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FLIGHT COMMENT

ROYAL CANADIAN AIR FORCE

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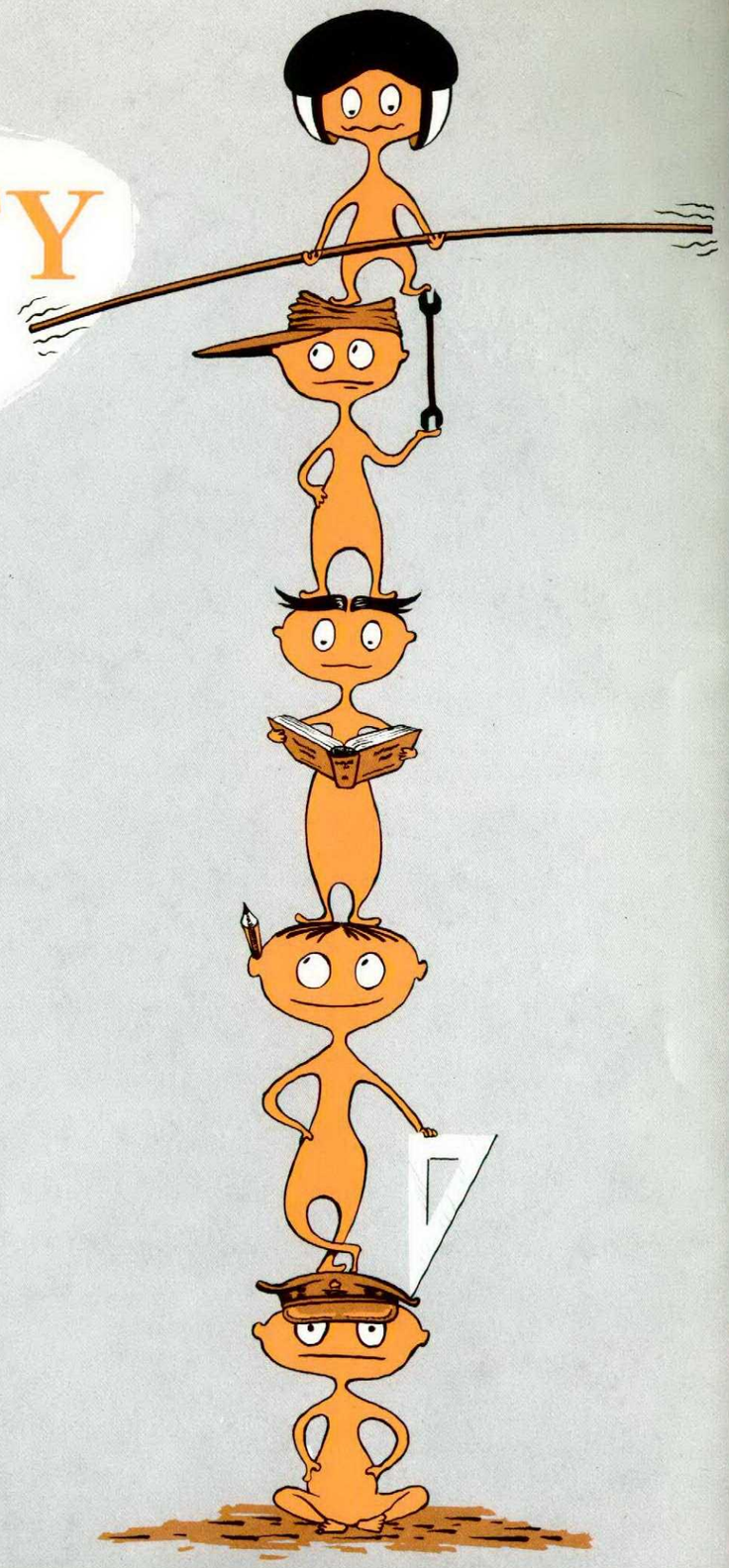
JULY • AUGUST • 1959

SAFETY

IS YOUR BUSINESS



Organization of individuals

Into a team

Is the first step

In a safety program.

After that

It's each person

Performing his duties

In the safest manner

For himself

And the other members

Of the team.

YOU are a member

Of a team.

Do your share

And we'll have a safer,

More efficient team.

EDITORIAL

We are at a critical stage in our accident program. Much of our equipment has been in use for several years and we are that many years away from our basic training in its operation. Introduction of new equipment could have an adverse effect on our accident rate unless adequate steps are taken to ensure that we are trained to handle it. To offset complacency with respect to old equipment, and to ensure safe handling of new equipment, a greater emphasis must be placed on supervision.

Supervision at all levels, the man on the hangar floor, the servicing supervisor, the flying supervisor, unit and station commanders, command staffs and headquarters staffs, everyone who has a directing responsibility connected in any way with the safe and efficient operation of our aircraft must make an extra effort.

A study of last year's accidents and incidents reveals that most of them could have been avoided. It points out the need for a new emphasis on supervision. It also suggests that a more efficient system of overcoming deficiencies in equipment and facilities, and that an examination of aircrew standards with a view to increased proficiency are needed.

Supervisors, experience has shown that your personal attention is indispensable, that an increased effort is essential, to reduce the unnecessary loss of personnel and equipment brought about by aircraft accidents.

J. Jordan 4/c

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

FLYING WITH THE R3350

To date more R3350 engine removals have been caused by mishandling than by actual materiel failure.

The established operating and maintenance procedures are contained in the EOs and are, of course, to be adhered to. This article is compiled from notes on the operation of the R3350 over a period of years. They apply to R3350s in general but you may find a few things which do not apply to your particular model.

Engine Starting

1. Hydraulic locking still accounts for a few R3350 failures. On starter engagement the propeller should be watched carefully through two complete revolutions for any hesitation or stoppage which might be caused by a piston operating in a cylinder partially full of liquid.

2. Turn on the ignition prior to operating the primer switch. If the primer is operated before the ignition is turned on the engine should be cranked through two revolutions with primer and ignition off. This will prevent hydraulic lock but liquid gasoline may still be present in the power recovery turbines. This fuel will be ignited when the first cylinders fire and will result in flame or torching from the turbine exhausts which may continue for a short period even if the engine is allowed to die. This condition is visually alarming but not dangerous as long as the flame source is confined within the turbine exhaust. If a CO_2 extinguisher is used to extinguish the flames the turbines should be inspected prior to restarting the engine as the thermal shock when the CO_2 hits the hot turbine can seriously crack or warp the turbine blades.

3. Engine conditions should be considered before priming to determine the amount of prime necessary, which for a good clean start depends on two factors; the temperature of the air entering the cylinders and the amount of throttle opening. The degree of throttle opening, together with the fuel added by priming determines the fuel/air ratio of the mixture entering the cylinders. There are numerous throttle settings and degrees of priming which will produce the correct mixture for combustion and a smooth start. Too rich mixtures will fire erratically while too lean mixtures will cause back-firing. If the engine should back-fire the alternate air door or carburetor heat control should be cycled and checked for full range of travel. (It should always be in the full cold or direct ram air position for starting.) Back-firing during starting can be eliminated by cracking the throttle only slightly at the beginning of the start and then, after the engine has started to fire, slowly opening the throttle until reaching the required throttle opening for the amount of prime being used.

Do not advance the mixture control out of idle cut off until the engine is running smoothly on prime at the proper rpm for the particular installation (800-1200 rpm). If the engine will not obtain this speed on prime alone something is wrong with the engine and it should be shut down and inspected.

Engine Run-up

Insofar as possible, make all engine checks with the aircraft facing into the wind. This is of greatest importance when trouble-shooting.

Not only does this aid in cooling the engine but effects of tail and crosswinds may produce completely erroneous results for comparative power checks, magneto checks, and idle-mixture checks. A higher rpm for a given power setting may be expected when headed into the wind and vice versa.

Ground cooling of the engine is critical. The heat may be sufficient to destroy ignition leads, seals, etc., even though cylinder head temperatures remain within limits. In this regard, engines with propellers stuck in reverse pitch or with cowl flaps stuck in the closed position should be shut down immediately.

Power checks are conducted to determine whether or not the engine is developing the required amount of power. Malfunctions which should be disclosed by these checks include dead cylinders, improper mixture, obstructions in the induction system, improper ignition or valve timing, seized bearings, etc.

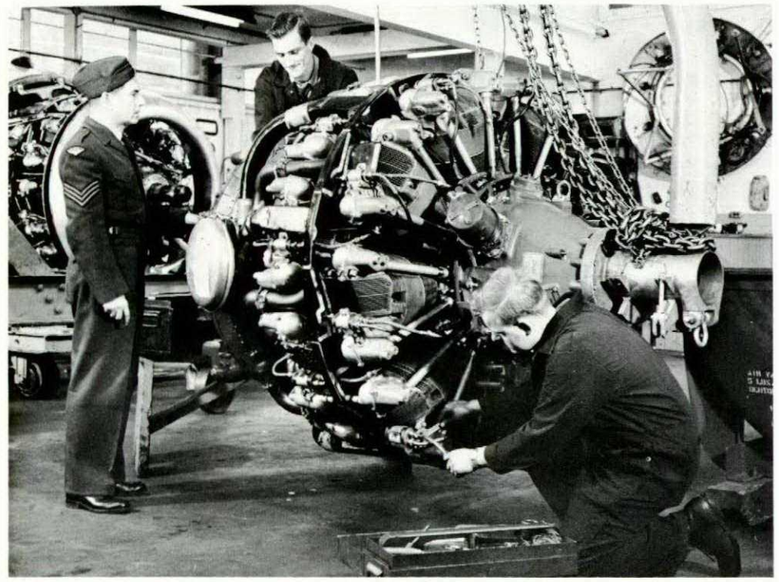
The power output of a reciprocating engine operating on the ground is indicated in two ways —by rpm and by BMEP (or torque pressure). Manifold pressure is not necessarily an indication of power output but only of the pressure of the mixture entering the cylinders. RPM is an indication of power output only when the propeller control is in full INCREASE RPM position, and the propeller is against the low pitch stops. The propeller will remain against these stops until takeoff rpm is reached. If the propeller control is moved toward the DECREASE RPM position until the propeller moves out of the low pitch stops and is governor controlled, all true power output indications are lost. If engine power output drops slightly, the propeller would then merely shift to a lower pitch and the rpm would remain constant. For this same reason, propeller rpm is of no value in determining power output in flight.

