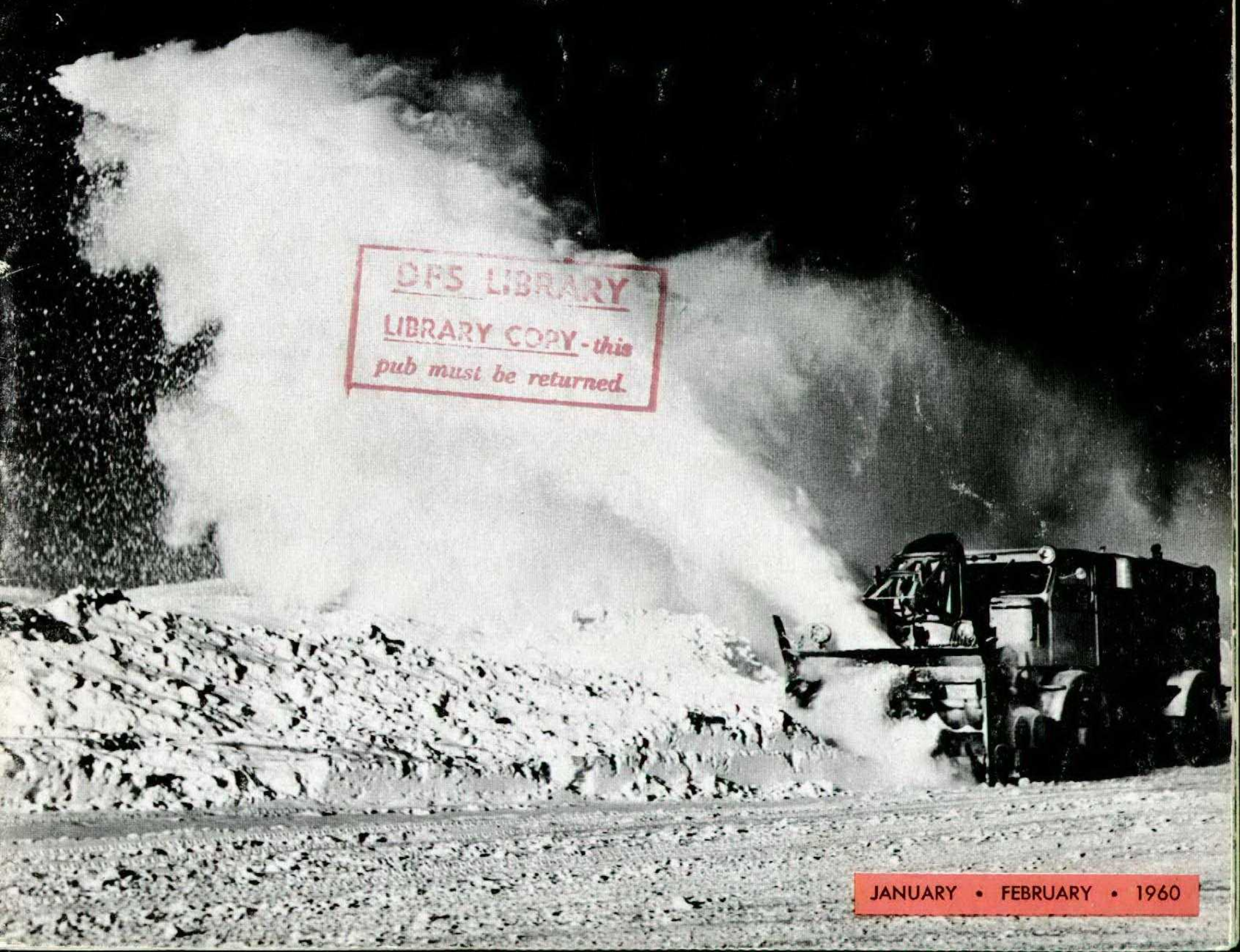
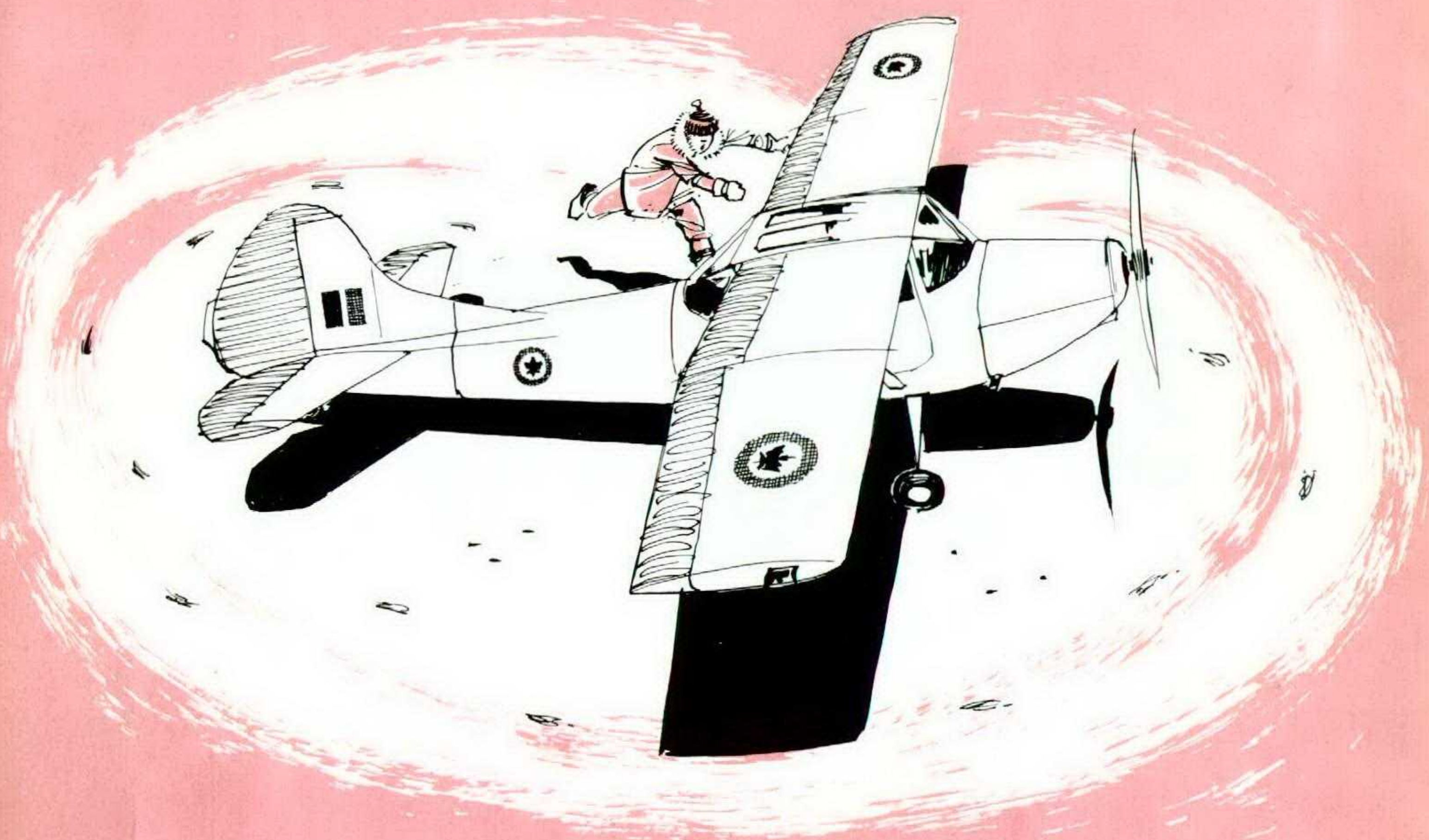
FLIGHT COMMENT

ROYAL CANADIAN AIR FORCE



JANUARY • FEBRUARY • 1960



(Quote from an L14)

The preflight runaround was completed by the student.

