt a hole in a low pressure fuel line when the energizer was turned on. While checking a CF100 fuel pump, the technician was called away to carry out a current delivery check—the live fuel pump wire shorted and ignited drained fuel. A C119 heater drain line was left disconnected. The neutral generator lead in an Argus was not connected to the terminal strip.

In the 'good old days' aircraft had a magneto, a "boy" to swing the prop—for an energizer, and a really posh aircraft had a generator tied to a strut somewhere. 'Electrics' were not much of a problem. Today 'electrics' are most important in the operation of aircraft. They are also the most important cause of fire. HANDLE WITH CARE.

Five little aircraft standing on the "floor",
One had an UP selection, now there are four.

In the undercarriage collapse or retracted group five accidents are listed; two Argus, two CF100, and one C119. All but one accident, an Argus, were the result of the undercarriage selector being left in the UP position after a retraction test. One Argus had its nose gear disconnected before it was jacked.

A number of these accidents have been reported in Flight Comment and in most reports the technicians have been given rather rough treatment. This time, however, the question is "What is being done at unit level to prevent such accidents?" Are the technicians properly supervised? Are they expected to work on two projects? Is anything being done to increase

their pride in their work? Carelessness may be a symptom of a more serious condition.

Four little aircraft were jacked carefully,
One had no tail trestle, now there are three.

Two CF100s, an Argus, and an Expeditor suffered damage in jacking or lifting accidents. These were caused by lack of adequate supervision. Examples: Someone removed the tail jack from an Expeditor which was jacked—when an airman entered the aircraft it tipped back onto its fins and rudders. The nose jack of an Argus was raised faster than the mainplane jacks forcing the tail of the aircraft down onto the tail steady trestle. And, because the Tee-bolts on slings were only screwed into the wood, the rocket pods of two CF100s were dropped—the Tee-bolts tore out of the wood.

Think of the weight you are throwing around when you jack an aircraft. A man can seriously injure himself by lifting 50 pounds improperly. What can he do with a 70 ton aircraft worth million of dollars?

Three little aircraft maintenance all through,
One jumped its chocks on runup, now there are two.

Four Sabres, a CF100, and an Expeditor were damaged during runup. A Sabre, and an Expeditor yet!, jumped the chocks during runup. A Sabre and a CF100 ingested metal objects—a handful of screws were left in the Sabre's intake duct and the CF100 ate part of its temporary cockpit cover. It seems just a wee bit ironic that one man's carelessness can ruin the result of hours of painstaking work by maintenance technicians.

Like the man said, "thinking is cheap; thoughtlessness expensive."

Two little aircraft, will they ever run?
A technician was careless, now there is one.

In the miscellaneous group there are ten accidents. Two Expeditors, an Argus, and a CF100 that had their flaps lowered onto various and sundry objects. A technician left the transmitter of a CF100 dangling between the flaps and fuselage overnight—next morning the flaps were raised. A CF100 dropped a rocket pod because the waisted bolt had not been installed; another had its radome dropped when the locks were released before the radome was properly supported. An Argus had its ASW doors closed on a step ladder. And two canopies were broken when a T-33 canopy was closed on the seat arming lever and a CF100 canopy was closed on a drogue gun.

To get this far we looked at 149 accident reports. Units, you take it from there.

One little aircraft the work of ten can't do,
For aircraft, like people, run out of pooh.

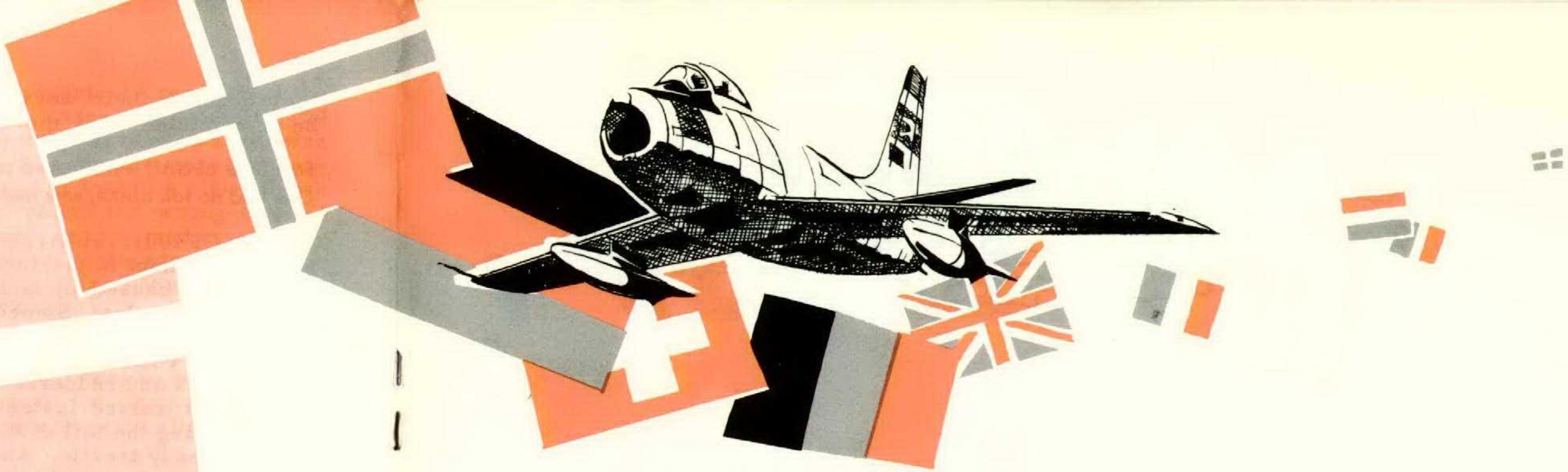
EXPLOSIVES

A member of one of the RCAF's North Bay Bomb Disposal Team was directed to proceed to Peterborough, Ontario, to investigate and report on the circumstances surrounding the finding of a rocket. The investigator confirmed the store to be a 2.75 inch rocket. Fortunately the motor, which had burnt itself out, was fitted with an inert plaster filled head.

The investigator's report explained that one of the town telephone operators had been notified that a number of children had been seen playing with a rocket. The operator went to the children's parents to retrieve the rocket. The operator was informed that the children had found it on a beach in the vicinity of the town and was questioned as to what right she had in meddling in this affair and taking away the children's plaything. Admittedly the operator should have notified the civil or military authorities in lieu of actioning the case personally, however, the rocket was eventually surrendered to an RCAF ground observer officer who brought it to the attention of North Bay Bomb Disposal Team.

These children are alive to-day; others might not be so fortunate, as the rocket head might be a highly explosive one. How many similar cases have gone unreported. We don't know, but we do know that it is up to you to inform your dependents and the public of the dangers involved. You may not be familiar with the exact procedure for reporting such matters but a degree of common sense will tell you to treat unfamiliar objects which you can't identify with suspicion. You should isolate them from children until such time as you can relay your findings to a responsible authority, i.e., civil, military, or RCMP.

AMC Quarterly Review



JET TRAVEL A L'EUROPE

by S/L C. T. Glauser
Flying Control Officer, 1 Air Div

Any pilot who has flown through the European sky in the past decade can strongly support the statement recently spoken by Mr. Knuth Hagrup of the Scandinavian Air Lines System, "It has become increasingly apparent that the organization of air traffic control...cannot function properly when broken up into independent and unrelated political subdivisions".

Until very recently (late 1959), when civil airline jet traffic appeared at the higher altitudes, all altitudes above 20,000 feet were left entirely to military jet traffic. There was a phrase "calculated risk" associated with traffic in this area and control of IFR traffic was very spotty.