Power checks are conducted at manifold pressures corresponding to field barometric pressure. Under no-wind conditions, the rpm obtained with the manifold pressure set at field barometric pressure should always be the same if the engine is operating properly. (This reference rpm can be found by using EO 10A-1-1N). A dead cylinder would show up as a reduction of approximately 100 rpm. Unfortunately, in some R3350 installations, the use of field barometric pressure invariably places the propeller in the 1950-2400 rpm restricted range. Details of the power check for these installations are found in AOIs.

The full power check is usually delayed until the beginning of the takeoff. The reason for this has to do with keeping high-power ground time to a minimum and because engines that check out properly on the power check will develop takeoff power—most of the time. Occasionally, spark plugs which operate well on the power check will begin to break down under the higher cylinder pressures produced at takeoff power. This is indicated in aircraft having torquemeters by a definite dropping off of BMEP at the beginning of or during the takeoff roll.

Troubleshooting Engines From The Cockpit

Back-firing or coughing of the engine in the 650-1400 rpm range may be caused by an idle mixture which is too lean. This condition is



Most engine removals are the result of mishandling

also evidenced by a tendency for the engine to cut-out or back-fire when the throttle is advanced rapidly. Sparkplug fouling, or a tendency for the engine to die with accompanying black smoke from the exhausts, is indicative of an idle mixture which is too rich. When confronted with any of the above cases, conduct an idle-mixture check as outlined below.

Idle Mixture Check

There has been much comment and argument, as to the best position for the mixture control during taxiing and ground operation. In this low rpm range, carburetor metering is independent of mixture lever position except when approaching cut-off. The only real danger in manually leaning during ground operation lies in forgetting to return the mixture to RICH before engine run-up or takeoff. An engine which satisfactorily passes the following check should not require manual leaning to prevent spark plug fouling.

1. Idle the engine at 650-750 rpm in RICH and lock the throttle.

2. Flick the primer switch momentarily and note any change in rpm. A momentary increase in rpm indicates that the mixture is too lean. If the mixture is either correct or too rich, a momentary decrease in rpm will occur when the primer is energized.

3. To establish whether or not the mixture is too rich, move the mixture control slowly but positively into the cut-off position. If the engine continues to fire for approximately one second without any rise in rpm, or if the rise in rpm does not exceed 10, the mixture is not too rich.

Cold Weather Effects

Numerous flights have been aborted and many engines over-boosted in the past due to a lack of understanding on the part of pilots concerning the effects of cold weather upon the engine and propeller installation. The following information is presented in an effort to prevent a recurrence of this misunderstanding.

In temperatures above 60° F the R3350 engine can be expected to turn 2850-2900 rpm at full power (without water injection) with the aircraft standing still. As temperatures decrease below this value, the air becomes denser and the engine can't crank the propeller as fast. RPM at full dry power with no movement of the aircraft may drop as low as 2700. On the other hand, cold weather improves the volumetric efficiency of the engines, and power output may easily exceed the limit value of BMEP. Thus, in cold weather and without water injection, the pilot must realize that he cannot expect to get 2900 rpm at the beginning of the takeoff roll and that to exceed the AOI limits of BMEP or manifold pressure is over-boosting the engine and may lead to detonation.

It has become apparent that carburetors installed on the R3350 engines vary considerably in their metering characteristics. In particular, it has been shown that the NORMAL position of the mixture control does not often provide the 7 to 12% degree of leanness from "best power" which is desired for cruise. "Best power" has been found to vary anywhere from NORMAL to RICH and even outside those positions in extreme cases. During the winter months, many engines run 1 to 2% lean in the NORMAL position. Since running closer to "best power" than 7% lean is undesirable due to the high temperatures produced and the increased possibility of detonation, resort has been made to manual leaning whenever possible (torquemeter required). Furthermore, comparison of engines in flight with respect to manifold pressure, BMEP, and fuel flow has no significance unless all engines are operating with the same fuel/air ratio, i.e., both leaned the same percentage from "best power".

Manual leaning should never be used above maximum cruise power. It is also obvious that it cannot conveniently be utilized in the cruise power range when rapid power or altitude changes occur, such as in formation flying. In these cases, resort must be made to NORMAL or RICH mixture regardless of the actual metering characteristics.

The actual manual leaning procedure is given in AOIs. If, during the leaning process, no "best power" position is noted check to see if "best power" requires more fuel than the carburetor is supplying in the RICH position by returning the mixture control to the RICH position and flicking the primer switch momentarily. If the BMEP drops off, the carburetor is within limits and the leaning procedure may be continued, using RICH as "best power". If the BMEP rises at all, "best power" is richer than the RICH position and no ready reference point is available for manual leaning. In this case, the carburetor is not metering within limits and should be changed.

Torquemeter Fluctuations

Torquemeter fluctuation, otherwise known as the "Nervous Needle", has been one of the most perplexing phenomena associated with the R3350 engine. Although often difficult or impossible to isolate the cause, it may stem from one or all of the following items:

1. Torquemeter system—Air in the lines or improper dampening of the system by the snubber may result in erratic BMEP indications. However, this type of discrepancy usually occurs throughout the entire BMEP range, and enrichening the mixture has no effect upon it. It can be usually corrected by bleeding the line of air and/or replacing the snubber assembly.

2. Ignition—Some cases of BMEP fluctuation have been traced to components in the ignition system, such as a faulty distributor or

Make all engine checks with aircraft facing into the wind

spark plugs. Enrichening the mixture generally helps to smooth out fluctuations of this nature since a rich mixture may ignite and burn more easily than a lean mixture. Where ignition is suspected, the use of the engine analyzer will generally shorten the trouble-shooting period.

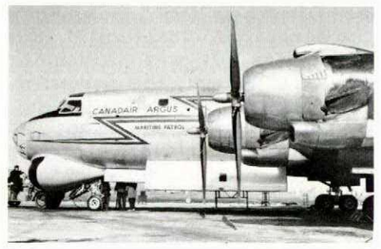
3. Valving—Improper timing or clearance of the valves may cause BMEP fluctuations which will smooth out with mixture enrichment. The only remedy is a complete valve check.

Torquemeter fluctuations are permissible as long as they are of a non-periodic nature and do not exceed ± 3 psi. Although enrichening the mixture will usually smooth out the fluctuations, do not operate closer to "best power" than 7% lean if at all possible. Should the power fluctuations be of sufficient magnitude to cause noticeable fluctuations of rpm, RICH mixture position can be used until a landing is effected.

No attempt will be made to influence pilots to baby their engines when confronted with certain emergency and operational requirements. Where no military necessity is involved, conservative operation will prolong engine life and increase reliability.

The following statement was made about the R1820 engine. However, it couldn't be more applicable to the R3350—"Treat your engine(s) better than you would your rich uncle. Abusing a well-off relative might leave you broke, but probably will not age you or interfere with longevity."

(This article, based on the article "C'mon Baby" published in the USN Approach, was prepared and edited at AMCHQ.—ED)



F/L P. H. Russell

F/O W. D. Osborme

"...TOWER, ...TOWER - MAYDAY, MAYDAY, MAYDAY - JET 246 - ANOXIA, ANOXIA ..."

Upon hearing this distress call F/O W.D. Osborne, the Flying Control Officer on duty in MacDonald tower, instantly alerted the area fixer network and prepared to render all available assistance. When it was apparent that the distress call had not been picked up by the aircraft's home station F/O Osborne took control. He instructed the student pilot to switch to one hundred per cent oxygen, to commence immediate descent to a lower level and to confirm that he had pulled his bailout bottle. He then used the tower VHF homing equipment to vector the aircraft to MacDonald, a distance of over 100 miles. It was evident from the pilot's hesitant speech, his laboured breathing and slowness in responding to instructions that he was in very poor condition. F/O Osborne was aware of the seriousness of the pilot's condition and attempted to force him to concentrate, and to otherwise encourage him, by asking the pilot to carry out various checks of the aircraft cockpit, the weather, terrain, etc.

During the time consumed for the homing, F/L P.H. Russell, a MacDonald flying instructor airborne in the area, intercepted and formed up on the aircraft in distress. When the aircraft were positioned over MacDonald aerodrome F/O Osborne turned control over to F/L Russell. This instructor set the student up in a forced landing pattern and then issued explicit descent instructions to a badly confused and sick pilot. A safe landing was carried out on the jet runway despite consistent attempts by the student to line up on the parallel taxi strip.

Investigation revealed that a loose fitting oxygen mask, combined with a faulty exhalation valve, had resulted in the pilot suffering from the effects of hypoxia and subsequent hyperventilation. The prompt and decisive action taken by F/O Osborne and F/L Russell, their teamwork and thorough knowledge of the procedures to be used in this in-flight emergency, prevented what would have resulted in a major accident. A truly professional performance by all concerned.