THE L19 CRASHED

EDITORIAL

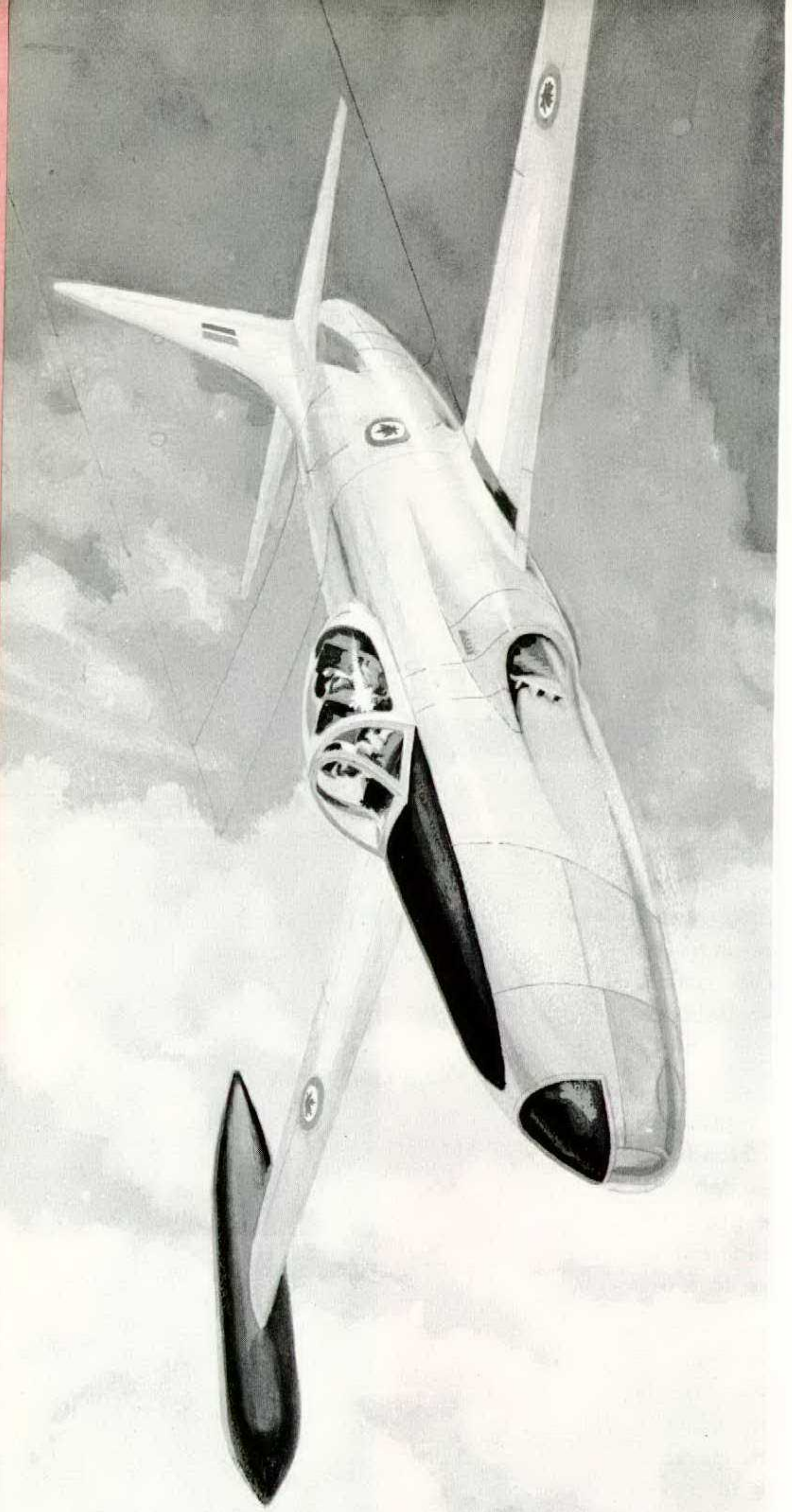
By the time many of you read this issue of Flight Comment you will have made your New Year Resolutions, reviewed your accomplishments and errors of 1959 and resolved to do better in 1960.

In reviewing safety for 1959, there is cause for satisfaction, for example, an improvement in the general acceptance of safety as a prerequisite of efficiency. There is, however, much room for improvement. Improvement in the detail given when reporting an occurrence, an unserviceability or unsatisfactory condition, improvement in recording the detail of corrective action, improvement in aircrew, servicing and maintenance standards, these are necessary elements in safety resolutions for 1960.

Improvements of this type cannot be legislated; they depend on the integrity of each man. Standards can be defined and maintenance procedures detailed. The means of reporting and recording can be provided. These are the tools of flight safety and each man should, among his other resolutions for 1960, resolve to make better use of them.

And, above all, you should not accept a reduction in the accident rate as the sole aim of your safety resolutions. The real goal of flight safety, while it emcompasses the conservation of men and materiel, is to continue the improvement in the minute to minute effectiveness of the R.C.A.F.

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



SPINNING THE T-33

by F/L J. G. Henry

This article first appeared in the Jan-Feb '56 issue of Flight Comment. As the information is still valid, it is reprinted in answer to requests for such information.—ED

Some Spin History

During the past two years there has been considerable needless apprehension about spinning the T-33. When this aircraft was introduced into the USAF as the T-33A, spinning restrictions were imposed because test pilots occasionally encountered an unusual flight condition which they referred to in such uncomplimentary terms as "tumbling" and "out-of control manoeuvre". Lockheed Aircraft Corporation, in conjunction with the USAF, investigated to determine what caused this manoeuvre and what could be done to prevent it. Among the problems arising out of the project, test pilots found that the aircraft's inherent stability made it difficult to reproduce the manoeuvre intentionally, particularly in spins.

The T-33 Mk 3 (essentially a T-33A with a Nene Engine in place of the Allison) was introduced into the RCAF early in 1953. Quite naturally our Air Force was interested in whether the spinning restrictions on the "A" would apply to the Mk 3. Subsequently Central Experimental and Proving Establishment (CEPE) was requested to do spin trials on the Mk 3. S/L R.G. "Bob" Christie, at that time Chief Test Pilot at CEPE, examined all the information available from American sources and then proceeded to spin the T-33 in all configurations and at various centre-of-gravity positions. Not once in these spin trials did he encounter the "unusual flight conditions", and since there had been no reported occurrences of it at RCAF units using the T-33, it was concluded that the Canadian version of the aircraft was not susceptible to "tumble".

S/L Christie's report stated that the T-33 Mk 3 spin was similar to the Harvard's worst and that standard spin recovery techniques as given in Pilot's Notes General were effective and adequate. This was all very well; but why should the T-33 Mk 3, with an airframe almost identical to the T-33A, not have the latter's one unusual characteristic?

To get the answers, the Air Force had a T-33A shipped to CEPE in February, 1954, together with a request that we investigate and report on its spinning characteristics. This time it was S/L J.F. "Jim" Fewell and myself who were elected to look into the matter. First we read all the available literature, consulted with the project engineers, and groped our way around a slightly unfamiliar cockpit. Finally we proceeded to get spin happy.

The first ten or so spins lulled us into a false sense of security. Nothing happened. Then I did another - a perfectly innocuous spin to the left. Coming out of the second turn I suddenly began tumbling through the sky, not knowing which way was up. Before I had time to take any recovery action at all, I was back into a normal spin - slightly shaken and very surprised.

All told, we did about seventy spins in various configurations and encountered this "tumble" four times. Our final report covered all types of normal upright spins, inverted spins, and the "tumble", and described their characteristics and the recommended recovery techniques.

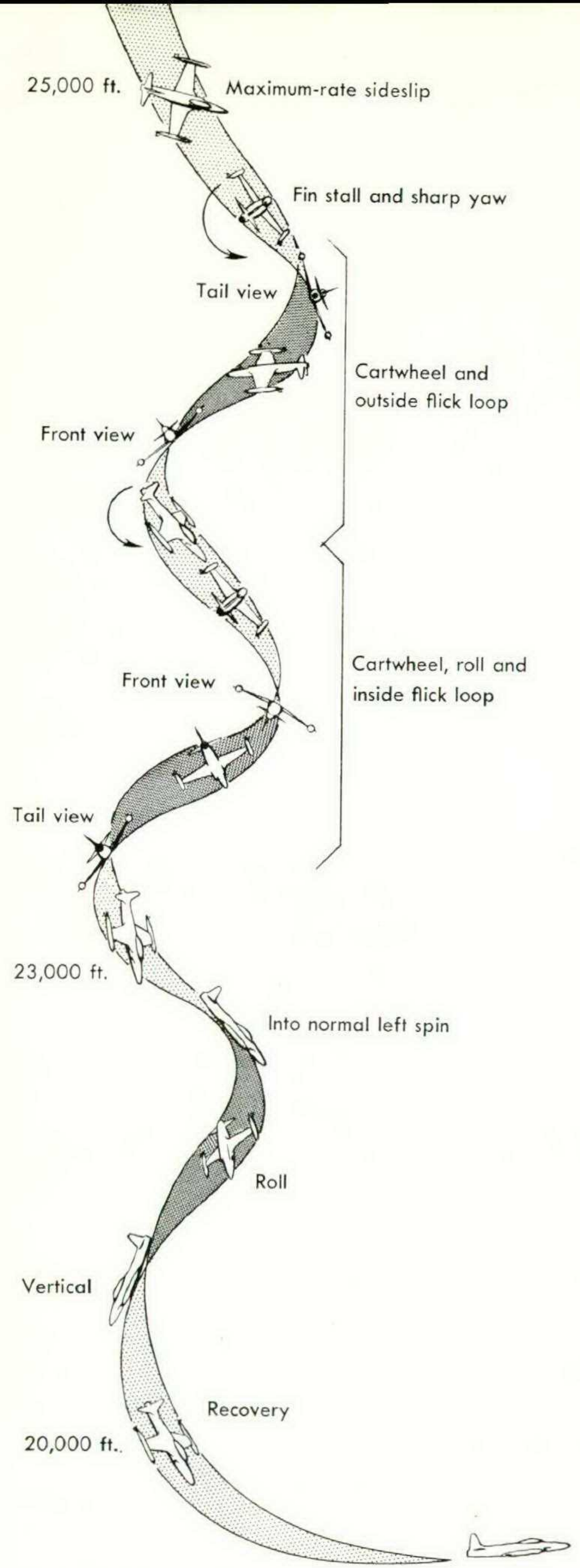
Following the trials, all was quiet until reports began to sift into Training Command Headquarters from units in the field. These reports covered a variety of complaints from poor stall characteristics to difficult spin recovery and unusual flight manoeuvres. The upshot was a request to Central Flying School, Trenton, asking that an investigation be made into the spinning of the T-33 Mk 3 and associated problems. The new trials were conducted in February and March of 1955 and a total of 140 spins and disoriented conditions of flight were racked up. Forty-seven attempts were made to obtain the tumble condition but only 16 were successful - and these occurred through gross mishandling of the controls.