However, with the coming of the jet airliner, upper air routes—flight levels (FL) 200 to 400—appeared and control of IFR traffic became mandatory. Yes, overnight all the military air traffic flying around uncontrolled became controlled. This was a sudden change to most military pilots who were accustomed to almost no control. It was also a shock to the national controllers who were suddenly given the control but didn't really have any idea of the number of aircraft which had to be controlled. Nor were they accustomed to jet traffic and its limited and often critical operational capabilities. In short, confusion reigned supreme.

To meet this situation the European air traffic services took advantage of the existing radar units and, using them to their maximum capabilities, declared there would be two basic types of traffic to control: General Air Traffic and Operational Air Traffic.

Let us examine these two types of control as they dictate the procedures to be followed; first of all, General Air Traffic. As we have stated previously upper air routes were developed from FL 200 to FL 400. After the first onslaught of traffic in November 1959 the control agencies suddenly realized that they did not have adequate equipment to control the air routes above FL 250. Therefore today these upper air routes are controlled from FL 200 to FL 250 as long as there is traffic on them. Above FL 260 the space is now known as a Flight Information Region. However, as experience is gained by controllers and with improvements in the Air Traffic Control System, the air routes will again be extended and control effected to FL 400.

The controlling agency for all France is located at Paris and is known as "France Control". "Brussels Control" controls the upper airspace over Belgium and Luxembourg, "Rhein Control" controls North West Germany and "Rome Control" controls Italy. All these agencies have variations of procedures and regulations which, while basically the same, contain sufficient differences to trap the unwary. All the aircraft that can fly in accordance with ICAO standards—that is, fly predetermined routes—carry radio frequencies to pass correct position reports can be re-routed without handicapping the operation of the flight, in short "make like an airline", and can be fitted into the General Air Traffic. The pilots of these aircraft declare their intentions on their proposed flight plan in the remarks section by inserting G.A.T.

If the nature of the exercise or the equipment carried is such that pilots are unable to conduct their flights in accordance with the General Air Traffic requirements, then they may file an Operational Flight Plan. When this is done the entire IFR flight must be closely controlled from FL 200 to FL 400 by a military radar unit. Fortunately, during the daylight hours, most of the military jet traffic is able to operate 1000 feet "on top" of all cloud. During the hours of darkness there is no such thing as VFR in most of the European countries, however, one country at present permits VFR at night. While a change of regulations is expected, the present situation is complicated. During the night hours operational jet traffic has to be limited as the air traffic radar units can become easily overtaxed and are unable to give the close control which is required of them.

The flight plan for this Operational Flight is usually a brief form and requires very little pre-flight co-ordination. The pilot files with the local agency, operations usually, who pass it on to the local radar unit approximately 15 minutes prior to the ETD. The pilot proceeds to his aircraft and either receives a procedural departure from the local approach control or is directed to climb with a radar departure. He is then controlled by radar as long as he is actually flying under Instrument Met Conditions (IMC). At night he is controlled at all times and handed from one radar to another. One requirement is essential: A pilot must ensure that the correct frequencies are available to establish contact with the various radar units. Oh yes, there are a couple of difficulties to be encountered; for example, in France the English language cannot be guaranteed by all the radar units. Also the hours of radar unit's operation must be checked; they are not all on a 24 hour basis.

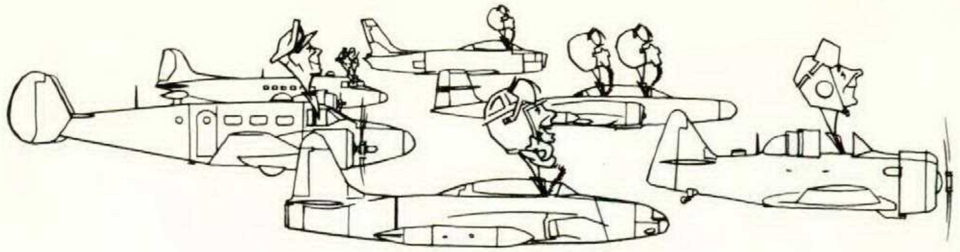
The operational flight plan is relatively simple compared to that required for General Air Traffic. In this case the pre-flight planning must be much more thorough and is much more time consuming. The pilot must be prepared at all times to be able to comply with the unexpected. For example, the phrase "cleared via flight plan route" takes on a variety of meanings. When the pilot hears this clearance before takeoff—perhaps on an instrument rating ride—he says to himself "are they ever good to me!" But pilot beware! No sooner are you settled on course in the climb-in cloud and you contact your controlling agency than you are instructed to report over a radio fix you may have to fumble to find. Mind you, the route has been just slightly changed—perhaps 45 degrees or to a different airway from that originally requested.

But don't let this discourage you from flying in the General Air Traffic System. At least one and a half hours prior to your ETD a thorough study should be made of the route you intend to take.

(a) Check the upper air routes and all possible variations.
(b) Ensure that you plan your flight along the correct route for the direction of flight avoiding "going against the stream" on one-way airways.
(c) Check all the compulsory reporting points.
(d) Take note of all the radio beacons at least 75 miles on each side of the route.
(e) Check your quadrantal flight levels. These have not been standardized in Europe and vary with political boundaries.
(f) Ensure you have the frequencies required to contact the controlling agencies.
(g) Check your destination and alternate for serviceability.
(h) Check the weather, then recheck it.

Now that the preparatory work has been completed and your flight plan has been passed to the controlling agency at least 30 minutes prior to your ETD, you proceed to your aircraft. Prior to starting your engines it is in the interest of fuel conservation that you contact the control tower on ground power and request your ATC clearance. Cases have occurred where clearances have been delayed up to 45 minutes which, when fuel is critical, may mean you will have to abandon the proposed flight. Most of the delay is caused by the co-ordination required. For an example, a flight from South West Germany to Belgium will require co-ordination between three controlling agencies of different nationalities. This must be done before a clearance can be issued to the pilot of an aircraft. Once the clearance is received, the engines may be started and a normal IFR flight expected. But, be prepared for unexpected changes.

A thoroughly planned IFR flight is the key to a successful General Air Traffic Flight. The number of aircraft flying in the upper air in Europe over an area comparable to Ontario and Quebec is two to three times that which can be found flying over all of Canada. So, regardless of the clearance you have, and regardless who you got it from, unless you are really IMC on the dials, the "swivel neck" will provide the best protection to make your clearance valid.



HEADS-UP FLYING

RUDDER CONTROL DISCONNECT

F/L Gervais took off to flight test a CF100 that had been previously rejected for roughness and vibration in the nosewheel. At the time the wind was 30 mph gusting to 40 mph with moderate turbulence. On the downwind leg of the second circuit, the aircraft suddenly yawed and the port wing dropped. The aircraft responded to aileron but the yaw persisted for a few seconds. The controls were de-boosted and, because the aircraft was over a built-up area, the pilot continued downwind across the city before taking further action. When he was clear of the city F/L Gervais realized that he had no rudder control but, in spite of this handicap, he returned to the aerodrome and made a successful landing.

This incident was caused by the bolt which connects the booster valve control rod to the rudder booster lever not being in place. The missing bolt was found in the aircraft, but no nut, washer, or cotter pin could be found. This of course meant that the rudder pedals were never securely connected to the rudder.

F/L Gervais is commended for his Heads-Up handling of a seriously disabled aircraft over a built-up area.

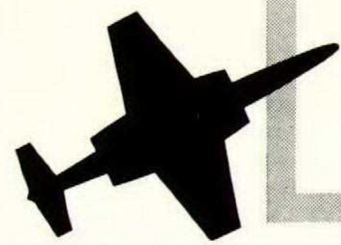
KNOWLEDGE AND AIRMANSHIP

A North Star, with F/L Johnson as captain, was taking off on a passenger transport mission. Late in the takeoff roll there was a tendency to swing to port and some nosewheel skidding occurred when corrective action was taken. Forward pressure was applied to the control column to increase nosewheel traction. When the undercarriage was retracted immediately after lift-off the "in-transit" warning light stayed on. The undercarriage was inspected, using the drift meter. The nosewheel doors were still open. At this time the tower informed the captain that the nosewheel appeared to be cocked shortly before takeoff and, as the nose steering wheel was free to turn, it was assumed that the nosewheel had not centered before retraction.