FS R. Shipley

FS R. Shipley was flying as crewman on an Expeditor when, due to frozen slush, the bolt that connects the tailwheel retraction operating cable from the main wheel mechanism to the tailwheel assembly sheared when a down selection was made.

The aircraft was climbed to a safe altitude and FS Shipley crawled back to see if the tailwheel could be freed. He decided that it could and that he could make a temporary repair with a steel bolt that he carried in his tool kit.

This work had to be done in very cramped quarters without interfering with the control cables. Several times the cold forced FS Shipley back into the cabin to get warm. When the bolt was installed and the ice cleared away a partial down selection was made by hand to insure that the tailwheel would lower without causing damage to the undercarriage mechanism because the steel bolt would not shear if something went wrong. The tailwheel lowered normally and a successful landing was made.

FS Shipley's thorough knowledge of the Expeditor's undercarriage system enabled him to make this in-flight repair and save the aircraft from extensive damage on landing. Good Show FS Shipley.

LAC H. D. Jamieson

LAC H.D. Jamieson, Aero Engine Technician, was carrying out a Primary Inspection on a T-33 at Portage la Prairie. He noticed a small buckle in the fuselage skin in the port aft area. Because of this he carried out a thorough inspection inside the fuselage and found that the rear fuselage, part No. 30-34010-6, showed signs of heat discolouration and buckling and that stringer rear fuselage, part No.178169-107L, was cracked.

The aft section was removed for closer examination, and a split 3-1/2 inches long and 2-1/2 inches wide was found in the exhaust. The engine was then removed to determine the cause of the split. This resulted in the discovery of an incorrectly installed burner in No.5 flame tube. Burners and flame tubes had been changed 7:25 hours previously. There had been no evidence of overheating given by warning lights or jet pipe temperature. The incorrectly positioned burner had caused a concentration of flame in one area of the exhaust unit, resulting in the split.

This professional approach, this insistence on learning the cause of a difficulty and fixing it, is the mark of a good mechanic and the strength of aviation.

F/O R. A. Crouch

F/O R.A. Crouch of 1 (F) Wing tells of his experience in a T-33.

"Cruising at 35,000 feet with 93 per cent, the engine icing light came on and almost immediately the rpm commenced dropping slowly. The alcohol de-icing button was pressed and kept pressed for several minutes. The light remained on except for one flicker. The rpm continued to drop slowly and surged very slowly 5 to 10 per cent. I estimated my distance from land was 60 to 70 miles. I climbed to 38,000 and selected fuel switches to gang loaded and in bypass. The rpm continued to drop very slowly and by now was 65 to 70 per cent. When bypass was selected the engine flamed out. I attempted to contact someone on 117.9 and 121.5 without results. I set up the aircraft in gliding configuration and squawked emergency.

At 20,000 the fuel was returned to fuselage flow, and emergency fuel selected. A relight was obtained but the engine gave only 60 to 65 per cent rpm. The radio compass indicated that I was over Alghero and I notified Decimomannu tower (radio contact had been made at 18,000) of my intention to land at Alghero.

I selected bypass and normal again without an increase in rpm. During a circling descent fuel fumes became very strong in the cockpit. As I had 340 gallons on board I elected to jettison the tip tanks to reduce weight and possibility of fire. Once intent on landing I no longer bothered with the engine but left it running to maintain hydraulics. At approximately 5000 feet I noticed the rpm was 27 to 30 per cent. The first attempt at undercarriage down produced an indication of right mainwheel unsafe. Recycling was effective

I dived off my altitude and crossed the button at 140 knots. (The landing was made 10 to 15 knots downwind because there was not time to take a better position.) Although the canopy was severely frosted I could still see a little out of the front side panels, but was prepared to eject the canopy if I ran short of runway or had brake failure. I touched down approximately 1/4 to 1/2 down the runway, flamed out the engine, turned off all switches, and managed to stop very close to the far end."

The cause of this incident was assessed "Obscure". F/O Crouch's good airmanship and knowledge of his aircraft rates a Good Show on our books.

RADAR ADVISORY

by W/C S. D. Turner

RCAF Station Lac St Denis

"Air Force 232, this is Crystal."

I did not know who Crystal was but I answered "Crystal, this is Air Force 232."

"Air Force 232, you have a CB buildup in your 12 o'clock to 1 o'clock position, alter port 45 degrees and I will steer you around them."

I turned port 45 degrees and then followed Crystal's instructions for about 30 minutes. There was some turbulence but nothing like the middle of a thunderstorm. Crystal's final instruction was to call Eskimo. I did and Eskimo steered right to my destination...

This aircraft had an uneventful flight from Bagotville to Trenton thanks to Crystal and Eskimo who, without being requested to do so, had steered it around a dangerous storm cell.

Crystal and Eskimo are two stations in the radar net that covers most of Canada. The primary function of this net is air defence. It has a secondary function, to provide navigational assistance, i.e., radar advisory and flight following. The radar advisory service includes; track and ground speed checks, position (Georef unless otherwise requested), vector to nearest aerodrome or other designated point, and position of heavy cloud. Flight following consists of continuous radar advisory service to military aircraft engaged in specific air operations and to any aircraft in distress.

How can a pilot make use of this service? By calling "Radar Advisory" (Canadian radar units) on 122.2 mcs or "Star-Gazer" (USAF radar units) on 133.2 mcs and, when your call is answered, requesting advisory service using the call sign given by the radar unit. Radar advisory should be requested at the highest practical altitude relative to your flight plan. It helps the radar to find and follow you. Tracking distances are increased by IFF, so if you have it use it. Normally, if you are being given radar advisory the radar will actually be giving flight following.

With all this it would seem that a pilot's troubles are over, but it's not quite so simple. In the first place the pilot is not absolved from adhering to every regulation applicable to the particular flight, e.g., flight plan, clearances, position reports, etc. In the second place, if radar advisory is requested and the answer is "Unable" it means that the radar net has air defence commitments and that you are on your own. If you have not planned it that way, you are going to find the sky a very lonesome place indeed. Radar units will do their utmost to assist you but, in the final analysis, any flight you captain is strictly your own show.

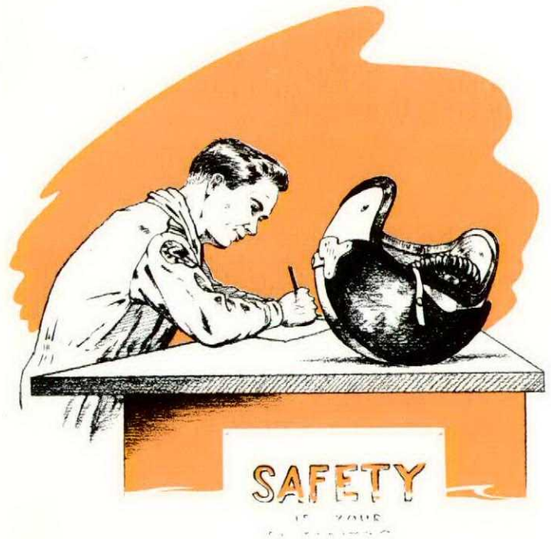
MAINTENANCE RECORDS

Directorate of Maintenance Engineering

Maintenance records, relatively simple in the beginning, have been required to develop as the aircraft developed. Changes to RCAF record forms have been made both because the more complex equipment required more complete records and because with the increase in recording simpler methods were required to maintain efficiency. However, the prime purpose of all our past record forms and our present Aircraft Maintenance Record Set (L14) is to record the serviceability state of the aircraft.

The problem is, all the past experience, all the thought and work that went into producing our present L14 doesn't make it a successful

document for recording serviceability state. Its success depends on the people who fill in the spaces.



Enter It

The first part of the problem is to get people to write in the spaces. Crews descending from the blue are not usually forgetful of outright unserviceabilities. By the time the captain reaches the L14 rack he's still sufficiently annoyed with the brute's performance to write it up. Minor defects, the gauge that fluctuates, the cockpit light that won't hold position, or the minute fluid leak are somewhat different. These things tend to fade in significance with each step from the aircraft. Putting it in the L14 won't guarantee it'll be fixed, but it will raise the odds. And what is more miserable than the next day finding you have the same aircraft with the same annoying defects?

Then, there are the strange things which happened at 35,000 and, which caused you to mentally vacate the cockpit, but which, once you recovered showed no further indication of trouble. These phenomena tend to be forgotten once the wheels are rolling on the concrete, yet are often recalled in the vicinity of a bar, especially if a Maintenance Officer is present. Conscientious Maintenance Officers have been known to take notes, but invariably in the morn-

ing they have thrown away the empty packet. These occurrences should be entered even if the details are somewhat vague. Maintenance may not have had experience that will permit an immediate fix but at least you'll warn the next man of the brute's idiosyncrasies.

For maintenance types who are now thinking "Yeah, if only those guys would...", how many times have you found a fault, corrected it, and not bothered to enter it. True, if you've done the work properly failure to make an entry won't affect the safety of the aircraft. However, the same fault may be occurring in other aircraft or once fixed, may recur. If so, the sooner a trend is established the better; we may need a special inspection or a modification.

EO 00-15-1

Now, the writing in the spaces. EO 00-15-1 "Aircraft Maintenance Record Set" states: "It is the responsibility of any officer or airman regardless of his employment or trade, who sees or knows of any reason which may cause an aircraft to be unserviceable, to personally make the appropriate entries in Form L14-1B, "Change of Serviceability and Rectification Record" of the L14, Aircraft Maintenance Record Set of the aircraft concerned, declaring it unserviceable."

Ludicrous though it may seem, personnel have on occasion failed to observe the portion of the order"...of the aircraft concerned...". Get the right book.