An excellent report was produced from these trials, and the conclusions and recommendations arrived at confirmed the previous results obtained by CEPE. In addition, an excellent film was obtained showing a T-33 doing one of the tumbles. It will be used in a training film now being produced by CFS and RCAF Photographic Establishment, Rockcliffe. (Now available as "Spinning The Silver Star", ref 14C/2878.)

While the foregoing tests were in progress, Lockheed had been doing some further investigation on the T-33A and ultimately recommended a small modification: the addition of a stall strip on the leading edge of each wing, together with a modified wing root fillet. With these modifications the USAF lifted spinning restrictions on the aircraft. Canadair, as the Canadian manufacturer of the T-33, was informed of this, and a modified Mk 3 T-33 was sent to CEPE for trials in March 1955. The new "mods" certainly improved the aircraft's stalling characteristics and appeared to aid the spins, too, since the characteristic tumble entry was not encountered on any of the flights. At the end of April, I had a chance to visit Lockheed's plant at Palmdale, California and discuss the whole problem of the T-33 with "Sammy" Mason, the Lockheed test pilot who has "lived with" the T-33 since it was first flown. Our get-together was most informative and revealed that basically we agreed on the conclusions drawn from our respective trials.

So much for the history of the T-33. A brief discussion of the various characteristics of the aircraft would now be in order. The manoeuvres covered are those which might be confusing to the pilot: spinning - upright and inverted; snap or flick rolling; and the tumble.

It is a sad commentary, indeed, when a pilot is not familiar with spin recovery techniques.



Tumble from maximum-rate sideslip to right

The Normal Spin

The normal spin in the T-33 is a typical oscillatory spin in all configurations. The entry is normal with full rudder and stick full back at the stall. During the spin the nose rises and falls; the rotation alternately speeds up and slows down; and, as the spin progresses, the attitude of the aircraft becomes progressively more nose-down while the oscillations decrease. The pilot is almost always under positive G, and the spin (although the aircraft may be momentarily inverted during the manoeuvre) cannot be classed as "rough". Normal height loss is 1000 to 1500 feet per turn. With the undercarriage or flaps down, with fuel in the tip tanks, with no tip tanks installed, or with power on during the spin, the rate of rotation may be changed but the basic spin pattern remains the same.

Standard recovery action provides the most effective method of recovery. In detail the action is as follows:

- Clean up the aircraft if gear, flaps or speed brakes are down.
- Throttle back to idle.
- Stop the rotation with full opposite rudder.
- Move the control column smoothly, steadily forward until the spinning stops. (It is not advisable to move the control column much beyond the central position since this could produce a bunt or possibly an inverted spin.) Immediately the spinning stops, centralize the rudders and ease the aircraft out of the resulting dive.

The Inverted Spin

This type of spin is not taught normally and it is seldom performed intentionally. However we mentioned it here because you might encounter it some time. The method of intentional entry is from inverted, level, power-off flight. As the speed falls off, the control column is pushed slowly ahead until, at the inverted stall, it is fully forward. Then full rudder is applied.

The inverted spin may take one of two forms. The first is a smooth, flat, fairly fast, inverted spin in which the pilot is subjected to a fairly steady minus one-half G. The second is an oscillatory-type spin, similar in pattern to the upright spins with the exception that, as the nose of the aircraft rises, the aircraft is inverted instead of upright. The pilot in this type of spin is subjected to alternate positive and negative G varying between plus 2 and minus 1-1/2. Combined with rotation and oscillation this treatment can easily confuse a pilot.

Recovery from the inverted spin is quite simple and is acomplished in the following manner:

- Clean up the aircraft if gear, flaps or dive brakes are down.
- Throttle back to idle.
- If the direction of rotation can be definitely established, apply full opposite rudder. Move the control column smoothly and steadily back until the rotation stops.
- If the direction of rotation cannot be definitely established, centralize all the controls and wait for the spin to stop - which it will do in about one or two turns. Then proceed with normal pull-out from whatever attitude the aircraft has stopped in.

Snap or Flick Rolling

Intentional flick rolling is prohibited because of the stresses imposed on the aircraft, although there is no record of damage caused to the T-33 as a result of the manoeuvre. Essentially the flick roll is a high speed spin; the controls are in the pro-spin positions with the stick back and full rudder on, but the airspeed is well above stalling speed. Consequently the aircraft motion is primarily a rolling one along a downward, curved path. The rolling motion is quite fast, with no nose oscillation, and can be readily recognized.

Recovery from this manoeuvre is simply to centralize all controls; and since the airspeed is well above stall, the aircraft is flying again immediately.

The Tumble

This is the manoeuvre which has caused all the concern and apprehension over the T-33. It can be entered only from a maximum-rate sideslip condition seldom encountered in normal flying. The actual tumble is caused by a fin stall and a stabilizer stall, the combination of which render the stabilizing sections of the tail non-effective. The resulting motion is a confusing mixture of cartwheels, flick loops, and rolls, subjecting the pilot to alternate positive and negative G varying in intensity from plus three to minus two. Consequently the inverted spin is easily mistaken for a tumble, and vice versa.

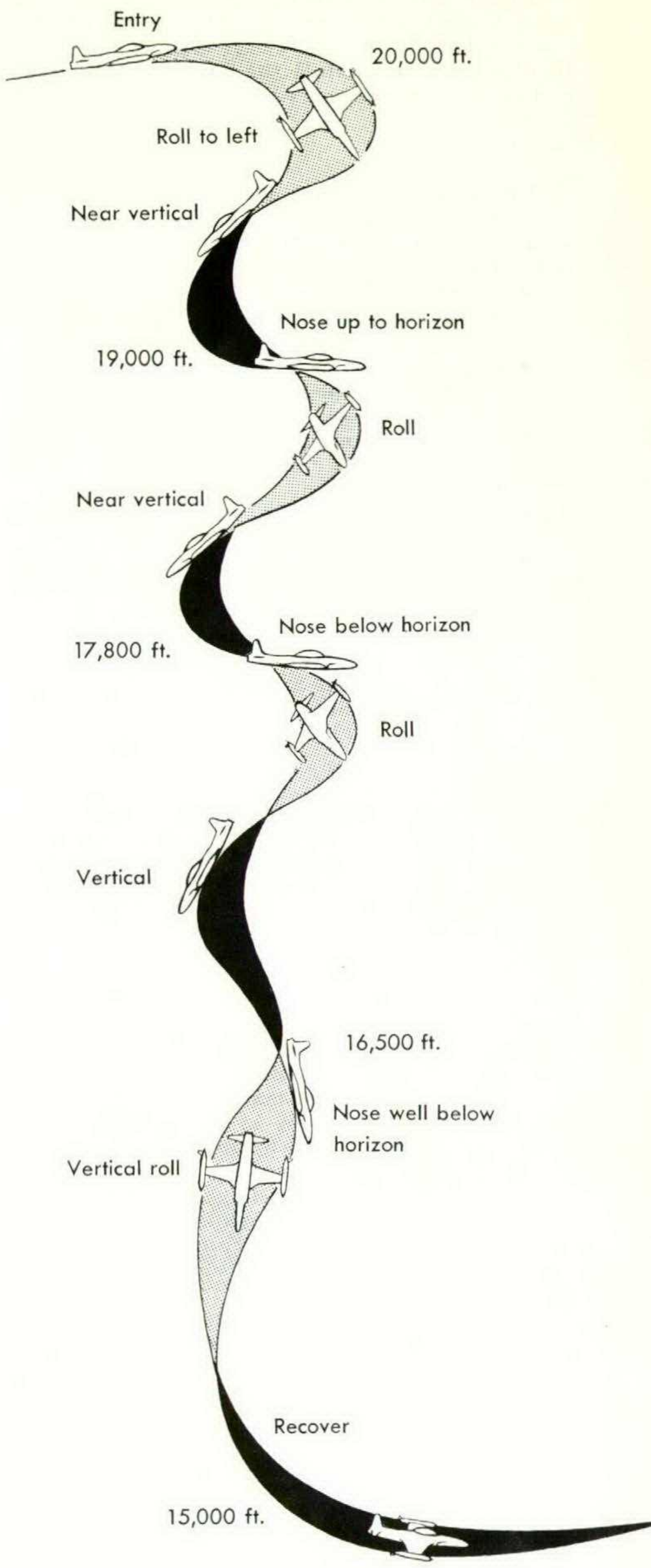
Recovery from the tumble is not strictly in the hands of the pilot. The proper procedure is to:

- Centralize all controls as soon as the tumble is recognized or suspected.
- WAIT until the aircraft assumes a known condition of flight.
- Take appropriate recovery action to get back to level flight.