The landing gear was extended and checked with the drift meter. The nosewheel was centered. The aircraft was returned to base and before landing fuel was dumped, all loose articles were secured, the passengers and crew moved to the rear to get the C of G as far aft as possible to allow the pilot to hold the nosewheel off as long as possible, a pass by the tower was made to confirm that the nosewheel was, in fact, centered, and crash equipment was requested. The North Star was landed without further damage.

Investigation revealed that a bracket, pt. No. 116447, was broken which, in turn, allowed the arm assembly, pt. No. 2110244, to slip out of place and cause the follow-up cable to break. During the takeoff run the nosewheel cocked and the centering cams jammed so the oleo could not extend and center the nosewheel on retraction. When the nosewheel retracted cocked, it is assumed, the nosewheel fork contacted the shoe turning the nosewheel to the centered position. The oleo then extended and damaged the shoe and door operating link.

Throughout the entire emergency, F/L Johnson's knowledge of his aircraft and SOPs, and his high standard of airmanship in taking advantage of all available facilities prevented a major accident.



NEAR MISS

LANDING HAZARD

An instructor and a student were doing circuits and landings in an Expeditor at a field where both runway 07 and runway 13 were in use. The Expeditor was using 07 and a Viscount had been cleared to takeoff position on runway 13, just clear of 07.

The Expeditor crew received and acknowledged landing clearance. When on final, the instructor used the intercom to correct the student so neither instructor nor student heard the Viscount's takeoff clearance. The Expeditor was landed and was rolling, tail up, past runway 13 when it swung violently to port. It had caught the full blast of four Dart engines because the Viscount was slow in initiating its takeoff. The swing was corrected with power and harsh braking and the Expeditor stopped undamaged.

The dangers involved in a situation like this are obvious. Tower controllers and pilots at terminals used by large aircraft where traffic necessitates the use of two runways must watch for this situation. There are better places to dodge Darts than at the start of the landing roll.

DAKOTA CONTROL LOCKS

This Near Miss occurred during a flight in a Dakota aircraft. The flight was a short transport trip with a planned quick turn-around at destination. The captain remained with the aircraft at the destination base. When all was ready, the crew boarded the aircraft for the return trip with the co-pilot at the controls.

The co-pilot experienced some difficulty during the takeoff run but got the aircraft off the ground. After reaching cruising altitude the co-pilot asked the captain to check the rudder as it felt queer. The captain checked the rudder and realized that the rudder was locked in the neutral position. A check of the control lock stowage was carried out and it was discovered that the rudder lock was missing. The captain advised the tower at base and carried out a successful landing.

It was determined that the groundcrew at the destination base had installed the rudder lock when the aircraft was parked. Although the captain was standing by the entrance door he had not noticed this being done. The installation of only the rudder lock by the groundcrew was error number one. The tail locks for the Dakota are tied together to prevent any one lock being used separately. The principle behind the tying of the locks together is that all locks are used at the same time. In this case the groundcrew either separated the locks or the locks were not tied together in the first place. The wind at the time was calm and there was no reason to install the rudder lock in the first place.

The co-pilot taxied the aircraft to the takeoff position and carried out a takeoff run and climbed to altitude before he realized something was amiss with the rudder controls. This could happen only when extremely poor operating techniques are used by the aircrew. In the first place the co-pilot obviously did not use rudder in taxiing, or he would have realized the situation. In the second place the crew did not use the proper check list; the second last check before the takeoff on a proper check is "controls". The controls are checked for free movement throughout their full range. Further it is difficult to visualize the takeoff run in the Dakota aircraft without the use of at least some rudder. In the report the co-pilot stated that he experienced difficulty during the takeoff roll. This difficulty was not spelled out but it is assumed that he had directional control difficulties. Why the blocked rudder was not discovered then is hard to understand.

This report ended up as a Near Miss but it could just as easily have been a bad accident. As in all cases similar to this one, there is one person who makes the mistake—the groundcrew who installed the rudder lock—and there are others who could have corrected the mistake. The groundcrew who installed the lock could have removed it, the aircrew did not do a walk-around check, flying control did not notice that the rudder lock was installed, the aircrew missed many opportunities to discover the rudder lock themselves. In this case we are fortunate to report a Near Miss instead of a write-off.

NOSTALGIA

Absence, they say, makes the heart grow fonder. But in my case it also left me with the idea that I knew all about a station where I had spent six years, but from which I had been transferred two years ago. What better way to get in some training than a trip back? For two years I had religiously maintained my flying proficiency so I knew the Flight Planning Centre at Practice Flight inside out. Get a T-bird. Whip off a flight plan (no need to check NOTAMS). Get airborne.

Here's what I missed:

"DOM CYED 073 SOUTHEAST 5600 PORTION OF RUNWAY 11/29 OPEN FOR TRAFFIC EFFECTIVE 15 JULY STOP TEMPORARY THRESHOLD OFF RUNWAY 11 IS 900 FEET SOUTHEAST OF INTERSECTION MARKED BY RED CONES EXTENDING OUTWARD FROM EDGE OF RUNWAY AND WHITE STRIP ACROSS RUNWAY STOP TOUCH DOWN POINT FOR RUNWAY 11 MARKED BY YELLOW STRIP EXTENDING OUTWARD FROM EDGE OF RUNWAY 500 FEET FROM TEMPORARY THRESHOLD STOP HEAVY EQUIPMENT AND CONSTRUCTION WILL EXIST ON APPROACH TO RUNWAY 11 UP TO TEMPORARY THRESHOLD WITH NO UNDERSHOOT OR OVERSHOOT AREA AND NO TAXI ACCESS TO RUNWAY 21 FROM THE INTERSECTION STOP AIRCRAFT WILL TAXI VIA 02 ALONG TAXI STRIP FOR RUNWAY 29 THEN ON TO RUNWAY 11/29 VIA THE FIRST CUT OFF STOP RUNWAY 02/20 CLOSED TO ALL TRAFFIC EXCEPT TAXIING AIRCRAFT STOP NAMAO REMAINS CLOSED TO ALL BUT ESSENTIAL TRAFFIC.

"DOM CYED 075 CORRECTION NAMAO AERODROME CLOSED TO ALL TRAFFIC EXCEPT AUTHORIZED SCHEDULED FLIGHTS OR NON TRAINING REPEAT NON TRAINING OPERATIONAL FLIGHTS AND EMERGENCY STOP NO OTHER FLIGHTS ACCEPTED WITHOUT PRIOR AUTHORITY FROM THE COMMANDING OFFICER.