An admirable job has been done on the lay-out and titling of the L14 sheets and, should any confusion arise, complete details on the use of a particular space are to be found in the EO. Nowhere in the L14 pages or in the EO is it stated that entries are to be brief. True, the L14-1B is printed in such a manner that it appears to allow you only three lines per entry. Make a full report; use 6 lines, 12 lines, or half a page. Try to be concise but make it clear, detailed and accurate.

For aircrew, quoting from the EO again, "...ensure whenever practicable that maintenance personnel directly concerned with the serviceability of the aircraft are aware of the defect." Maybe not too important for, say, a blown tire. But, for those somewhat vague and hairy ones, most desirable; and go beyond "ensure...are aware"; give them the details. However, do not use your conversation as a substitute for the L14 entry required. The man you talk to may not get the story across to the next shift.

For the technician who finds what went wrong and administers the fix, make sure your rectification entry is clear, detailed, and accurate. The importance of good rectification entries is apparent in cases where the first fix doesn't result in a complete cure. If the fault recurs and if your entry was inadequate considerable unnecessary work may be required if you should not be available.

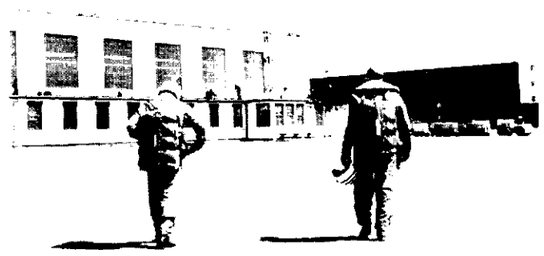
Special Case

One type of fault, the airborne unserviceability that cannot be reproduced on the ground, merits special mention. When this type of fault occurs, maintenance in attempting to effect a cure, is completely dependent on the L14 entry; so aircrew, tell all you know. Technicians, if you didn't find a definite cause but wish a test flight, make a complete list of what you did. Never use the short form "ground checked serviceable". No matter how many hours you spent checking and testing systems and components, if you use that entry and the aircraft is again u/s airborne, the pilot will be convinced you tried it, found it worked, and signed it out. If your entry gives the pilot an understanding of the work done and hence an indication of what he may expect during the test flight, your operation will not only be more co-operative, but safer.

Paper Tiger

A final part of the problem - failure to use the spaces provided. Make the entries but make them in the L14. In the introduction, EO 00-15-1 states"...units may adopt any local routine maintenance recording procedure to suit their requirements". This doesn't make the attachment of various and sundry pieces of paper to the corners of L14s fair ball. The intention of drawing attention to some important detail is good, but the method is downright dangerous. Not only is the pilot not required to read them, but should one become detached.... Make this type of entry in the proper place, on the appropriate page of the L14, and the pilot will read it.

- Make the entry
- Make it clear, complete, and accurate
- Make it in the right L14 and you'll help
- Make flying safe.



How much is forgotten by the time they reach the L14 rack?

LET UP ON THE LIGHT UP

Unfortunately most pilots do not recognize that tobacco acts in a way similar to alcohol, as far as vision is concerned. Tobacco also reduces your altitude tolerance, partly by cutting down on your supply of oxygen and partly by increasing the rate at which your body uses oxygen.

The carbon monoxide which results from the incomplete combustion of tobacco is the very same gas that comes from the engine.

Incomplete burning of tobacco puts a small percentage of carbon monoxide in the smoke and whether you inhale or not, the carbon monoxide is absorbed by the blood stream in place of oxygen. If you do inhale you simply make things easier for the carbon monoxide. When the blood stream is loaded with carbon monoxide, any oxygen trying to get in finds all the parking spaces occupied, and so proceeds blithely on its way.

Blood Absorbs CO Fast

The fact that blood actually prefers carbon monoxide to oxygen and absorbs it 210 times as readily makes things worse. If you're a heavy smoker, you can get as high as 10 percent carbon monoxide blood saturation. It takes only three percent to cause measurable impairment of functions, such as vision, and altitude tolerance.

With the 10 percent concentration possible by heavy smoking, you are halfway to the 20 percent stage. With 20 percent saturation you are in pretty bad shape, and might not be able to continue reasonable safe control of your aircraft because of throbbing headache, visual impairment, reduced power of concentration, and muscular inco-ordination.

Insidious Effects

One of the insidious things about CO poisoning is that you are subject to sleepiness, reduced mental and physical powers and some loss of vision prior to any recognizable symptoms, such as a headache.

If you have been smoking steadily, you have enough carbon monoxide in your blood so that at 10,000 feet altitude your body acts as though it were at an altitude of 14,000 or 16,000 feet. Your vision will be correspondingly affected.

In fact, smoking just three cigarets in a relatively short period before takeoff will reduce your night vision as much as the effects of 8000 feet of altitude. One cigaret results in a saturation of 1 to 1.5 percent of your hemoglobin with carbon monoxide instead of oxygen.

Once carbon monoxide enters the blood stream it leaves very slowly, like alcohol. About half of it is still present at the end of 6 hours, and there may still be some left at the end of 24 hours.

Effects of Nicotine

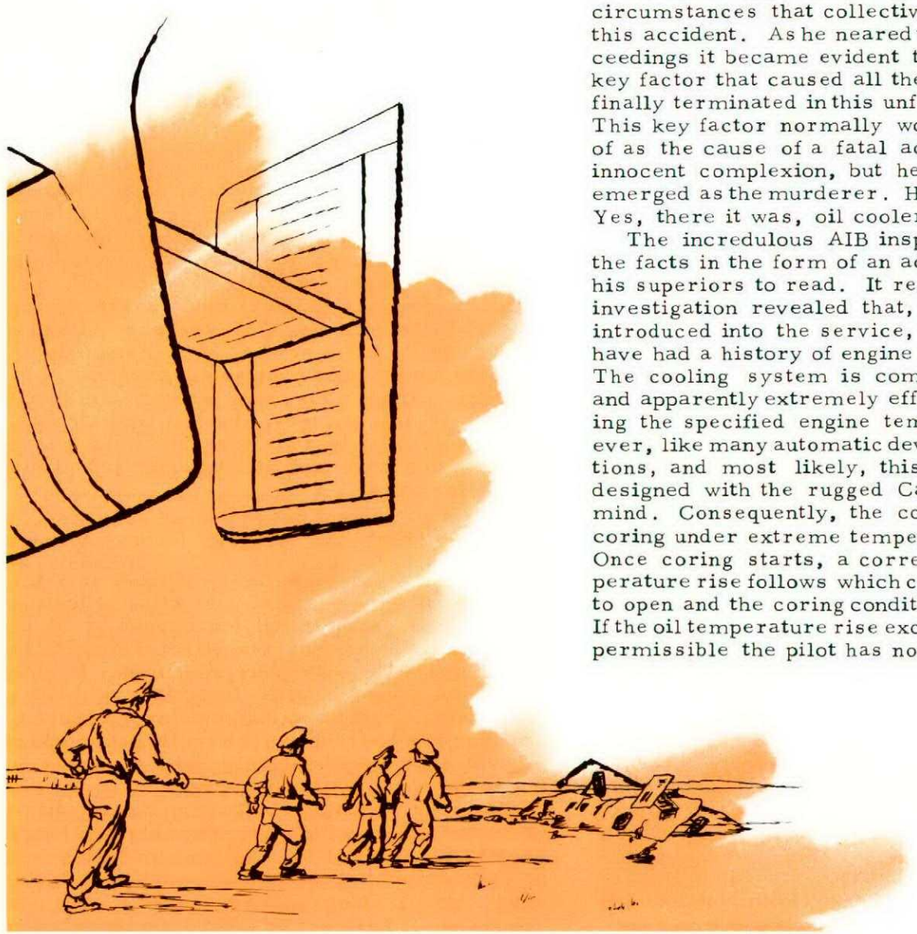
At the same time another product of smoking causes problems — namely, nicotine. Nicotine raises your requirement for oxygen by 10-15 percent. A further adverse effect of nicotine is its interference with your reactions. It also increases your nervous instability and tires your mental processes. Night vision is reduced, and your depth perception can really get knocked off center. A smoldering cigaret also produces ammonia which irritates the eyes.

The pilot who wants to fly at optimum efficiency and safety will try to reduce his smoking, especially just before flights, and most especially before night flights.

USN Aviation Safety Center

IF A THING IS WRONG DO SOMETHING ABOUT IT

by S. L. Thomas Wallnutt



The staff officer in the Accident Investigation Branch reached into his over-laden basket for another file. The file contained a D6 on another fatal accident. He regarded the bulky D6 with its many pages of evidence with some misgiving and settled back in his chair to peruse the contents.

As usual there were a number of errors and circumstances that collectively contributed to this accident. As he neared the end of the proceedings it became evident that there was one key factor that caused all the other events that finally terminated in this unfortunate accident. This key factor normally would not be thought of as the cause of a fatal accident—it had an innocent complexion, but here, in this D6, it emerged as the murderer. His name? Coring! Yes, there it was, oil cooler coring.