This may not seem like a very positive recovery technique, but it DOES work. The aircraft will normally tumble through about 2000 feet before settling into a normal spin or some other recognizable flight condition. From there the pilot can take positive recovery action to return to level flight.

On one or two occasions it has been reported that a tumble lasted through six to eight thousand feet; but whether these were tumbles or inverted spins cannot be ascertained. The fact remains

Normal, erect spin to left-three turns



that on each of these occasions the tumble or spin stopped before the aircraft reached an altitude of 12,000 feet. Denser air at the lower levels tends to unstall the fin and stabilizer, and so aids in recovery.

Conclusion

Recovery from any of these unusual flight conditions - spinning, flick rolling, or tumbling - can be boiled down into the following simple procedure:

- Clean up the aircraft if the gear, flaps, or dive brakes are down.
- Throttle back to idle.
- If the direction of rotation can be definitely established apply full opposite rudder to stop the rotating.
- Move the control column smoothly and steadily to the central position until rotation stops.
- Centralize the rudder and recover to level flight.
- If the direction of rotation cannot be definitely established, centralize all the controls and wait for the aircraft to assume a familiar or recognizable condition of flight. Then take appropriate recovery action to regain level flight.

To clarify the last point listed above, if the familiar or recognizable condition of flight is a spin, the appropriate recovery is a normal spin recovery. If it is a spiral dive or aileron turn, stop the rotation and ease out of the dive. If it is inverted flight, allow the nose to drop, and gain sufficient airspeed to roll out. The altitude required to loop out of the inverted position is very much greater than that required to roll out.

Dropping the tip tanks, with or without fuel during a spin or tumble, is not recommended unless the fuel load in the tips is known to be uneven enough to cause control difficulty. The reason for this is that the dropped tanks, during a spin, may roll along the top of the wing and then back towards the tail surfaces, possibly causing serious damage.

For pilots, a word of caution should be added here: Always ensure that the seat straps are fastened securely before flight to prevent you being tossed around the cockpit and to prevent the seat or emergency pack from being dislodged and jamming the control column. This has happened!

As yet no difficulty has been experienced by test pilots in recovering from spins, tumbles, and other out-of-control manoeuvres. However, the following should be borne in mind.

- If the terrain clearance goes below 10,000 feet or if the pilot feels that sufficient time has elapsed for recovery action to be effective without results, it is recommended that the canopy be jettisoned. This serves a dual purpose in that it is the first step towards a possible bailout and it may assist the actual recovery. Consequently, if the pilot stays with the aircraft a few seconds after the canopy has been jettisoned, a recovery may be possible.
- However, if a definite recovery from the out-of-control condition has not been established prior to reaching a terrain clearance of 7000 feet. BAIL OUT! Bear in mind that observation of the altimeter is difficult, and that ground reference, due to the gyrations of the aircraft, is even more difficult!

A tribute to the design and manufacture of the T-33 - or "T-bird" as it is called by pilots familiar with it - is certainly in order here. Not once during all the spinning, gross mishandling, tumbling and other unusual manoeuvres that were carried out, was there a case of structural damage. Nor were flameouts encountered, although it is possible that one might occur under prolonged negative G.

The T-33 is a docile aircraft when handled properly but it is a fairly high speed trainer and as such needs to be treated with respect.

MANHOLE COVERS BEWARE

Now that powerful engines are here to stay, the following two paragraphs from a memo to DFS will be of interest to personnel who must ground run such engines:

"On 1 Jul 59 the CL540 (440 with Napier Eland Engines) leased by Napier to Allegheny Airlines for route proving trials was involved in a freak accident in which a small manhole cover was sucked up during a high powered ground run and damaged the propeller.

It is understood that this also happened to a Viscount at Pittsburg in June."

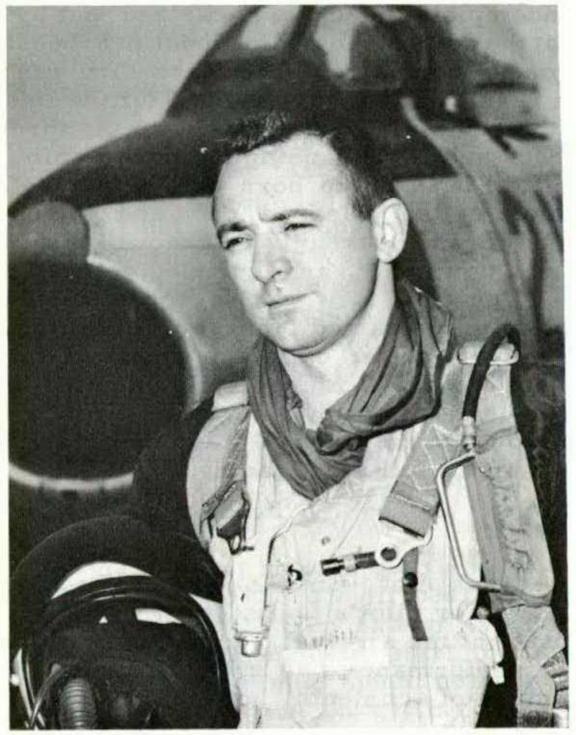
The Directorate of Engineering is aware of this problem and will issue the necessary instructions. In the meantime care must be exercised to ensure that the runup area contains no loose objects—light or heavy.

ALL DONATIONS

You, the man in the field, the man who is working with the equipment, can be of invaluable assistance to us by bringing to our attention any discrepancies, no matter how small, and recommending changes to procedures as a result of your experience. We realize that in asking for your valuable assistance we are placing another task on your already very crowded work programme, however we feel that the extra effort will produce much improved Engineering Orders.

AMC Bulletin

HEADS-UP FLYING



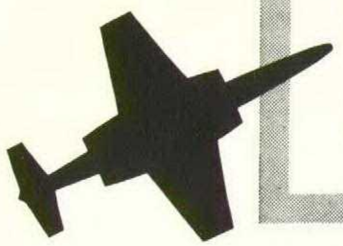
F/L F. E. SYLVESTER

While joining up in formation after a gunnery exercise, the throttle of the Sabre V was reduced to 70-75%. The pilot noticed a scraping sound at this power setting. After landing he experimented, and found out that the scraping sound was apparent only at a power setting of 70-75%. He placed an entry in the L14 to this effect.

Inspection of the aircraft revealed the JO bolt that was installed during modification EO 05-5E-6B/23 had sheared and was ingested by the engine. Three blades were nicked on the first stage compressor rotor, and at least seven blades were severely damaged on the tenth stage compressor. Because of this incident an inspection was made of the rest of the Sabres on the unit. It was found in almost every installation of this mod the JO bolt was either loose or missing. As a result all Sabres with this mod were grounded until reworked by the MRP. It is not known at this time whether this failure was the result of over torquing of the JO bolts or materiel failure.

The pilot of this aircraft, F/L F. E. Sylvester, displayed sound judgment and good airmanship in reporting the roughness of the engine at a certain rpm. Because of this report, all aircraft were modified and a potentially hazardous situation was removed before a bad accident happened.

This again points up the importance of good reporting however minor an unserviceability or in this case sound might appear.



NEAR MISS

DANGEROUS D14 ENTRIES

While a CF100 was on a number 4 check it was discovered that the port engine fire bottle had been fired. On checking back in the L14 an entry by a pilot, "Fire Warning Light came on and stayed on", made two months previously was found. D14 action was taken at the time of the entry.

It is obvious that this aircraft had been flying for two months with the port engine fire extinguishing system unserviceable and, had this system been needed, the seriousness of the consequences are easily imagined.

In this case the pilot was at fault for not entering in the D14 that he had fired the extinguisher. Also, the Specialist Officer should have noted the entry and ensured that the groundcrew checked the extinguisher system.

My recommendation to prevent a similar occurrence, is to have some sort of seal or easily broken locking wire over the extinguisher button cover, and this seal or wire checked on every inspection. (It is also worthy of note that the check on the detector pressure gauge has been deleted from PI and BFI inspections.)

(Pending revision of EOs, ADCHQ has sent out an ink amendment to EOs by message. The use of locking, as suggested, is not considered advisable because, sooner or later, someone is going to use high tensile steel wire to seal the switch. Aircrew can, however, make an invaluable contribution in preventing similar incidents—tell maintenance, via the D14 entry, exactly what action was taken. All too often a brief D14 entry is the first link in a chain of events leading to an accident.—ED)

CHECK PILOT?