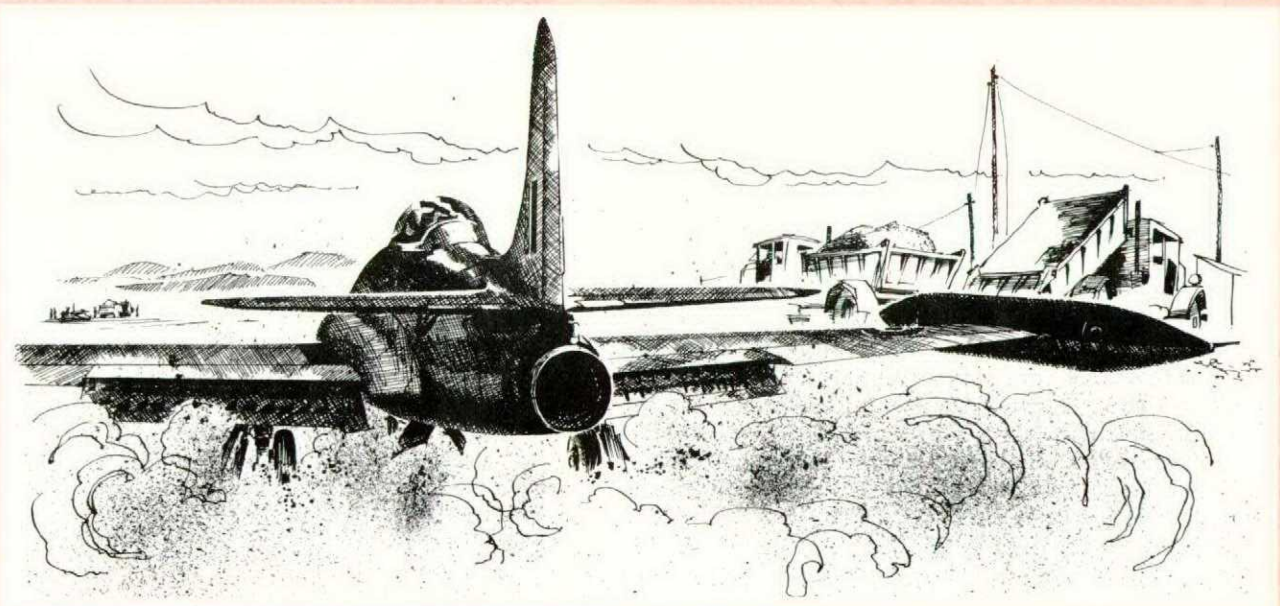
I was in such a hurry to get to my destination that, expert opinion to the contrary, I made it from Ottawa to Portage without a refuelling stop. At Portage I refiled for my destination—and missed checking NOTAMS again. I saw the destination field from 29,000 feet, cancelled IFR and requested landing instructions.

The tower gave me runway 29 with a right-hand pattern and the altimeter setting. Just before I let down I turned on the defroster, but during the descent the windscreen frosted over and was only partially clear at touchdown. Touchdown was made 2000 feet down the runway as there was traffic in the circuit behind me. Then, through a small clearing in the windscreen I observed that the runway ahead appeared to be nothing but smooth, compact gravel. Brake pressure was released.

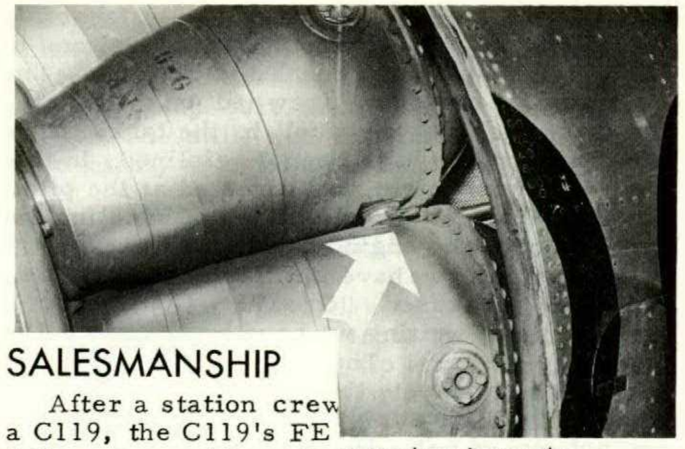
My observations were correct, and while I was rolling across the gravel I asked the tower if they had informed me of this condition. The tower said they had not because they assumed I would have read NOTAMS.

When the dust had cleared the T-33 had blown a tire and the Station Commander had blown his top. All debris landed on this pilot who is resolved never to assume anything when he prepares future flight plans. (The pilot concerned has gone into hiding, but if urgently required, he can be found checking NOTAMS.)

(The subject of a standard presentation of NOTAMS in FPC's, and their translation into a more easily read form, is at present under active consideration at AFHQ. In the meantime, SFCO's are urgently requested to do all they can to ensure that NOTAMS are current, and are brought to the attention of pilots during flight planning.—ED)



ARRIVALS and DEPARTURES



nector clamp incorrectly.

SALESMANSHIP

After a station crew a C119, the C119's FE full runup could not be mac was slippery. The FE then tried to position the propellers by means of the starter switch to check the fluid level. He discovered that the starboard propeller would not rotate so he reported this to the PI crew. The PI crew confirmed the propeller lock and, to clear it, rotated the propeller counter-clockwise two revolutions. Some discussion took place as to why the propeller had locked and, apparently, the captain and FE were induced to accept the aircraft on the grounds that it was a hydraulic lock which was cleared by backing off the propeller.

A full power check was done on the initial part of the takeoff roll. When MAP reached 50 inches, there was a torque drop of 40 psi so the takeoff was aborted. After the aircraft was stopped the starboard engine would not respond to the throttle and, because the oil pressure was dropping rapidly, the engine was shut down. The oil filters contained metal chips and when the propeller was moved by hand the engine sounded very, very sick.

There are many questions raised by this "caper". For instance: Why would an FE accept the hydraulic lock theory when he had just shut down the engine, or why would he accept an engine that developed a hydraulic lock in so short a time? Under the circumstances, why did the technicians diagnose hydraulic lock and where did they discover so unique a cure? Certainly not in EOs. The captain, because he could not do a full power check on the tarmac, chose to interpret "intent to fly" as meaning that he would take off if the engine checked out on the takeoff roll. What would he do if the engine failed just as he reached flying speed?

From a flight safety point of view, this accident is a fine lesson in the teamwork that is necessary between groundcrew and aircrew. Pilots must rely on the integrity of the ground staff. The FE, who is thoroughly familiar with his aircraft, is the bridge between the pilot and the technician and he should not allow his pilot to be talked into accepting an aircraft of doubtful serviceability. Technicians are the people to whom the aircrew trust their lives. In this

NOSTALGIA

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NOTAMS). Get airbor
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"DOM CYED 073 S
TION OF RUNWAY 1

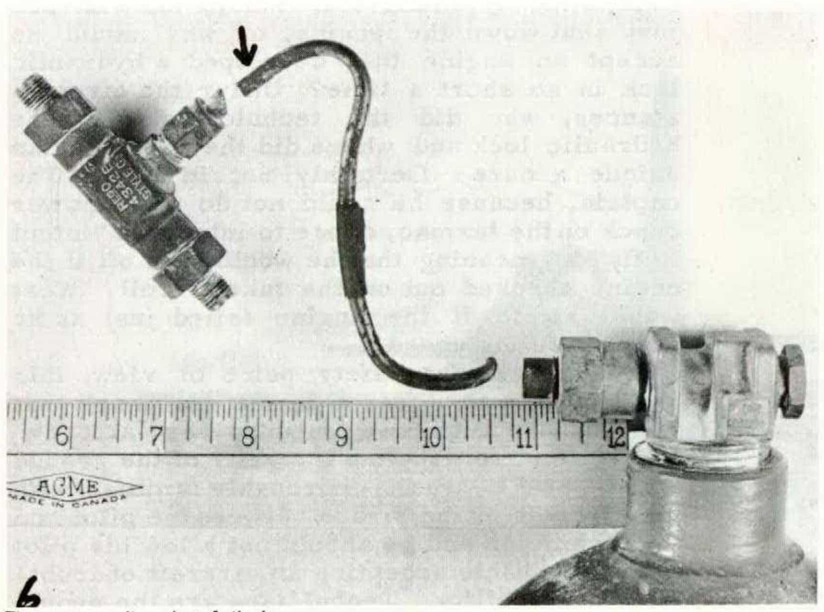
OXYGEN SYSTEM FIRE

A CF100 was receiving turn-around servicing during a tip tank exercise when the Corporal who was topping up the oxygen system heard a pop, saw a spark fly down from the aircraft and then heard a hissing sound. Before the oxygen cart could be disconnected the Corporal noticed a fire inside the aircraft. The oxygen cart, refuelling tender, and personnel were cleared from the area and the fire fighters were called. Before the fire was extinguished the aircraft was seriously damaged.