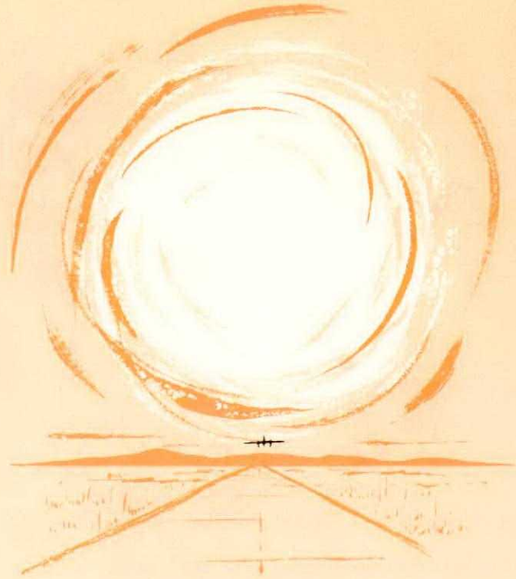
The incredulous AIB inspector jotted down the facts in the form of an accident resume for his superiors to read. It read like this: "The investigation revealed that, since they were introduced into the service, these helicopters have had a history of engine oil cooler coring. The cooling system is completely automatic and apparently extremely efficient in maintaining the specified engine temperatures. However, like many automatic devices it has limitations, and most likely, this system was not designed with the rugged Canadian climate in mind. Consequently, the cooler is subject to coring under extreme temperature conditions. Once coring starts, a corresponding oil temperature rise follows which causes the shutters to open and the coring condition is aggravated. If the oil temperature rise exceeds the maximum permissible the pilot has no alternative but to land and idle or shut down. If the outside temperature is well below freezing the coring will remain and excessive oil temperature will reappear as soon as the engine is opened up again to high power.

"According to the evidence, this helicopter crew experienced this condition on previous flights and made forced landings, remaining on the ground long enough for the oil to cool off. On the night of this fatal accident the same routine was necessary. Normally, forced landings in a helicopter would not be too serious, but on this fatal flight it was the key cause factor which triggered off the other events that resulted in the crash. For example, the extra landings and take-offs enroute increased the fuel consumption well beyond the rate flight-planned for; they increased the time enroute to such an extent that the aircraft was placed in the path of a severe snow storm that otherwise would have been missed entirely; and the increased time enroute also caused pilot fatigue with its accompanying effects of impairment of judgement and increased susceptibility to spatial disorientation, etc. Thus, it can be seen that an apparently innocent thing like coring can cause an accident.

"However," muttered the frustrated AIB inspector, "the really sad part of this whole thing is the shattering realization that no one did anything about this coring problem—the records show no UCRs on the problem of controlling engine oil temperature in cold weather. And even worse, there wasn't one word written in the L14 about this unserviceability. The aircrew and technical personnel operating these helicopters lived with this entirely unsatisfactory condition and did nothing about it. This is a sad fact. The deficiency was never recorded! Nothing was done about it! The result a fatal crash.

"Some pilots and technical people grumble about deficiencies in their aircraft and that is as far as they go. But grumbling will not relieve the situation. If you want your aircraft or associated facilities improved you have got to put it on paper—L14s and UCRs are conveniently provided for this purpose. Two sentences in a UCR are not enough—you've got to put up a well supported case that will sell. You've got to convince the person in headquarters that a modification or change is necessary. You've got to provide him with the arguments, otherwise he can not justify the cost. L14s too are notoriously bad—pilots particularly are loathe to use more than one or two lines in an L14. Some unserviceabilities require a comprehensive description before they can be understood and dealt with properly by the maintenance staff.

"These thoughts are old chestnuts, the need for people who maintain and fly aircraft to identify problem areas quickly, the necessity to put things on paper, their tendency to adjust to and accept unsatisfactory conditions or equipment until, as in this case, people are killed".



HOT WEATHER TAKEOFFS

The Naval Air Station at Memphis, Tennessee, has placed into effect an instruction which sets forth special requirements for clearance of jet aircraft during periods of hot weather. Whenever the runway temperature exceeds 80° F, the pilot is required to enter the calculated takeoff distance in the remarks section of DD Form 175. When the runway temperature exceeds 95° F, the duty forecaster strongly stresses existing runway temperature during the pilots' weather briefing and calls attention to temperature at destination when destination is in a hot weather area and/or field elevation exceeds 2000 feet. When the calculated length of a takeoff run indicates doubt as to whether a successful takeoff can be made, the clearance is referred to the NAS Operations officer.

USN: Approach

[If, on a standard day (+15° C at sea level), it requires 3550 feet of ground roll to clear a 50-foot obstacle in a particular aircraft and configuration, it will take approximately 4970 feet to do the same thing (at sea level) on a day when the temperature is +35° C.

If, on a standard day (+15° C at sea level), it requires 3550 feet of ground roll to clear a 50-foot obstacle in a particular aircraft and configuration, it will take a run of approximately 5400 feet (at the same temperature) if the field height above sea level is 5000 feet.—ED]

ALTIMETER ERROR
or
DON'T YOU BELIEVE IT!!

1. That the pressure altimeter reaches approximately true altitude if the current setting is maintained. IT DOES NOT!
2. That true altitude may be computed in flight by correcting altitude for free air temperature. IT CANNOT BE DONE!
3. That high pressure always means a high airplane. IT DOES NOT!

1. All of us are familiar with accidents that occurred when the aircraft just failed to clear the terrain by a few feet. Was the pilot off altitude or didn't he have the proper altimeter setting?

2. WHY NOT ASSUME THAT THIS TYPE OF ACCIDENT COULD OCCUR IF YOU ARE AT THE PROPER INDICATED ALTITUDE AND DO HAVE A CURRENT ALTIMETER SETTING?

3. Most pilots confidently expect that the current altimeter setting will compensate for irregularities in atmospheric presure. Quite often this is not true. In fact, in some weather situations, the correct current altimeter setting will actually aggravate errors in true altitude above sea level.

4. The pressure altimeter is good only for landing (at which point possible atmospheric errors diminish to zero) and flight-level aircraft separation. IT WILL NOT TELL YOU HOW HIGH YOU ARE!

5. Pressure altimeter indications (excepting instrument errors) depend solely upon two variables, (1) the pressure which the instrument is measuring and (2) the mechanical displacement of the indicator needles—altimeter settings. Disregarding instrument error, it is easy to anticipate the effects of the other variables. By asking for three specific items of information during a normal pre-flight weather briefing, you can at once determine if you will be higher or lower than indicated altitude and by what amount.

6. For example ask the duty forecaster:

Q. Are the pressures near my intended flight level (10,000 feet indicated) above or below normal, and by how many feet?

A. Pressures today at that altitude are about 420 feet below normal. You will therefore be 420 feet lower than you indicate.

Q. What are the altimeter settings through this area?

A. Altimeter settings are about 30.60 inches. Because a high setting increases the altimeter scale indications, you will lower your aircraft to maintain indicated altitude, you will be low by:

30.60 inches current setting
-29.92 inches standard setting
.68 x 1,000 = 680 feet

Q. What will the total difference be?

A. Add the two effects:

Pressure low	-420 feet
Altimeter setting high	-680 feet
	-1,100

You will actually be 1,100 feet below indicated altitude.

7. This example is an actual situation and neither unusual nor outstanding. Errors of this type may easily reach plus or minus 2,000 feet. If you are one of those pilots who feel perfectly safe because you are maintaining the current altimeter settings, you had better think again.

8. HIGH altimeter setting plus LOW Pressure at flight level is dangerous."

USN Aviation Safety Center

BEWARE OF THE OVERSHOOT

While flying VFR in the circuit I was given number four to land. Just before the turn on to base leg I decided the circuit was getting too large and told the tower I was going around again. While I was on base leg I flew over number two who was about five hundred feet below me on final. When he disappeared under my nose I was not concerned because I considered I had adequate vertical separation. I turned up wind and flew to the end of the runway very slightly to the right of it. When beyond the end I again turned cross wind. At this point the tower called to ask if I had seen the aircraft which had passed quite close to me. I had not. Another aircraft then called to say that I had passed about 25 feet above him.

It turned out that the aircraft which I had assumed was landing was doing a practice GCA low approach and overshoot, and shortly after he disappeared from my sight he pulled up and climbed straight ahead to circuit height. Because the visibility from the cockpits of both aircraft is restricted up and down, neither of us could see the other. A collision was missed entirely by chance. The tower had called the other aircraft several times while he was overshooting but he did not reply. I assume he was still on GCA frequency.

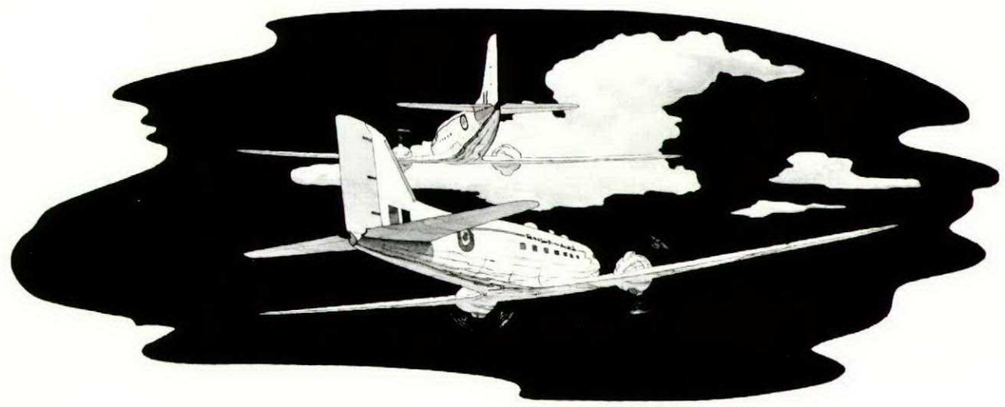
It is plain that the fault was chiefly mine, because I flew over the runway when I should have been well to the right.

FSO's Comment

As the pilot admits, he has only himself to blame, because he did not pull over to the right and keep the runway in sight. After all, any aircraft may overshoot; not only those on practice GCAs.

These close calls (fortunately seldom as close as this) are a particular hazard when GCAs are practiced in VFR conditions. There are a number of reasons for this: the aircraft on GCA is not on tower frequency; only one pilot in that aircraft is looking out; the aircraft does not follow the normal traffic pattern; and, quad-radar is of little help in providing separation. Both pilots and controllers must be particularly alert in these circumstances.