I was authorized to carry out a unit check on a pilot. The checkout was below standard up till the time the circuits were commenced. On the second circuit I cut the inside engine. An incomplete check was carried out by the pilot at the controls including much overboosting and much confusion. The base turn was too close resulting in a very steep S turn to line up with the runway. During this time the throttle was back and forth causing the horn to blow on and off. I pushed the horn cutout just before the tower called "Cleared touch and go, check gear down and locked". I acknowledged with "it's not down yet", and intended to keep it in mind. The final turn was so ropey that I was completely distracted, thereby forgetting the gear until the tower called on roundout that it was not down. I immediately applied both throttles and pulled up. After this I again turned control over to the other pilot and we did another circuit with a full stop landing.

FSO's Comment:

The check pilot seemed to be more concerned with the other pilot's faults, than with the safe operation of the aircraft. Impatience with anothers performance has always caused a high percentage of accidents, both in the air and on the ground.

This check pilot should know that he is in the aircraft to prevent accidents from happening. If the pilot undergoing the test is as bad as the one in this "Near Miss" appeared to be, then it is the check pilot's responsibility to recommend more dual training, not to see how far he can let the other pilot go without taking control to avoid a crash.

HASTE MAKES WASTE

A Canadian mother nearly lost her handsome son who is a member of an RCAF flight line servicing crew. This near miss was the sum of numerous little factors which, when totalled, come close to ending in disaster.

Two sub-totals of events, the aircrew column and the groundcrew column, must first be arrived at before they can be brought together.

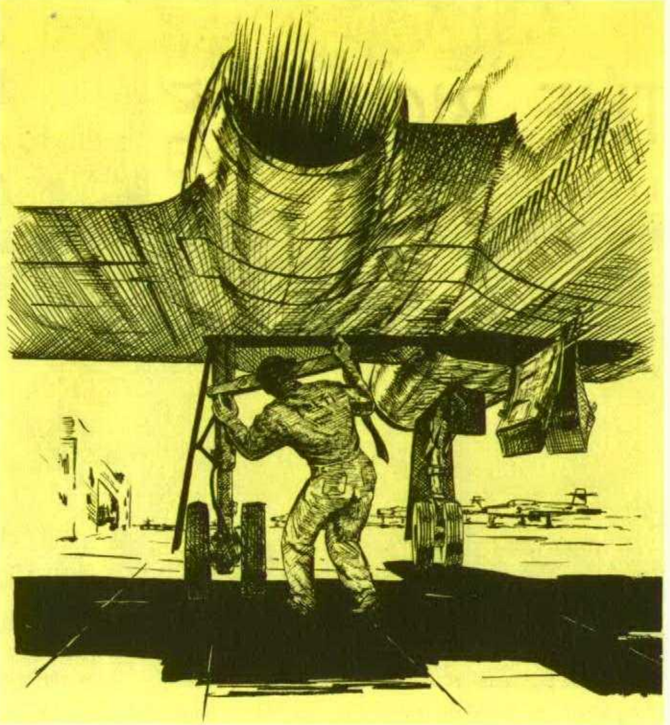
The aircrew were late starting the flight because of an extensive pre-flight briefing, and because the instructor had to perform unexpected flight duties prior to flying. Since a late start makes a days program more difficult to adhere to and also makes a pilot late for lunch (again), the instructor did not want to waste any more time. This adds up to a pilot in a hurry.

The servicing crew were short handed because of pay parade and the lunch hour shift. When four Canuck aircraft needed starting at the same time, the groundcrew did their best but had to start two aircraft with only one lineman. This adds up to a very busy servicing lineman.

After start-up, the lineman drove the "brute" away from in front of the aircraft and disappeared beneath the plane to remove the undercarriage locks. Here he ran into a very stubborn lock pin that defied removal. A time consuming struggle ensued.

Meanwhile the pilot, having completed his poststart checks, was ready to taxi but no lineman was in view to help finish the external checks. After 30 seconds of waiting, the impatient pilot decided that the busy lineman had left him, so the flaps were set; the speed brakes exercised, and the canopy was locked. The groundcrew often remove the undercarriage locks after the first engine of a CF100 is started, so the pilot decided that he would taxi and have the tower or another aircraft check for the red undercarriage lock flags prior to taking off. The aircraft started to move smoothly and slowly out of the line, but the pilot jammed on the brakes when he spied a wildly running man go racing out to the wing tip past the pitot head. Here was the missing lineman.

The lineman had noticed the flaps go up and then back down, to the takeoff position; he had noticed the speed brakes extend and retract; he had noticed the engines start to increase in rpm, but these events meant nothing to him since he was so intent on getting the under-



Suddenly the aircraft began to move forward.

carriage lock off. It wasn't until the plane started to roll that he realized the danger that he was in. His own quick action saved him from injury. This now gives a grand total of a NEAR MISS.

To prevent a recurrence of a similar incident, the groundcrew of the flight line concerned have been instructed that if a lone man is doing the start-up, the moving of the "brute" is the last action to be performed. When the standard two-man starting crew are present, one man always stands in front of the aircraft within the pilots vision until the pilot is clear to proceed.

SFSO's Comment

Haste makes waste (of airmen).

WEATHER FORECASTING

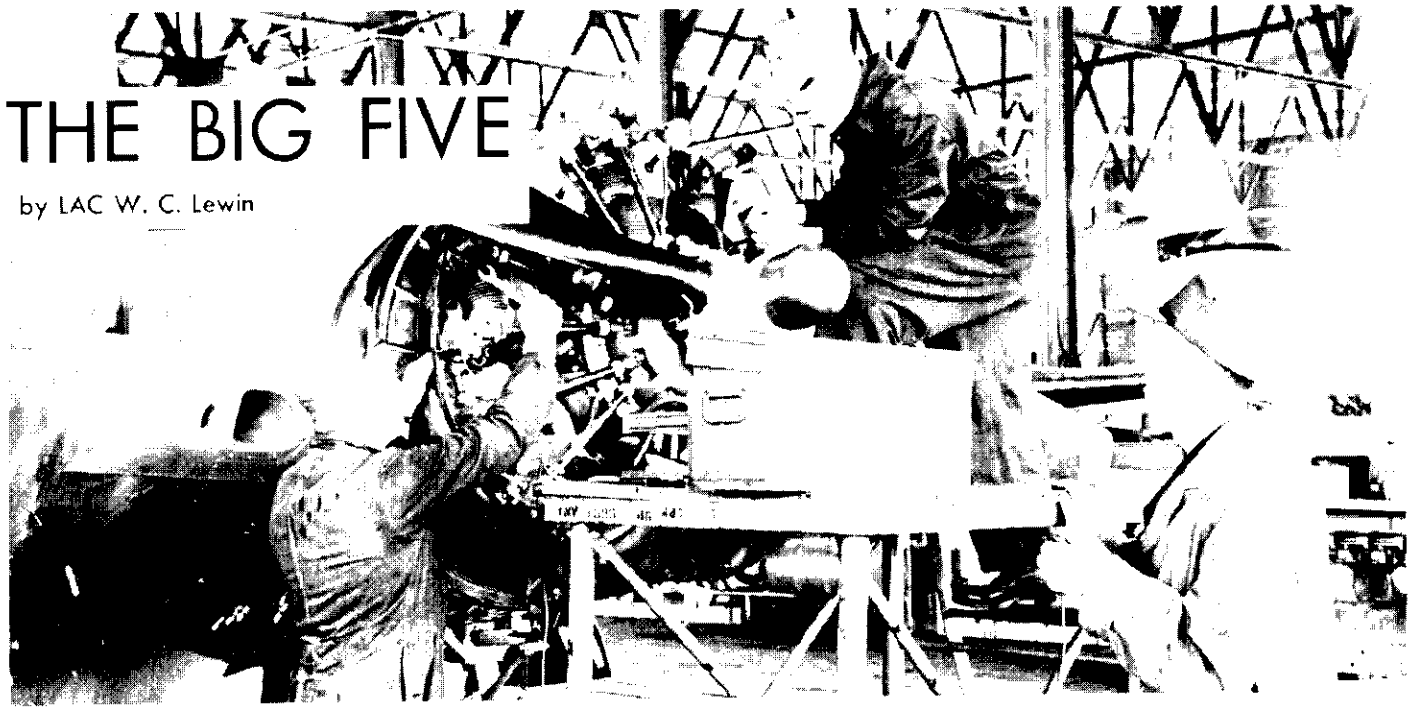
No amount of money spent on air traffic control, jet transports, or hypersonic aerodynamics, is of any help when severe weather blocks off a major airport and multiplies congestion for a thousand miles around. Fail-safe developments permitting all-weather landings are badly needed. Military developments, such as ILS and GCA, have permitted operations in more severe weather. Until an all-weather landing system with fail-safe features is available, the industry will be dependent on accurate weather prediction at terminals.