A Board of Inquiry was instituted. Here are some of the more interesting items of evidence that it produced: The Corporal did not know where the closest fire alarm box was located. The technician who called the fire hall knew where the box was located but was so excited he drove the mule down to Servicing Section and telephoned the fire hall. The Board did not, however, establish the source of the spark. The oxygen system failure occurred in line 9Q22146 between No. 4 bottle and the non-return valve. (See photographs of failed line and fire damage.)

On the technical side, the Directorate of Aircraft Engineering is investigating a "fix". The "pig-tail" line has to be disconnected each time the O_2 bottles are dropped. This practice introduces a hazard in that the line may be twisted or cracked. Another problem is the operational necessity of a quick turn-around which forces servicing personnel, if they are to meet schedules, to recharge the O_2 system rapidly. This leads to excessive heating. The fix then will be one that provides lines that can withstand a greater amount of heat and some means to circumvent the need for dropping the O_2 bottles.

On the servicing side, the Board recommended a campaign to make unit personnel aware of the locations of fire alarm boxes. An excellent idea. But why not go a step further and run spot checks or fire drills to train servicing personnel into a habit of immediately turning to the closest means of reporting a fire. From infancy we have been trained to jump when we hear "FIRE". As technicians who handle dangerously inflammable and explosive materials we must be trained to jump in the right direction.



The oxygen line that failed.

THREADING THE NEEDLE

Did you ever try to thread a needle at arms' length? No? Try it and then see what you think of this situation.

A CF100 was on scramble call. It was parked 21 feet back from the door of the alert hangar. The hangar door was 40 inches wider than the wing span of the CF100 and the taxi guide lines needed to be repainted. The scramble call came at 0550Z. The crew fired up their aircraft, started to roll, and struck the door guide rail with th wheels could be moved
On one side is the fa other approximately
in use at the time wa complete loss of aileron
aircraft. On the other on panels in the main-
and training to prepar ne aileron cable tension
being lost because the d aileron to the master
quate room to taxi. T s found to be normal,
best to correct this si ble tension between the
craft missed its call. embly and the control
erations we must be embly, including chains,
pilot's mental conditio leys, was inspected and
to go. He wants to go eron cable run was fol-
to "exercise due caution" while wondering what his orders will be. He needs all the advantages that planning and foresight can provide.

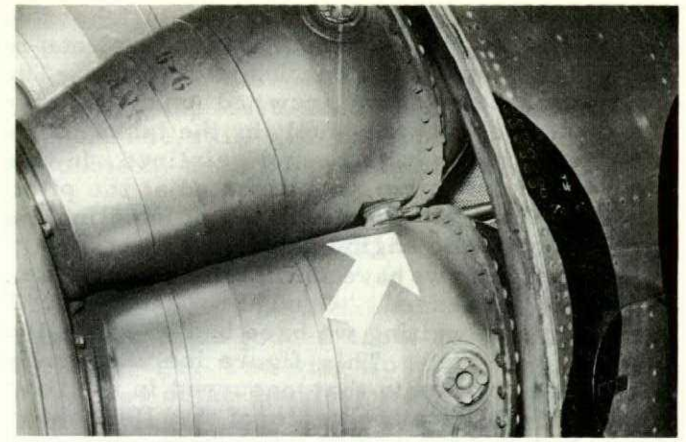
of wires, was broken in
panel, part No. 5116643,
tions 5 left and 5 right. An
area revealed marks of gr
and out-of-line wear on a
that the port side cable had
the clip and had operated
some time. The subsequ
of the clip allowed the
straighten out and lose its
Judging by the wearing
the excessive wear on fair
face of the centre section

THE OLD SHELL GAME

The pilot of a T-33 checked the brakes while taxiing out for a test flight. They were "normal". When the aircraft passed over a bump after completing about 2000 feet of the takeoff roll, the starboard wing dropped and the aircraft swung to the right. The pilot gained control, taxied the aircraft clear of the runway, and shut down. At this time there was 100 gallons of fuel in the starboard tip tank and only 20 gallons in the port tip tank.

The pilot had accepted the L14 entry of 543 gallons on board with 125 gallons in each tip tank. Further investigation of the L14 revealed the following record of the fuel state: Four days before the accident the T-33 completed inspection, was runup, fuelled, the tip tanks dipped and their contents recorded as 100 gallons each. The day before this incident, following a PI at 0820 hours the fuel was recorded as 100 gallons in each tip tank. At 1900 hours the day before the incident a BFI was completed and the fuel state was recorded as 125 gallons in each tip tank. The aircraft was hangared for the night with the tip tank caps loosened. At 1030 hours the following day the pilot ran into trouble.

The obvious conclusion is that the fuel was never put in the port tip tank in the first place. If this conclusion is correct, what about the L14 entries? This reminds one of the old game of betting which walnut shell contains the bean. The bettor, in this case the pilot, always has the odds against him.


It IS possible to install an interconnector clamp incorrectly.

WORN INTERCONNECTOR CLAMP

During a cross-country training flight, the fuselage and fuselage tank of a T-33 were scorched because the clamping ring, BK 21388, on the interconnector between No. 8 and No. 9 combustion chamber had been improperly installed.

The picture shows how the clamp was installed. The engineering staff of the station concerned used several different crews on several different engines in an attempt to duplicate this error. None of the crews could tighten down the clamp in the manner shown. The conclusion reached was that the proper combination of wear in the interconnector and in the clamp is necessary before improper installation is possible. Without these conditions of wear, the clamp could not be tightened down.

The unit suggested a semi-annual call up of EO 10B-15B-2, pt 4, paras 36 to 40, with a note to the effect that it is possible to install interconnector clamps improperly.

MAINTENANCE—CONTRACTOR

A pilot, whose only experience on the T-33 was gained on a conversion course, was detailed to ferry a T-33 from a CAIR contractor to an RCAF station. During the climb to 29,000 he noticed that the tip tanks were not feeding so he topped up the fuselage tank from the wing groups. After trying to pressurize the tip tanks at altitude without success, he descended to 6,000 feet. When the tip tanks could not be induced to feed at 6,000 feet, the pilot realized that he had a serious fuel problem so he immediately started to climb. The engine flamed out at 31,000. The flameout occurred about 50 miles east of Namao at 1122 MST and the pilot landed at Namao at 1138 MST.

Although the fuel counter was set at 493 gallons prior to takeoff, investigation by the contractor indicated that the aircraft had, in fact, only 146 gallons in the tanks at takeoff—78 gallons in the fuselage tank, 68 gallons in the wing groups, and none in the tip tanks. The contractor's servicing crew had set the counter but had not put any fuel in the tanks. The men responsible have been disciplined. In this case some criticism was directed at the pilot, but he did do an excellent job of handling his aircraft once the engine had flamed out.

How often do we have similar accidents, i.e., accidents assessed "Ground - Contractor"? At the time of writing we have had 49 since the beginning of 1959. This figure includes many but not all accidents that occurred in the first half of 1960, because some of the 1960 cases are not closed yet. However, the records are sufficiently complete to indicate that the situation is not improving. What aircraft are involved? There have been 29 jets (12 of them CF100s), 19 piston aircraft (8 of them Expeditors), and one helicopter. What type of errors are made? There have been 11 control malfunctions; 8 where fuel or fuel systems were involved; 7 each for hydraulic systems and propellers; 4 each for oil systems, piston engine faults, and electrical system; 3 jet engine faults; and one "other airframe".