(The FSO is right. GCA's "blind spot" covers much of the area outside circuit pattern and final approach. There is really no substitute for sticking to regulations.—ED)



I LEARNED ABOUT FLYING FROM THIS

The T-33 had been modified in an attempt to prevent loss of hydraulic pressure after or during negative "g" manoeuvres. The project pilot had reported complete success. As OC of the section which designed the modification and as a current T-33 pilot, I was most anxious to check its performance. The project pilot requested that other pilots besides himself fly the aircraft so that individual pilot technique would be eliminated as a factor. I was assigned the aircraft for a one hour trip.

Check of the aircraft on ground was normal except that groundcrew were still tying the seat pack in the back seat when I completed my check of the back seat area. Climb was to 6000 feet and a series of pushovers (60 degree nose up pushover to 60 degree nose down) were carried out, while dive brakes were used to attempt to induce hydraulic pressure loss. The system worked perfectly and about 15 minutes was spent flying around at normal cruise powers to check that the hydraulic fluid would not become too cold under normal flying conditions, i.e., straight and level cruise.

A pushover was carried out and immediately the controls, both elevator and aileron "locked". Slight movement was possible but required considerable force. The canopy jettison handle was noticed to be out of the detent, however this seemed unimportant under the circumstances. Altitude was gained and the area around the control column checked for odd material which might be causing the difficulty. Finally I assumed that the seat pack must have slipped and in some odd manner was holding the controls neutral. Eskimo control were asked to track the aircraft.

A pushover was carried out, and after some further control movement, reasonable control was regained. There was some difficulty of movement in the right and forward direction. A typical approach was carried out at 15,000 feet and control was adequate. After alerting the tower, I carried out a normal landing. Taxiing in, I forgot about the canopy handle being out of the detent, and unlatched the canopy. The canopy blew.

What would you have done?

The pilot makes several points. First, his ground check was not complete as he did not check the rear seat pack. Second, for tests involving negative "g" the rear seat pack should be removed. Third, although poor briefing is indicated he realizes that testing a jet at 6000 feet is very dangerous business. Another point, why do additional pushovers once a control problem has developed? Still another lesson was learned when he read POIs for the T-33, Part 2, para 78. (Have you read it recently?) And finally, we think, the most commendable thing the pilot did was to relate this hairy tale so that everyone concerned will know how not to test a T-33.

FM CANAIRDEF

A NEAR MISS CMM WHICH COULD HAVE SERIOUS CONSEQUENCES CMM OCCURRED WHEN GCA OPERATOR LOST CONTACT WITH THE AIRCRAFT DUE TO INTERFERENCE ON HIS SCOPE PD THE INTERFERENCE WAS CAUSED BY UNSERVICEABLE AIRCRAFT RADAR PD AIRCREW ARE ADVISED TO SWITCH SET TO STANDBY OR OFF IF THIS TYPE OF INTERFERENCE IS KNOWN OR SUSPECTED PD THIS HEADQUARTERS SIGNAL AO27616 FEB INSTRUCTS ALL GCA OPERATORS TO NOTIFY THE PILOT IMMEDIATELY RADAR CONTACT IS LOST OR EXCESSIVE CLUTTER EXISTS

DEAR ABBY:

I am an Expeditor seven years old; have had normal care and only one taxiing accident (damaged rudder) and once I had a fire in my brake relay that did very little damage. My problem is why, after all these years, when I went on a week-end with a couple of the boys I was treated in a most disgraceful fashion—even left out in the snow all night. My diary tells the story:

"Landed in Maritimes Friday evening. Forecast low for night - 10° F. The boys asked that I be fuelled up and put in the hangar and gave an ETD of 0900. Everybody left and never saw a soul until next morning—Saturday—sat out all night.

Saturday a.m.—boys arrived and raised cain because I had been neglected. The servicing men said, 'We don't know anything; we just came on shift'. Finally got fuelled but my mixture controls and port manifold heat control were frozen. Two hours in hangar and I thawed out. It seemed odd that, with several hangars around, it took an hour to find a place for me. At the time I thought the place was not very well organized.

Saturday p.m.—enjoyed five hour flight with the boys. In the evening they asked that I be refuelled and put in the hangar. This time I was put in the hangar but not given any fuel.

Sunday a.m.—was awakened by the telephone; boys phoning to say they would be right down and for me to be towed out. It was 3/4 of an hour before I was towed out. Given some fuel. The boys raised cain again and again the men said, 'We don't know anything; we just came on shift'."

Why should this happen to me Abby? Is it because Maritime servicing flights do not like Upper Canada girls? Or were the men telling the truth when they said 'We don't know anything'?

Confused

Dear Confused: You have no cause to worry your record is too good. Take comfort from the fact that "the boys" have taken the proper steps to educate the offenders.

SEQUEL TO DEAR ABBY

On the return portion of a week-end training flight to the east coast, just after passing Montreal range station, it was noted that the starboard engine oil pressure had fallen to 55 psi. Oil temperature was 60° C with oil shutters fully closed at an outside air temperature of -20° to -25° C. In a short while the pressure dropped to 50 psi. The starboard oil shutter was partially opened so that the temperature was reduced to 50° C. This caused the oil pressure to rise to 55 psi where it fluctuated very slowly between 50 to 55 psi. IFR flight plan was cancelled and it was decided to proceed VFR direct to Ottawa which by this time was just as close as Montreal. The pressure slowly decreased until during the straight in approach to runway 25 at Uplands the pressure read 40 psi. As the aircraft was taxied on to the ramp the pressure fluctuated between 35 to 40 psi.

A check of the oil quantity revealed that both tanks were very low and on replenishing the starboard tank 5 1/2 gallons were required while 4 gallons were put in the port tank.

The aircraft had been refuelled at 0830 EST 8 Feb, just before departure. The fuel state was entered in the L14T by the pilot and was signed by the man who did the refuelling. When the pilot requested that the oil contents be checked the same man did a visual check of the tanks and stated verbally that neither tank required oil. A dip stick was not used. Both the pilot and the co-pilot thought it was unusual that no oil should be required after approximately 10:30 hours flying time since last refuelling. The man's statement was accepted and no further check was made. Additionally, the oil state was not entered on the L14T and this was not noticed by the captain.

The oil filters were dropped on return to Trenton but no abnormal condition was revealed.

The lesson is obvious: When accepting servicing at a strange aerodrome make doubly sure of every detail. After this crew's experience, as related in 'Dear Abby', they should have checked everything personally—and especially things that they thought were "unusual".

LET'S THINK ABOUT US

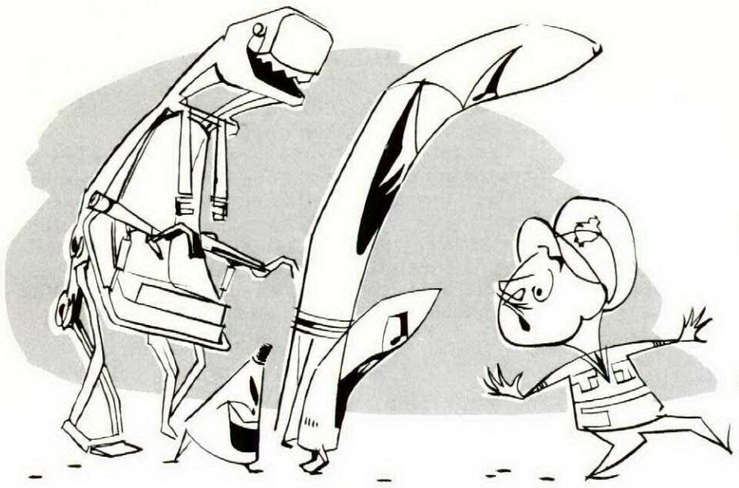
A great deal has been written about how to live with the other fellow, how to work with him, how to supervise him, how to teach him. We have been told at length to respect his opinions, to give him credit for what he knows and what he does. We can buy that, it is all good, but with so much talk about the other fellow it is just possible we haven't thought enough about ourselves.

We may, for example, have come to depend upon the other fellow to take care of us, to look after our interests. Perhaps we let the Safety Committee find and report the unsafe condition in the shop, instead of either fixing it or reporting it ourselves. Maybe we expect the other fellow, be he the server in the coffee shop or the flight sergeant on the hangar floor, to give with the special favors. Lots of people do.

There are plenty of ways to be dependent. We can free load and let the rest of the crew do the dirty and the hot and the cold jobs. We can stay home on election day. Letting some one else look after us is easy, but it can become a stultifying and stupifying habit. And crying because he hasn't looked after us better, blaming him for all that is wrong in the world, is even less practical.

Thinking correctly about ourselves is more fun and much more productive. It is not selfish. It does not mean we forget or neglect any one, or dump the team concept. It does mean that we recognize our own capacities and capabilities and our endowment of mechanical skill and ingenuity. We think, rather than dream, about what we are, what we can do or build or achieve. Thus we claim, and so experience, the joys of fine craftsmanship, the pride of responsibility, the dignity of honest labor.

FSF: Mechanics Bulletin



EXPLOSIVE SITUATIONS

Directorate of Armament Engineering

Only thirty six hours to go! The CO considers his chances of winning the AOC's trophy away from G/C Huckleberry who had won it for the past two years. This trophy is awarded to the station having the lowest accident rate in the Command. From the start of the current competition the CO had watched his flying and ground personnel respond magnificently. Not only had the accident rate for the station been reduced but a new low rate for the whole Command would be established if no accidents occurred during the next thirty six hours.