A more complete network of weather stations, including automatic surface and sounding balloon stations, are needed to improve enroute observations and forecasts. More funds for weather research would pay off many times if weather-caused diversions and bottlenecks could be reduced. The Center urges wholehearted support for expanded research into weather phenomena. This cannot fail to help the safety not only of aviation, but of the nation as a whole.

Aviation Safety Center
Cornell University

THE BIG FIVE

by LAC W. C. Lewin



Accident prevention, as many have discovered, is an enormous task. Like a cloud, it hovers over everyone, engulfing them with responsibility. It is up to those in charge to lay down safety rules, ensure that safety devices are installed, and that safety practises are continuously followed. But whether we like it or not, the real job rests with the workmen. They are the ones who make the most use of the machines and work areas; they are, therefore, our main force against accidents.

Hundreds of years ago, today, and most likely until the end of time, people were, are, and will probably continue to be confident in their luck or whatever it is that makes people sincerely believe that it "couldn't happen" to them. It's just like saying, "Fire is hot, but it couldn't burn me", and then jumping in to prove it. Sounds a little ridiculous, doesn't it? On the other hand, how many people today are working among hundreds of small hazards and thinking the same thing? Small they may be, but the smallest grease spot, or the most insignificant little nut in the wrong place have the latent powers of a live cartridge, which can be too often fatal.

Fatal. A sinister word, isn't it? With it can be outlined five of what I think are the most important factors which, sad to say, put it in front of the word "accident" more times than it should.

With the first letter of the word we have Familiarity. This, I think accounts for a great majority of accidents. People who become too familiar with their work tend to get over-confident in their immunity to mistakes and neglect to check their work. Familiarity also breeds short cuts. When you get this temptation, just remember EOs and the like are made up by experts and if there were any safe short cuts to be taken they would have been included in the book. A note to NCOs and section heads also, that extra capable AC in your section is still human and subject to error—check his work.

Next we have "A" for Ability. The RCAF trains hundreds of men for a specific job or trade. A man is not trained for electronics and expected to work as an engine technician; there are separate training facilities for that. Know your own trade and don't try to meddle in something that is not covered by the scope of your training. Many accidents have been caused by failing to do just that.

"Better late than never" is another good adage. Tardiness causes more missing bolts, empty fuel tanks and consequently more accidents than can be reckoned. A pilot would much rather arrive at his destination late in his aircraft than on time in his coffin. A good schedule will cut out the majority of hurried checks and, thus decrease accident potential.

Animosity is next. Just because you don't like the guy you're working with, or your NCO isn't giving you the breaks, don't take it out on your work.

Last but not least, we have Loss. Take care of your equipment. You can't do the job right if you haven't got the right tools. A wrench can make a nut much tighter than a pair of pliers, don't lose it.

By being alert to the dangers inherent in these five accident-causing factors; familiarity, ability, tardiness, animosity and loss, we can cut down the accident rate considerably. True, there will likely always be "unavoidables", but we might at least be able to keep the word "fatal" away from many of them.

GROUND FIRE FIGHTING

(TURBOJET ENGINE)

The following information was extracted from Pratt & Whitney Manual "General Operating Instructions for Dual Axial Compressor Nonafterburning Turbojet Engines". It is reprinted here in view of the constantly increasing exposure to turbojet operation.

This type of fire occurs inside the engine while the aircraft is on the ground and is most likely to be encountered AFTER ENGINE SHUTDOWN.

"Experience has shown that the best method of handling an internal, ground engine fire in axial compressor engines is to rotate the compressor by means of the engine starter, whenever possible, in order to cool the engine in the vicinity of the fire and to clear out both the combustible material and the fire. The rear section of the engine will withstand very high temperatures. Normally, if the fire is permitted to burn until an external power source can be connected to turn the compressor, the engine will suffer far less damage than that which would be caused by the spraying of foam into the engine exhaust pipe. Once this latter method is used, the engine must be removed and sent to overhaul. The possibility of smothering a fire by heavy applications of carbon dioxide (CO_2) or dry chemicals at either the engine compressor inlet or the exhaust pipe, or both at the same time, requires investigation before definite recommendations can be made in this regard. The greatest damage to the engine by the use of CO_2 might possibly be caused by thermal shock or seizure due to contractions.

"Should a fire occur while a starting attempt is being made, simply keep the compressors turning over until the fire is out, after having, first, turned off everything that will turn off except the starter itself. If the engine is equipped with a combustion starter, the procedure should be the same. In this case, it will be impossible to keep the engine rotating continuously unless cross airbleed from another operating engine can be used. However one, or at the most, two accelerations with the combustion starter normally should be sufficient to eliminate the fire. Airborne combustion starter systems usually will be provided with a fuel/air supply capable of at least two starting attempts.

"Internal fires may occur immediately after shutdown and are usually the result of a dump valve which has failed to dump (drooling manifold fuel into the engine, instead), or are caused by a severe internal, engine oil leak. It is good practice to inspect the engine exhaust pipe for evidence of fire after each engine shutdown and to check the exhaust gas temperature indicator at the same time for the same purpose. Should an internal fire exist, a power source for the engine starter should be connected as quickly as possible and the compressor should be rotated until all evidence of fire has disappeared. Pratt & Whitney Aircraft recommends that fighting an internal, ground engine fire by means of chemicals applied from outside the engine be employed only as a last resort."

FSF: Mechanics Bulletin

STOP

by S/L G. L. Sheahan

When accident statistics are broken down into "phases" of flight, the landing phase contains the greatest number of accidents. Many of the more obvious hazards of landing have been discussed before, but little has been said about stopping the aircraft once it has touched down.

Accidents that occur during the landing roll can destroy an aircraft just as completely as "stalling in the turn". That many such accidents are the result of poor braking action is obvious. But why do they happen? Is it because we do not appreciate all the factors that affect braking?

The braking action on ice is about the same as the braking action on dry concrete. So why can't we stop an aircraft on an icy surface? The reason is heat. Sounds funny doesn't it? But heat is our problem. Because ice has a good co-efficient of friction, a lot of heat is generated when you apply the binders. This heat causes melting, and a thin layer of water forms between the tire and the ice, and the braking action is lost. The same thing happens when we land on a wet runway. The water on the runway forms a cushion between the tire and the runway and causes an almost complete loss of friction and reduces the braking action to zero.

To this point we have mentioned water and ice as a braking problem. There are other factors such as speed, temperature, and wind conditions that compound the landing problem and cause accidents. Let's examine a typical case.

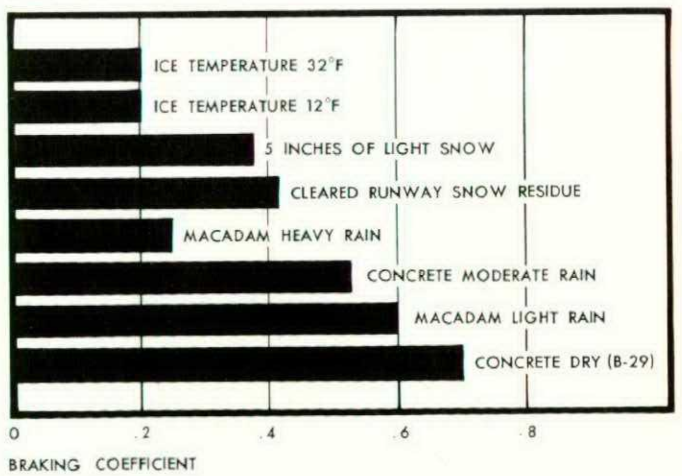
A CF100 was returning from an exercise. The weather was 600 feet overcast, with limited visibility in moderate rain. The wind was from the east at 8 mph. The runway in use was 08 but was switched to 26 to provide a precision approach rather than a surveillance approach. Now let's review the factors that will effect this landing. Firstly, the runway was covered with water; secondly, the aircraft was landing off a GCA and would touch down well down the runway; and thirdly, the aircraft landed downwind, increasing the touchdown speed to a higher value. The pilot stated that the GCA approach was normal, and the end of the runway was crossed at 125 knots. The brakes were checked shortly after touchdown and seemed serviceable. About one third the way down the runway, the brakes were used with no result whatever. The foot brakes were tried with varying pressures as was the hand brake but without any discernible result. Approximately 3000 feet from the end of the runway the engines were flamed out, and the aircraft continued on in to the overrun area. In this case the factors of a downwind component, a wet runway, and a GCA approach were sufficient to set up a condition in which, using normal procedures, the aircraft could not be stopped on the runway.

The result, the aircraft missed the barrier, entered the overrun, ran into the unprepared surface, and was a write-off.

Let's examine this particular case. This aircraft had a gross weight of 29,000 pounds, and was landing at 125 knots IAS, and had a downwind component of 8 mph. In other words the approach speed, ground speed, was approximately 132 knots. The EO states that at 29,000 pounds, the landing distance required to clear a 50 foot obstacle is 3890 at sea level, and 4150 at 2000 feet. Now examine the following charts*, and use a pencil and paper to figure out just how much runway was required to effect a safe landing. If you don't fly a CF100, use similar conditions and apply them to your own particular type of aircraft.