Statistics do not make exciting reading, but they do show the areas where a little more care will obtain the biggest reduction in the accident rate. Blaming the contractor's technicians and inspectors is not the whole answer to this problem. The answer is a more thorough inspection by all concerned, the technican, the supervisor, the independent checker and lastly the ferry pilot. It is normal to assume that an overhauled aircraft is in perfect shape, but we have all heard of the chap who bought a new car that turned out to be a lemon. Well, treat all new or overhauled aircraft as lemons, and we will cut down the accident/incident rate in this problem area.

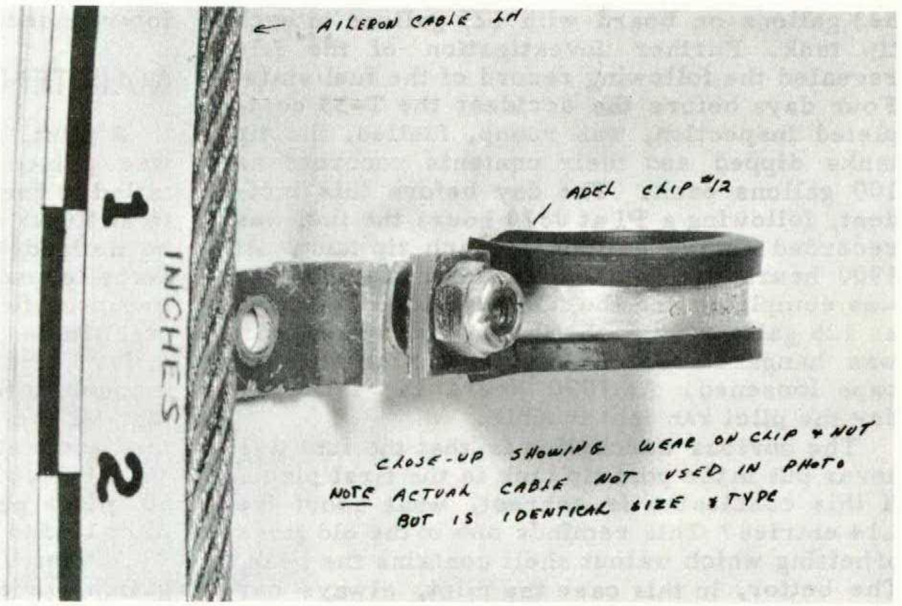
line and fire damage.)
On the technical s
Aircraft Engineering i
The "pig-tail" line has
time the O_2 bottles are
introduces a hazard i
twisted or cracked.
operational necessity
which forces servicing
to meet schedules, to
rapidly. This leads to
fix then will be one t

CONTRACTOR—MAINTENANCE

A Dakota 392, back from the CAIR program, flew a total of 110 to make unit personnel P125 was carried cons of fire alarm boxes. port aileron was re But why not go a step aircraft was test fl t checks or fire drills to board wing low wa onnel into a habit of im- fixed tab was adjus to the closest means of was carried out. A rom infancy we have been reported that the en we hear "FIRE". As ive stick force and indle dangerously inflam- cables were tighter e materials we must be tension and a furthe e right direction.

Immediately follc
air test a small cor NEEDLE
the port wing, which had dropped owing to mild turbulence. The aileron failed to respond normally and at the same time a sudden release of tension was felt in the aileron control. The pilot raised the wing by using coarse rudder and climbed the aircraft to 1000 feet. The aircraft was levelled off beneath a scattered cloud condition. A control check was carried out and it was found that positive aileron control was lost but the aircraft was manoeuvrable by use of the rudder and elevator. A successful landing was made.

A full investigation followed. It was found



Adel clip severed by control cable.

that the aileron control wheels could be moved independently of each other approximately 100 degrees, indicating complete loss of aileron cable tension. Inspection panels in the mainplane were opened and the aileron cable tension from port and starboard aileron to the master bellcrank assembly was found to be normal, indicating a loss of cable tension between the master bellcrank assembly and the control wheels. The yolk assembly, including chains, sprockets and cable pulleys, was inspected and found normal. The aileron cable run was followed from the yolk assembly to the master bellcrank. By removing all the inspection covers and panels in the centre section, it was discovered that an Adel clip, holding a bundle of wires, was broken in the area above the panel, part No. 5116643, between lateral stations 5 left and 5 right. An investigation of this area revealed marks of grease on a wire bundle and out-of-line wear on a fair lead, indicating that the port side cable had been hung up behind the clip and had operated in this manner for some time. The subsequent wearing through of the clip allowed the cable to fall clear, straighten out and lose its cable tension.

Judging by the wearing of the Adel clip and the excessive wear on fair lead on the forward face of the centre section spar, it can be assumed that this hang up of the aileron cable had continued for some time. It follows that the error in routing the control cable occurred during the CAIR overhaul by the contractor, probably during installation of the wire bundle or during the installat: itself this winter? If it or the fuel tank lines ics indicate that it will,
In other words, the onths four accidents will
required 114 hours 're bashing the empennage
through the Adel clip a snowbank.
cident was directed ll occur while the aircraft
was assessed contrac -to-snowbank by ground
It is a sad state w ll be an adequate towing
cable is not discover ill turn the aircraft as
the contractor. It is as possible so that when
same error is not pi he will not have to back
Normally this partic ingman will watch care-
removed for inspection of the control system on the 500 inspection. In this case an aileron was changed on the P125 inspection and this called for an inspection in accordance with EO 05-1-2J which reads in part, reference para 3(c):

"Carrying out a functional check on the specific system involved in accordance with the following:

(1) Flying controls - Following re-installation or re-adjustment of any part of the flying control system and/or its related components, the ENTIRE system is to be carefully tested to ensure:
(a) Full and free travel."

It can be seen that had the inspection been carried out properly after the aileron change, this malfunction would have been discovered. Further, two write-ups in the L14 regarding a control problem should have indicated that something was amiss, and a complete control system check carried out. Because this was not done, the test crew had a hair-raising flight. The skill and experience of the crew undoubtedly averted a serious accident.

HANGOVER HAZARD

During a BFI on a Dakota the port wing tip was found to be gouged from the leading to the trailing edge. The wing tip had to be changed. The cause of the accident was a newly installed sign approximately eight feet six inches high set twelve feet from the edge of the taxi strip. The taxi strip was fifty feet wide, so a taxiing Dakota would have a twenty-two foot hangover on each side.

The Dakota was taxied down the centre of the taxi strip and was stopped before it reached the sign to allow two fuel bowsers to leave the compound. This distraction plus the fact that the sign was set parallel to the taxi strip, which made it difficult to see from the aircraft, contributed to this accident.

The real cause behind the cause, however, was lack of liaison between the CE Section and Flying Control. The NCO under whose direction the sign was erected did not check with Flying Control to determine what clearance was necessary to accommodate the type of aircraft that would use the taxi strip. The NCO was new to the station and inexperienced as a Construction Hand. This also suggests a weakness in training or indoctrination. The help an NCO receives while gaining his first few month's experience on a new job often spells the difference between a superior and an average supervisor.

quarters.