Even as the CO mused, the stage was being set for an accident. A CF100 aborted an intended exercise due to a flame-out on the button. Hurriedly inserting the seat pins the crew left the aircraft and headed for the hangar aboard the flying control van. Towed back to the line, the aircraft received no further attention until shortly after midnight when the DI was started. Started because the technician had scarcely climbed into the cockpit when the seat fired because the safety pins had not been inserted properly.

By daybreak the MO had patched up the fractures of the technician and prepared him for helicopter transfer to hospital. The photographic evidence for the Board of Inquiry was taken and the CO who, inwardly edgy by now, was preparing to catch what sleep he could before breakfast.

Dawn arrived with the promise of perfect weather. At 0530 Red section had been scrambled to 32,000 feet for a VIP on a bogey. By 0537 Red two, uncertain whether the aircraft he flew was "loaded" or "armed", had set up the correct sequence of switches, pushed the button, and jettisoned his rocket pods. When he saw the pods land in a field well clear of human habitations he was relieved. No one would be hurt provided the armourers found and disposed of the rockets before anyone tampered with them.

Then the Sabre squadron got into the picture, once at 22,000 feet over the air firing range, and once at the firing butts. The air accident involved the penetration of the tow Sabre's tail section by one 50 calibre round fired at too small an angle off from a range greater than the limiting opening range. The other accident occurred when two junior pilots approached the aircraft during firing in harmonization procedures on the 1000 foot range. Their approach direction and timing were perfect. The NCO in charge had completed his pre-firing scrutiny and, seeing that all his crew were in position, pressed the button to fire out all six guns just as the pilots, approaching from the rear, reached the leading edge of the wing. One quarter of an hour later the pilots were automatically grounded when the MO confirmed that their eardrums were damaged.

At this point the CO was notified of the two latest mishaps and, with many misgivings over his dwindling chances for the trophy, cancelled out his skeet shooting exercise and immediately proceeded to the hospital to check on the latest injuries. He was thus unaware of the accident which occurred when skeet shooting resumed. As accidents go it was relatively minor but the potential for a fatality was certainly present. It happened like this. Firing was suspended when the CO was called away. The operator in the high hut, overcome by curiosity for the unscheduled delay leaned forward over his trap apparatus to peer out the exit port just as firing recommenced. The shooter fired very late at a bird launched from the low hut. Pellets ricocheted off the high hut and several entered the exit port and struck the operator in the face. Fortunately his safety glasses saved his eyes but considerable probing with forceps was necessary.

This should have put "Finis" to the series of accidents, but it didn't. During the 1700 Club festivities, a carefully hoarded thunderflash was retrieved from its hiding place and thrown into the doorway of the crowded bar. No one really got hurt although ringing ears and shattered nerves were prevalent for some time afterward in spite of soothing liquids. Probably the redecorating bill for one wall of the bar, scorched and smoke blackened from the detonating thunderflash, together with the necessity to volunteer for extra OO duties will convince our hero to think before he throws another thunderflash into a building.

No one RCAF station has ever had the misfortune to endure such a series of accidents in so short a time. It is, however, accidents like these that ruin an accident record. All these accidents with explosives and armament have happened in the RCAF in very recent years. None of us must ever forget that ejection equipment is designed to eject canopies or personnel when they are airborne, and that ammunition and explosives are designed to kill. No one, aircrew or groundcrew, technical or non-technical, can relax for a single instant because that moment's relaxation may put the unwary into a state of permanent repose.

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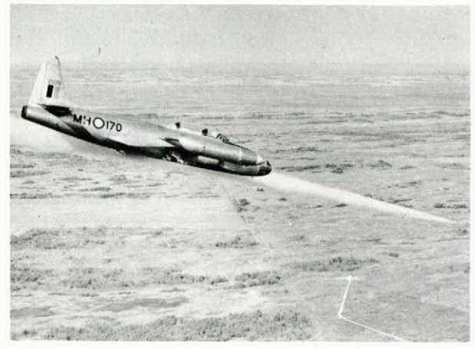
soi assembly. As this line is too stiff to "whip" over the nipple it must have been pushed over when the oleo was being serviced. When the oleo extended the flexible line was stretched and flattened where it passed around the lower swivel of the scissor assembly. This "pinched off" the line and caused the brake failure.

The oleo was serviced at night. The servicing crew worked by the light of the hangar flood-lights and flash-lights. The pilot did his preflight inspection with a flash-light and specifically checked for a possible hydraulic leak.

The observation was made that the accident would not have occurred or the damage would have been less severe if: the servicing work had been thoroughly inspected; the pilot had detected the misplaced brake line during his preflight examination; or the snow adjacent to the runway had either been removed or rolled.



ARRIVALS and

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Elbow Room

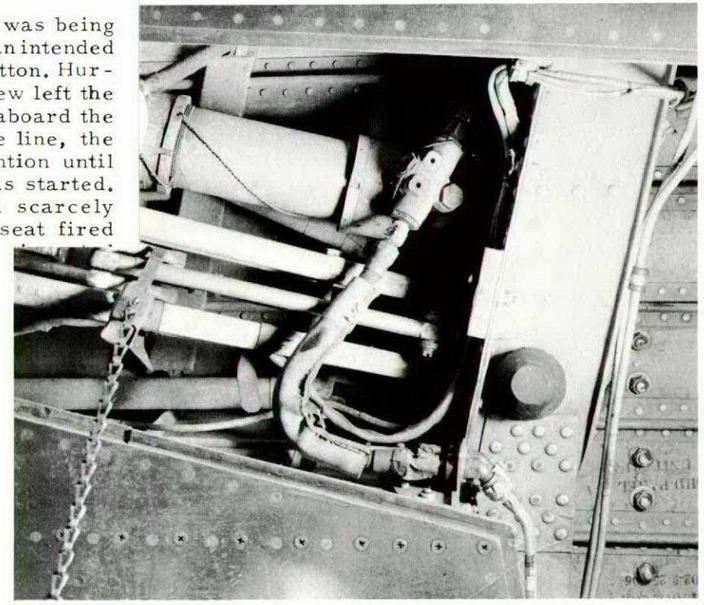
Immediately after take-off in a T-33 from RCAF station MacDonald the undercarriage was selected up, but the main gear indicated an unsafe condition. The power was reduced to keep the airspeed within limits.

With the reduced airspeed, the port main gear locked up and at the same time the controls stiffened and the aircraft started a roll to the right. A quick check revealed that hydraulic pressure had fallen to zero. The controls were deboosted and the aircraft brought under control using the trim. The emergency hydraulic system was used to lower the undercarriage, and after burning off excess fuel, a landing was made without incident.

An investigation was carried out and it was found that the up line of the starboard undercarriage was broken at the elbow (Part AN833-4D, EO 05-50C-4, page 692) which joins the line to the undercarriage jack.

Before the broken elbow was removed the two broken pieces were matched to determine the

The line was broken at this elbow



off-set of the line to the centre line of the jack. The line was off-set 7 degrees.

A new elbow was installed with off-set at 7 degrees. With the outer door removed for better visibility the undercarriage was raised slowly by hand. Just before the undercarriage reached the full up position the ground safety switch came in contact with the metal end of the hydraulic line. This is believed to be the cause of the failure.

A new elbow was then off-set at 40° and undercarriage raised by hand. At this setting the safety switch cleared the hydraulic line by approximately 1/2 inch.

The log books were checked and the last work done on this component was at NWI when the aircraft underwent CAIR. At this time the jack was removed and the locking sleeve, as described in Canadair SB T-33-209, was installed. This was done 18 Apr 58. It appears that the elbow was misaligned at that time and due to the ability of this line to flex the failure did not occur immediately.

This investigation was thorough. The theme of the technical investigation is to find the cause and the fix. When personnel are conducting all investigations into accidents and incidents with this attitude the RCAF will derive the maximum benefit from its accident investigation activities.

Professional Approach Required

While flying on a cross country in a T-33, the pilot noticed that the hydraulic system pressure was 500 psi. The pressure was noted to build up slowly and then fall off. When the system was used the pressure fell off rapidly. The pilot assumed complete hydraulic failure and deboosted. A gradual descent was made with the speed brakes up. On the downwind leg, the hydraulic pressure read 1000 psi so a normal gear down selection was made. The pressure dropped to zero and the undercart would not lock down. The emergency system lowered and locked the wheels down. A long approach to the field was carried out and the aircraft landed successfully. A stop was made on the runway without the use of brakes.

A technical investigation revealed the hydraulic accumulator bladder 27Q/402986 was leaking air past the metal plug 411471 and special washer 406813-1 on top of the bladder. The nut securing these together was tight. The result was loss of air in the accumulator and no reserve pressure in the main hydraulic system.

Further investigation revealed that this aircraft had been put unserviceable 14 times before this incident for hydraulic malfunction, 10 cases for low accumulator pressure, 1 case where it was flat, and 3 cases for a schraeder valve replacement.

These 14 cases add up to just one thing, an unserviceable hydraulic accumulator, that should have been checked properly in the first place. It seems ironic that it takes a situation where the skill of a pilot averts a major accident to get things fixed properly. Any recurring unserviceability certainly proves that any fix that was tried obviously was not the fix required. In such cases good trouble shooting is necessary to identify the primary cause and get the proper fix. In this way and this way only can we prevent accidents.

T-33 Brake Failure

On a flight from Saskatoon to Nova Scotia the pilot of a T-33 landed at an RCAF base in Ontario to refuel. During this stop the schraeder valve on the port oleo was changed. Takeoff was normal. Before landing at his final destination the pilot checked the brake pressure. It was normal. During the landing roll complete port brake failure was experienced after three or four applications. Once rudder control was lost the aircraft gradually swung to starboard and ran into two feet of heavy snow at the side of the runway. The nosewheel and port undercarriage collapsed.