When you are through with your computations, allow up to 20% more distance, for the human element. The human element in this case is you. Do you know how to get the maximum braking action under all conditions? If you don't, tack on another 20%.

COMPARISON OF MAXIMUM BRAKING
COEFFICIENTS FOR VARIOUS SURFACES



Landing Speed	Kinetic Energy Factor	Actual Test Stopping Distance (Feet)	Required Per Cent Increase Stopping Distance
Stall	1.00	2300	0
1.10 Stall	1.21	2700	18
1.20 Stall	1.44	3300	44
1.30 Stall	1.69	3800	65
1.40 Stall	1.96	4500	96

* Taken from USAF's Flying Safety

In the past year we have had 21 accidents due to overruns. The reason has been a combination of many factors. Landing hot, touching down too far down the runway, landing downwind. Any of these factors combined with an icy or wet runway is enough to set up circumstances where the aircraft just can not be stopped in time.

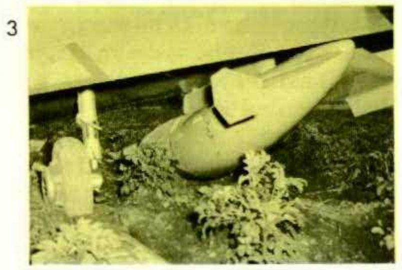
There are a few pointers, over and above what is contained in the EO that can assist in effecting a safe landing under adverse conditions.

Most runway surfaces become very slippery immediately following the first rain. This is due to a chemical reaction from the runway surface and the initial wetting. After the rain has had a chance to wash the residue from the runway, braking action improves. In a jet aircraft, stop cocking the engine will assist in reducing the landing roll. A rule of thumb figure indicates that when the engine is not stop cocked 15% residual thrust is working against the braking action. This does not apply to a piston aeroplane. The old habit of adding 10 knots for the wife or girl-friend and a few for Ma and Pa, just doesn't apply any more.

The problems associated with landing an aircraft under reduced visibility, wet, icy or snow covered runways are many. The proof of this statement is the number of accidents that happened when these conditions prevailed. We can't change the conditions, but we can make a concerted effort to prepare ourselves to meet these conditions, and not end up the landing roll in the boondocks. So if you are not really up to date on the proper procedures and techniques, it is possible that your whole squadron is in the same boat. The next aircrew meeting is a good time to discuss this subject—get all the aircrew on the ball. In this way we can look forward to a reduction of this type of accident, or better still, the elimination of the overrun accident completely.

1

2

3

4


1. Landed fast on a short runway.
2. Landed off a fast approach.
3. The next Sabre to land was flamed out and stopped on the runway.
4. Following a thunder shower the runway was slick.

RETREADS PRO AND CON

by S/L E. D. Harper

Arguments about the use of retreaded tires are heated, sometimes amusing, and often uninformed. The protagonists in these discussions are usually more interested in the red hot question, who is right, than they are in the facts. This article may help answer the questions; what are the facts, why do we still use retreads, and why do we have tire failures.

From statistics presently available the following facts are evident: (a) practically all commercial airlines use retread tires; (b) there are far more retread tires in use in the RCAF than new tires; (c) the rate of new tire failure is as great as or greater than the failure rate of retreads; and (d) the failure rate of all tires is too high, particularly the rate for jet aircraft tire failures.

Bearing these points in mind, the next item of interest is just how does the RCAF handle its tires? First, when a Type 7 tire (for jet aircraft) is purchased it is given a life of four years. In these four years it may be given up to a maximum of four retreads. Only about 60% to 70% of the new tires put into service qualify for the first retread. Of tires with one retread, a smaller percentage qualifies for the second retread, and so on. Few tires ever go a full four retreads because they are either inspected out, destroyed in use, or are removed for old age. Other types of tires are handled similarly, but with less stringent limitations on qualifications for retreading.

The second point in RCAF tire use is how tires get to be retreaded. The process starts when the maintenance organization removes a tire which has led a normally useful life, still has rubber on it, and has been treated with reasonable care and attention. This tire is then sent to one of two retread contractors where it receives a rigorous inspection. After retreading it receives another rigorous inspection. This inspection is more demanding than the inspection done on new tires. This point is worth emphasizing because it has led some experts to state that probably the best tires in use are first-time retreads. It certainly indicates that there is no reason to vilify retread tires.

Tests carried out by the Quality Control Laboratories (QCL), Ottawa, substantiate this. QCL has tested new tires, retreaded tires, and both new and retreaded tires which have failed. The results of these tests show, in general, that: (a) there are at least as many faults in new tires as there are in retread tires; (b) there is nothing in the approved retread process that degrades a tire; (c) the retread is attached more securely than are the inner layers; (d) materials used for retreading are top quality; and (e) in most cases of retread tire failure, the failure has had nothing to do with the retread, but has been precisely the same type of failure expected of a new tire.

Considering these facts, it is obvious why the RCAF is still using retreads. They are just as good as, if not better than new tires, and they save a great deal of money.

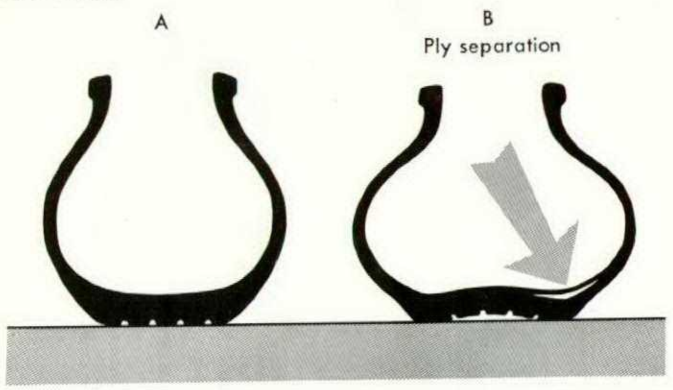
All the misunderstanding has arisen because of the poor history of retreads. Not too long ago retreaded car tires would invariably throw the tread as soon as the tire got warm, and very often, so would RCAF retreaded aircraft tires. The retread process has changed radically since then, however, and now retread methods in use are sound. It must be realized that both the RCAF and particularly the USAF are now having trouble with new tires throwing treads. At one time the RCAF had several retread contractors, but now, as a result of RCAF qualification tests conducted by QCL, there are only two contractors who are considered capable of doing a satisfactory job. The others no longer retread for the RCAF.

Why, then, are tires failing? This is the worrisome part about flight safety; the controversy over retreads is not the real issue at all.

Some random checks carried out at various stations revealed many direct faults: airmen who did not know where the one (!!) tire gauge was; tire gauges which had never been calibrated; low tire pressures; new tires mounted on dual wheel installations with a tire that was almost flat, or one that was badly worn; stones on taxiways and runways, and broken up or poor runway surfaces. All these and many operating faults such as heavy landings, excessive braking, and turning too sharply, seriously decrease tire life. Miscellaneous maintenance faults such as installing brake pucks backwards, or connecting hydraulic lines improperly also contribute their share. The trouble is that the result of such tire abuse is often temporarily hidden. The tire does not fail directly as in the case of a puncture, but it does sustain damage and will inevitably fail at some later time. When this happens, if it is a retreaded tire, the accident report inevitably has either a colourfully expressed or a clearly implied condemnation of retreads; if it is a new tire the whole thing seems to be accepted quite philosophically.

Probably the most common result of all the different ways of abusing tires is ply separation. When tires are designed, they are designed to operate at certain specified deflections; in the case of Type 7 tires this is 32%. This gives a good margin for awkward operating conditions because trouble will not usually develop until a deflection of over 42% is made. Excessive deflections can occur in many ways, and practically all the abuses mentioned will do it.

When the tire is excessively deflected, abnormal stresses are imparted to the various layers. In the sketch, tire A shows a cross-section of a tire under normal deflection; tire B shows a tire deflected excessively. When the tire deflection is excessive, as in B, separation of plys will occur and cause voids in the tire.



It seldom, if ever, occurs at the tread layer. If the deflection is due to under-inflation, the separation will continue around the whole circumference of the tire, and in severe cases, the material from the separation out may peel off. If the deflection is localized, such as in a heavy landing, or from hitting a sharp elevated corner of pavement, the separation will be localized. Of course, if the tire is slightly under-inflated, other abuses will have greater effect. When separation occurs, the tire does not necessarily fail immediately. It may take several more hours of operation before the void spreads to the point that the tire fails. The centrifugal force involved in high speed operation at takeoff or on landing is then usually the final straw that breaks the "camel's back".