(To err is human.
good maintenance. Assessment: Personnel - Human Error.—ED)

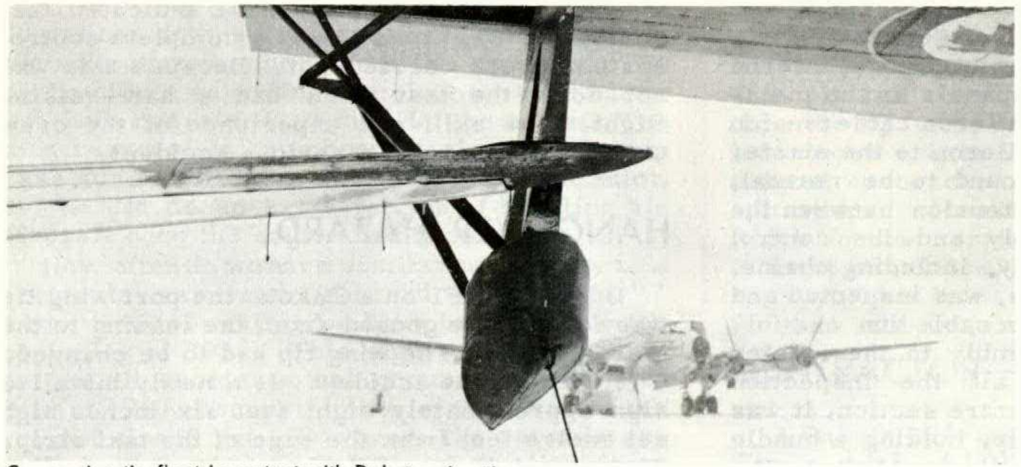
Non Annotated

Your oh-so-true article: "Flying Pro-
rne Pilot" (Jul-Aug 60)

POWER SURGE

pilot to do everything
This particular ca s in his favour. Well,
running a Canso. A c 1? Like endorsing his
guard so that he would ated", raising thereby
t standard. This would
the runup. There was an airman in the cockpit and another in the flight engineer's tower. The wheels were chocked, the wing tips were anchored to heavy cement blocks, and the hydraulic system was pressurized to 500 psi—just half the pressure called for by EO 05-60A-1.

On a signal from the corporal the starboard engine was started. It fired several times and



Canso wing tip float in contact with Dakota wing tip.

then "caught". The Canso jumped the starboard chock, swung through 90 degrees, and stopped with its wing tip float against the wing tip of a Dakota. The Dakota's wing tip and wing tip de-icer boot had to be changed. The Canso was undamaged.

The fact that this particular accident occurred on snow-covered ice does not excuse a sloppy runup. Here are some of the major details. There was insufficient brake pressure. Incorrect throttle setting. Normal starting position for the throttle should give 800 to 900 rpm, barely enough to move the aircraft. (This one jumped the chock against what brake pressure there was and dragged its starboard anchor.) There is also the excuse, "power surge due to overpriming". Overpriming can cause a big bang, but it cannot cause a "power surge". To get a power surge the throttle setting has to be incorrect—too much throttle.

Three of four accident reports a year (not all Cansos) are about par for "power surge due to overpriming" accide[illegible]
power surge that canr
priming. These three c
could be avoided by fol
cedures.

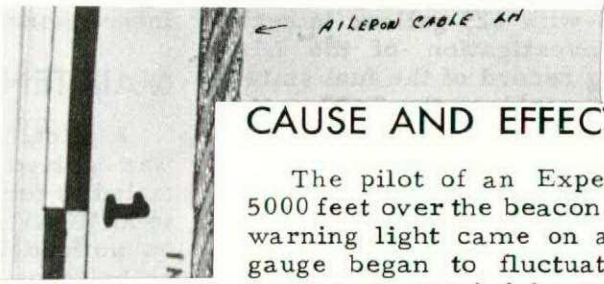
WASHED UP

Some soap is 99 ^{44}/100% pure; some soap is used by nine out of ten screen stars; some soap is packed in automatic washers; some soap is used by maintenance personnel on Argus aircraft, and this is the soap that caused an Argus propeller control circuit to fail.

It seems that when the pilot of an Argus called for METO power after takeoff, he was informed by the engineer that No.4 propeller was stuck at 2900 rpm. The propeller control circuit breaker on the pilot's overhead panel had popped and would not remain reset. No.4 propeller was feathered and the aircraft returned to base.

Ground investigation revealed that No. 4 propeller circuit breaker, pt. No. 6141H81, had been internally corroded by soap and water and was shorting the ground. UCR action was taken because this area is not adequately protected from the intrusion of moisture. The assessment was Materiel (Design).

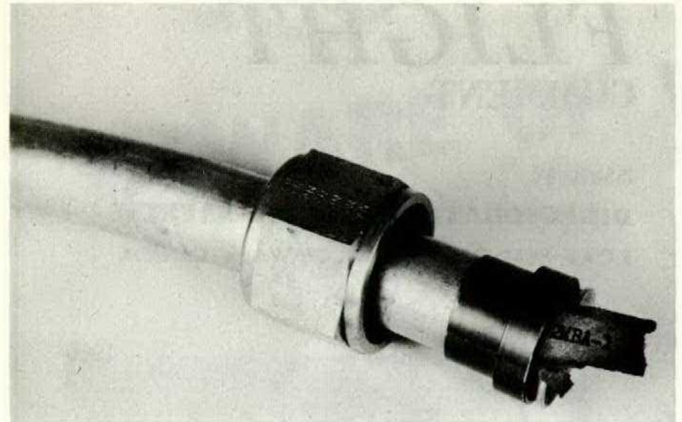
and climbed the aircra
aircraft was levelled off
cloud condition. A contr
out and it was found that
trol was lost but the aircra
by use of the rudder and
ful landing was made.
A full investigation fo



CAUSE AND EFFECT

The pilot of an Expeditor was holding at 5000 feet over the beacon when the fuel pressure warning light came on and the fuel pressure gauge began to fluctuate. These symptoms were accompanied by a strong odour of gasoline. An emergency descent was made and the aircraft landed without further incident.

A fuel leak was found in the starboard wheel well where the fuel line from the wobble pump connects to the fuel strainer. When the line was removed the nut was found to be undertorqued, and a paper part number tab, similar to the ones used by contractors, was lodged between the ferrule and the coupling nut (see photo). The paper tab prevented the nut from being properly torqued and, over a period of time, vibration loosened it. As the L14 did not list any removal of this fuel line it was assumed that the part tab was introduced into the fuel line either during CAIR maintenance or during the original installation.



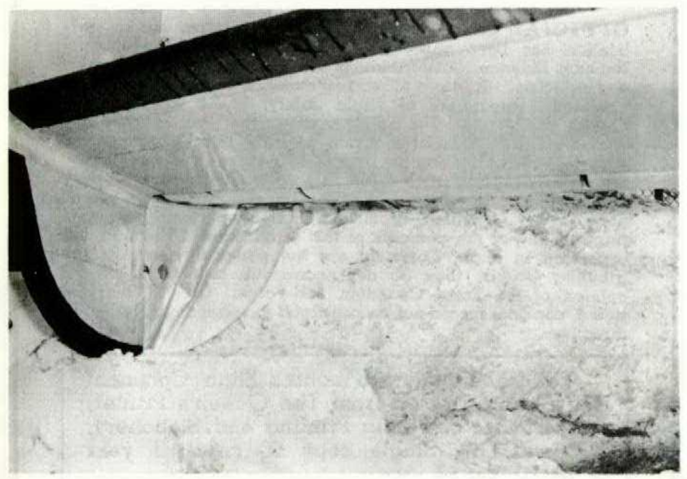
Expeditor fuel line with a part identification tab under the ferrule.

The D14 lists the airframe as 4230:00 hours "since new or overhaul" and 1284:35 hours since CAIR. This is an isolated case, but it illustrates a basic safety principle: Every error must be paid for. Today, tomorrow, or a year later, sometime somewhere somebody is going to pay with lost time, or with lost efficiency, or maybe with his life for each error. It's inevitable. It's cause and effect.

WANT TO SAVE SOME MONEY?

Will history repeat itself this winter? If it does, and our statistics indicate that it will, within the next five months four accidents will be reported that involve bashing the empennage of an aircraft against a snowbank.