Investigation revealed that the flexible brake line on the port undercarriage was caught behind the grease nipple on the lower swivel of the scissor assembly. As this line is too stiff to "whip" over the nipple it must have been pushed over when the oleo was being serviced. When the oleo extended the flexible line was stretched and flattened where it passed around the lower swivel of the scissor assembly. This "pinched off" the line and caused the brake failure.

The oleo was serviced at night. The servicing crew worked by the light of the hangar flood-lights and flash-lights. The pilot did his preflight inspection with a flash-light and specifically checked for a possible hydraulic leak.

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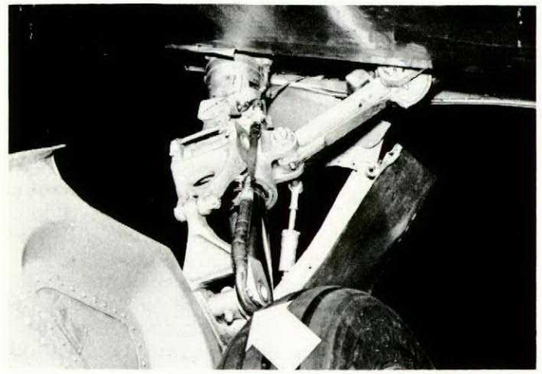
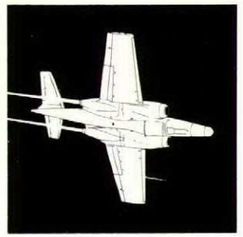


The flexible line was flattened when the oleo extended



Parking Problems

A CF100 had landed and was taxiing down the tarmac between two lines of parked aircraft. The marshaller was about 200 yards down the line and was indicating in which line to park the aircraft. The captain of the aircraft was moving slowly down the line as the distance between the two lines of aircraft was limited. He estimated that he had sufficient clearance on the port side so he was watching the starboard wing tip closely. He judge that the pod would clear the tail of an aircraft. The pod came into contact with the tail cone of the parked CF100.

The distance between the tail of the front line aircraft and the nose of the rear line aircraft measured 75 feet. The wing span of a CF100 is 60 feet 10 inches, so 14 feet of clearance was available.

So there you have it, one marshaller only was on duty due to a shortage of manpower, it was a very dark night, the taxiway was too narrow, and the pilot elected to taxi in. At this unit the hazard was recognized and an Operational Hazard Report was submitted, followed by an A for P. All aircrew were briefed concerning the hazardous taxiing conditions and were informed that if they were in doubt they were to either call for wing walkers or, if the extra crew were not available, to shut down and have the aircraft towed into position.

The assessment was pilot error, and it's pretty hard to argue the case, but what action has been taken on the A for P? And why was one marshaller only on duty? A shortage of personnel—we can't be that short.

Do Not Feed The Animals

A CF100 was being prepared for temporary storage. The canopy cover was not removed, just rolled back over the fuselage leaving a ten foot length of bungee cord with a metal hook at the end lying along the wing root adjacent to the fuselage. The engines were started and, during the run-up, the bungee cord vibrated forward and was drawn into the engine.

The airman responsible was reliable, qualified and properly authorized to run-up the CF100. Still he gambled the extra work involved in handling the cover properly against a $65,000 engine—and lost.

This type of accident—the result of cutting corners—has become one of our most reliable sources of copy for "Arrivals and Departures". But surely we soon should realize that a jet engine is just like the proverbial goat—ingests everything within reach. If there was a safe short cut we'd be the first to recommend it.

Speed, Rain And Barrier

A CF100 was landed too fast under heavy rain conditions. Although these circumstances called for severe braking action, braking action was slight. The aircraft went into the overshoot area and was stopped by the barrier. The undercarriage doors were badly bent, nosewheel pick-up door was ripped, and the brakes were filled with stones. No one was injured.

(Nice to have you home. But was it really necessary to come charging over the threshold like that? —ED)

Landed Ten Feet Too High

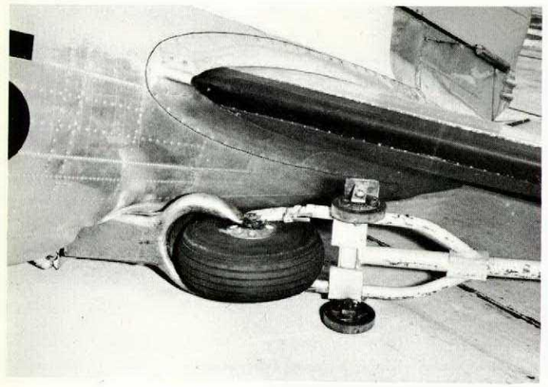
An Otter was approaching for a landing. Conditions were perfect; unlimited ceiling, visibility 15 plus, temperature 22°C, wind nil, weight 7861 pounds, an experienced pilot to make the landing. The last hundred feet of the approach was made at 55 knots with full flaps. The roundout was made about ten feet too high and, anticipating that the aircraft would float, the pilot cut the power. The aircraft stalled and struck the ground 60 feet short of the strip, nosed over momentarily when it struck some concrete slabs which were used as boundary markers, then rolled to a stop about 1400 feet down the strip.

The Otter's right undercarriage was badly damaged, cockpit and cabin floor damaged, front fuel tank ruptured, and propeller bent. It will have to be returned to the contractor for repair.

Why should an accident like this happen? The approach was good enough. The roundout was not serious, that is until the power was cut. Lack of attention must be the answer. One other point should be considered; the other pilot noticed the low airspeed condition but, in deference to the pilot's greater experience, he did not mention it.

To Slow Or Not To Slow

A C47 was being towed across the taxistrip to the flight line. The tow was across wind, and the wind speed was 35 mph with gusts to 45 mph. The tow crew consisted of a Cpl and four men. While crossing a patch of ice on the tarmac, the tail of the aircraft swung to starboard. The swing was arrested abruptly as the tail tire came in contact with the dry pavement. Since the tow bar was in place, the tailwheel was unable to castor so the tailwheel assembly broke off allowing the rear fuselage to drop to the pavement causing considerable damage.



Crossed up by a crosswind and some ice

A D8 and a crosswind played at tug-of-war for a C47

Investigation revealed that when the aircraft reached the icy patch of tarmac the driver of the D8 slowed down, allowing the aircraft to jackknife in the high wind. Had he maintained a steady pull on the aircraft over the icy section, in all probability this accident would not have happened.

While it is natural for an inexperienced driver to slow down on an icy surface, it is deadly when there is a high crosswind and you are attached to a 12 ton trailer.

The unit called this a pure accident; we call it just poor towing technique. In this case the driver was an authorized operator, but he was not properly instructed as to how to tow an aircraft in conditions that we have described. The result, one badly damaged aircraft.

Letters to and from the Editor

Candid Shot Of A Crewroom

Everything was dropped when they rushed off to read the new issue of Flight Comment. We sincerely hope the next issue does not include an item about a parachute that failed.

Compressor Stall

...After studying LAC Griffiths' letter, my only comment is—it is interesting, but hardly critical. You probably appreciate more than most people that, in a brief article on an involved subject such as this, it is impossible to give more than general coverage. It is sel-

dom possible to go into the detail that is sometimes desired, without running the risk of misleading the readers into thinking that only those specific situations are possible. In general, LAC Griffiths writes about limited, specific situations which I covered, with many others, in a general manner.

The following are some specific comments regarding his letter.

(a) Paragraph 2 first sentence—This condition probably occurs more frequently than his experience would lead him to believe.

(b) Paragraph 2—It would be a mistake to expect a BANG everytime.

(c) Paragraph 5—The first action to be taken in the event of a compressor stall is always to close the throttle. What the pilot does after that depends entirely on circumstances. The pilot may or may not be prepared to dive the aircraft, and diving the aircraft may or may not produce the desired results quickly enough. The pilot still has to watch JPT and rpm and govern himself accordingly.

(b) Last two paragraphs—My article was intended to help prevent serious damage in the operation of jet engines, not as a guide to maintenance personnel in carrying out repairs. I quite agree that incorrect diagnosis of troubles has often resulted in improper corrective action, but I believe that pertinent EOs have quite a bit more to say about trouble-shooting.

I trust this answer will be satisfactory. As I said before, it is difficult to consider this letter critical because LAC Griffiths merely goes into details which space limitations prevented me from going into. His comments on the situations he brings up are not exhaustive either, and he concludes his letter with comments which have no bearing on my article. No doubt his closing comments touch on a very important problem, but I suggest that they do not apply here, and would be better amplified as a complete article on fault diagnosis.

Why don't you get two experts to write on the problem? One pilot to write on fault observation and diagnosis, and a maintenance man on diagnosis interpretation and repair...

E.D. Harper S/L
RCAF Staff College

(Here are the troubles of an author who, due to space restrictions, has been forced to treat a technical subject in general terms. However, if his treatment prompts people to think, he has done much to improve our operational efficiency. LAC Griffiths put a lot of thought into his letter, and thinking men are what we could use more of.

S/L Harper's suggestion for two experts to write on the problems is a good one. Do we have any takers? —ED)

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HOT WEATHER TAKEOFFS

Takeoff with a smile

Altitude — 345
Weight — 75,000
Centre of Gravity — within limits
Temperature — above normal
Complexion — sunny, some frontal build up

Miss takeoff for '59 reminds you

To check the hot weather takeoff

Procedure in POIs

(See "Hot Weather Takeoffs" page 13)

one forgotten

or improperly

installed

is a small

mistake,

but often

fatal.