These accidents will occur while the aircraft are being parked tail-to-snowbank by ground personnel. There will be an adequate towing crew. The driver will turn the aircraft as close to the snowbank as possible so that when it is turned into line he will not have to back it into position. The wingman will watch carefully as the wing passes over the snowbank, then will watch to see that the wing clears the adjacent aircraft. The driver and the brakeman will watch the "director of operations". No one will watch the tail. The results will be similar to those in the photograph—a crumpled Expeditor rudder. The cost will be somewhere between 3 and 5 hundred dollars.



Expeditor fin and rudder in contact with snowbank.

Will history repeat itself this winter? Here is your chance to give the lie to our statistics and save a couple of thousand dollars at the same time.

LETTERS TO THE EDITOR

Heads-Down Reporting

On pages 20 and 21 of Flight Comment, July - August 1960 issue, is an article Hangar Door Hits Aircraft, which states in part, "the operating cables of one counter-weight broke and sent the counter-weight crashing down on the port wing of the Dakota". The photograph accompanying the article clearly shows that the starboard wing of the Dakota sustained the damage.

Through the excellent medium of your magazine, Headquarters continually remind the people in the field that heads-up maintenance is a "must". So it follows that the people in the field expect heads-up reporting from Headquarters.

J. L. Giles, WO1
412 Transport Squadron

(To err is human. To catch an error is good maintenance. Assessment: Personnel - Human Error.—ED)

Non Annotated

Your oh-so-true article: "Flying Proficiency vs The Chairborne Pilot" (Jul-Aug 60) exhorts the desk bound pilot to do everything possible to keep the odds in his favour. Well, why not give him a hand? Like endorsing his green ticket "non annotated", raising thereby his limits to white ticket standard. This would provide a very convenient shelf 300 feet high on which to rest his flagging prowess, and his ego.

But while we are at it, let's not overlook his desk work. If his job is flight safety for example, is he affecting directives on the strength of this flagging prowess just acknowledged? If so he must slow the flow of personal prejudice and rely more and more on those who know, i.e., aircrew actively engaged in flying duties. Perhaps his work should be endorsed "non annotated" also.

C. W. Steacy, S/L
Non Annotated

(I believe that most of the chairborne pilots have already raised the shelf by 300 feet. If they haven't, I recommend a second reading of the article. Editor (Non Annotated))

Aircraft Hits Hangar Door

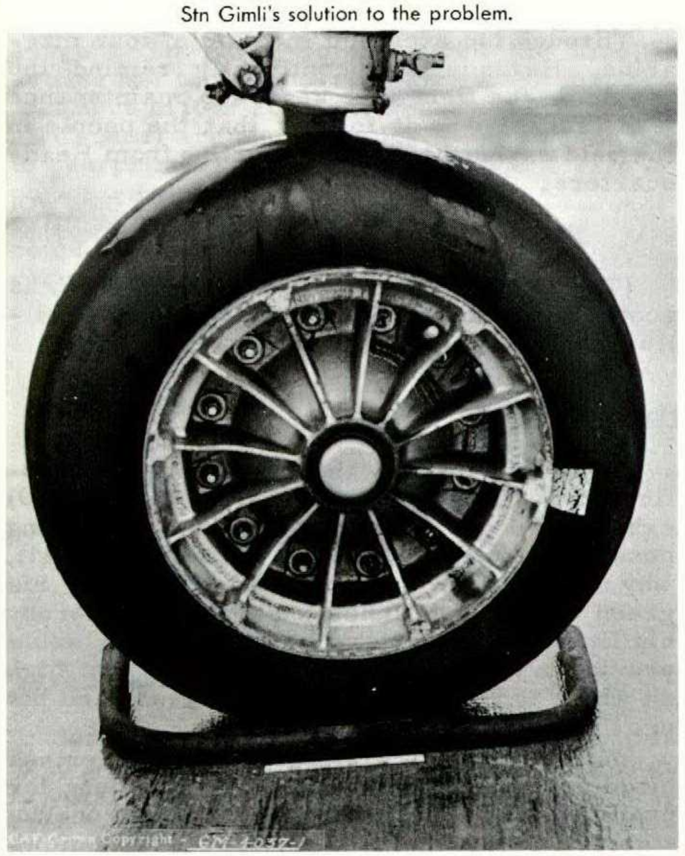
Reference is made to the item "Aircraft Hits Hangar Door" on page 20 of the Jul-Aug issue of Flight Comment.

This station had the same trouble (aircraft rolling due to change of slope of hangar floor) a few years ago which resulted in a badly damaged T-33 tip tank. We started to use the parking brakes but had to stop this when we became suspicious that this practice was contributing to our brake problems.

Our solution is illustrated in the attached photograph. These do the job and the aircraft can be towed over them, so no hazard concerning movement is involved. The total length of the chock is 32" and it is manufactured from 7/16 inch steel rod covered with 1/2 inch inner diameter scrap hose.

J. Woodrow, S/L
RCAF Stn Gimli

Stn Gimli's solution to the problem.



FLIGHT COMMENT

ISSUED BY

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November • December 1960

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Taxiing is treacherous on ice — go slow

BEWARE OF WINTER HAZARDS

Don't learn through experience — too expensive. Get the gen from your winter instructions.

Poor Visibility

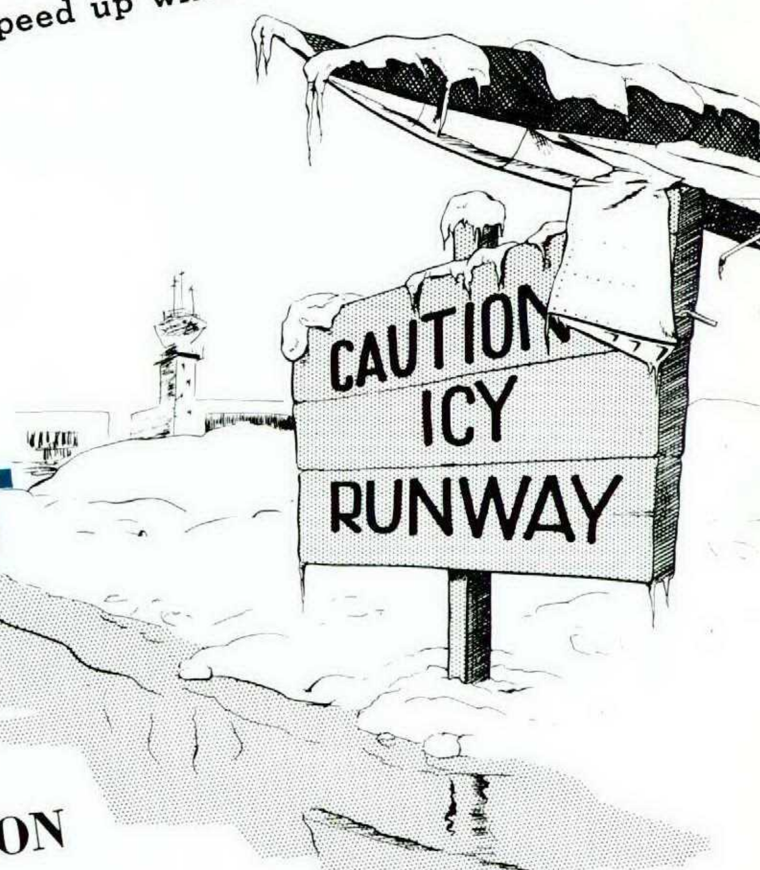
FROSTED WINDSHIELD

Longer Landing Run

Icy Conditions — Slow down on the ground and keep your speed up when airborne.

Winter Reminder

Caution Icy Runway



Nosewheel inoperative on ice

CARB HEAT

Slow is fast enough on ice.

MENTAL WINTERIZATION

Don't be caught unprepared! Review your winter procedures, *NOW*

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Roger Duhamel, F.R.S.C., Queen's Printer and Controller of Stationery, Ottawa, 1960