Overloading a new tire by mounting it in dual with a worn tire or with an under-inflated tire will produce ply separation. Overheating will speed the whole process, and will also cause tire failures in its own manner. In fact, overheating is probably the most serious single factor affecting tire life. A good example of this overheating was when a Sabre pilot aborted a takeoff, using fairly heavy braking. About 10 minutes later, the pilot did a taxi test "to test his brakes", and then took off. A few minutes after takeoff, one tire blew in the nacelle causing extensive damage to the undercarriage. It was a new tire. Obviously, the people concerned did not realize that a tire's internal temperature does not reach its maximum until approximately 15 to 20 minutes after severe braking.

In all fairness, it must be stated that there was a time when condemnation of retreaded tires was only too right. This is no longer true. There is now only one circumstance that will result in a retread being inferior to a new tire—when a carcass that has some insidious fault is retreaded. With the present inspection techniques now in use, including X-ray, the possibility of a faulty carcass being retreaded is remote. However, this may be an argument for reducing the number of permissible retreads from four to two. To date, the information provided on D14s does not support such a decision. If the information were more factual, contained a better tire history, who knows?

The problem, then, is not retreads versus new tires. The high tire failure rate is common to both and is primarily due to malpractices in operating and maintaining the tires. Faulty tires unquestionably contribute to the failure rate, but with so many abuses being inflected on the tires it is difficult to pin down material faults.

To overcome these problems and reduce the incidence of tire failure, a concerted effort is required of suppliers, maintainers, and operators. It is essential that everyone concerned, from commanding officer to airman, become tire conscious. (EO 15-45-2A is highly recommended reading.) Improving specifications and tightening inspection systems must be paralleled by improving operating and maintenance standards. In any program, however, the following points are absolutely necessary:

- Tire inflation should be checked frequently, at least once a day, when the tires are cold, using a calibrated tire gauge.
- Taxiways and runways should be kept in good repair and clean.
- Pilots should do everything possible to prevent maltreatment of tires—use as little brake as practicable; taxi slowly; no screeching turns or excessively sharp turns where the inner wheel locks and twists; leave sufficient time between landings to permit the tires to cool; make sure maintenance is advised of all abnormal operating conditions affecting the tires.
- Tires that have been operated under-inflated, overheated, or overloaded, should be removed without any hesitation and thoroughly inspected; it is better to remove a few undamaged tires than to have one blow and wreck an aircraft.
- When a tire does blow or is removed early because of some fault, the D14 or UCR should contain a detailed history of the tire and the events leading to its removal.

WHY THEY BLOW

A T-33 touched down smoothly at 110 knots and when nicely along in its landing roll the left wing dropped. Aileron, rudder, and later right brake were needed to keep it on the runway. The aircraft finally staggered to a stop fifty yards short of overshoot with its left tire blown and its port lower rear wing fuel cell panel badly torn.

The tires on this aircraft were serviceable prior to this flight. Port braking was used on takeoff, and with all factors considered an assessment of poor technique seems reasonable.

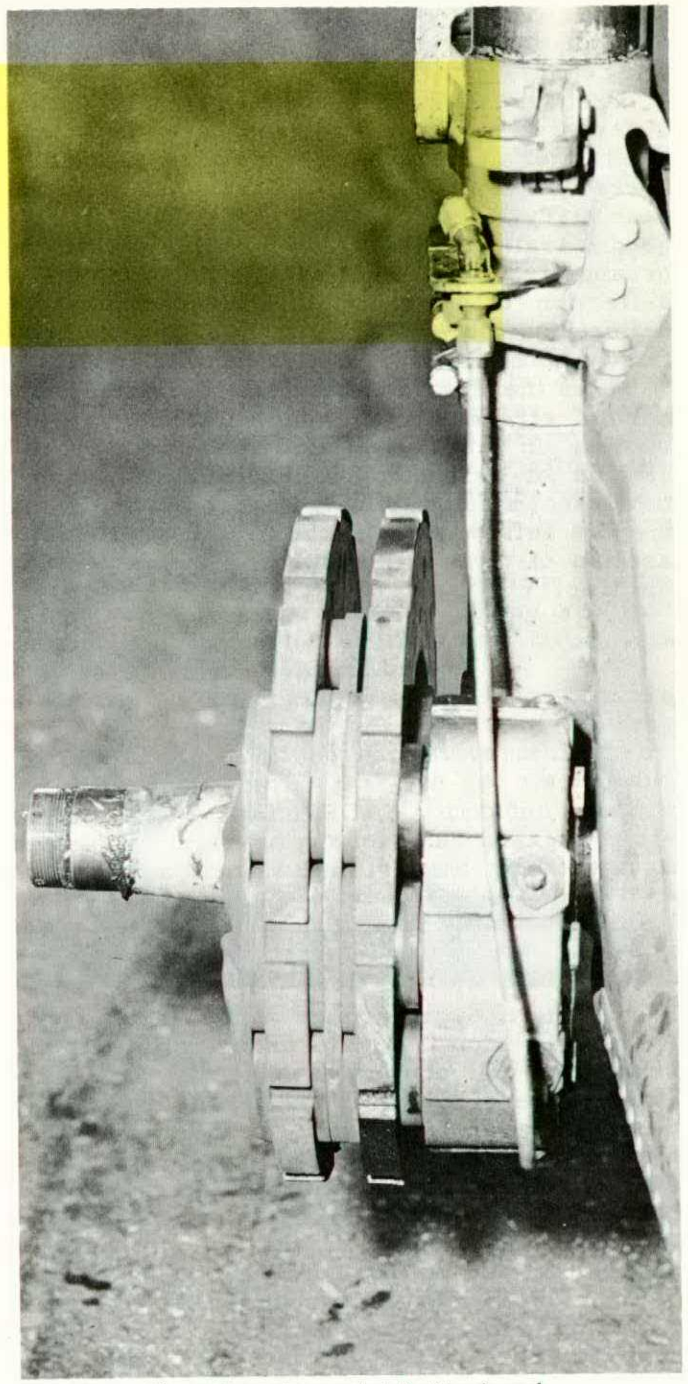
Next case on the docket concerns a CF100. This aircraft was landed in the approved manner. Harsh braking was not necessary but still the tires showed evidence of skid-type failures and both port tires had blown by the time the aircraft cleared the runway.

In the face of such evidence the pilot seemed doomed to an "Aircrew" assessment. Later, however, during an inspection of the undercarriage, new evidence was discovered—the flex lines to the normal braking system and the emergency braking system had been crossed allowing full brake system pressure to be fed directly to the brakes without the cushioning effect of the maxaret units. The pilot, of course, used to having operative maxaret units naturally leaned on the brakes.

In closing this case the assessment was changed from "Aircrew" to "Maintenance".

The third case brings us back to a T-33 and a pilot with something less than 200 hours total on T-33s. Nothing in the D14 suggests that it was other than a good landing, yet the aircraft wobbled to a stop on the runway with a blown port tire. The first assessment, of course, was "Aircrew" but it was later changed to "Obscure".

Now an AIB man enters the case and asks for a review of the evidence, that additional checks be made, and that the tire be forwarded to Quality Control Laboratory. As the messages flew back and forth a series of eleven pictures of the accident arrived in DFS. The photographs were examined and to quote: "It was discovered that the brake lining puck carrier was installed in reverse. Reverse installation...can cause uneven puck wear...in such a way as to cause the brake to jam... The cause is therefore assessed as "Maintenance"."



The puck carrier was installed backwards.

In each of these three recent cases, circumstantial evidence seems to indicate that the pilot was at fault. In two of the three cases the pilot was exonerated by further investigation. In the last case photographs of the accident made the difference. The lesson should be obvious—INVESTIGATE. Thorough investigation plus proper maintenance, of both braking systems and tires, will, in the long run, beat the tire failure problem. When this is done an "Aircrew" assessment need not bother the most tender conscience.

ARRIVALS and DEPARTURES

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at 18" so the engine was fe
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The unit commander
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DON'T TRUST YOUR LUCK

"After breaking off air fighting I turned to climb away on the vector passed to my section. I was at about 22,000 feet straight and level when I experienced abnormal flight symptoms which at first, caused me to feel weightless in the cockpit. I suspected trim failure or a mild runaway nose-down trim but everything checked normal. The next check was on the engine and I found the JPT gauge erratic so I throttled back to 80% power. The gauge flicked around 450° then dropped to 0°. As I called for a steer to base and for a join up with my element leader the JPT would give the occasional reading and I considered that this was due to a loose connection. As I did not trust either the flight controls or the engine I proceeded to base at about 18,000 feet without making unnecessary turns and a power setting of 80%. Over base I asked my element leader to visually check my aircraft but he could see nothing out of order. I then did a very large circuit at 80% power and a long straight in approach and landing without further abnormal indications."

"On removal of No.2 combustion chamber it
was found the flame tube c
steps are there.
away from the flame tube
the ring approximately 8
the starboard side.

up against the turbine noz
pieces of this ring are a
through the turbine. R
bustion chamber reveal
this chamber was broke
consecutive welds.

It was concluded th
cause of engine failure a
flame tubes were remov
gation carried out.

The variation of exhaust gas pattern due to a changing turbine performance would effect the trim of the aircraft."

The pilot of this Sabre had good reason to suspect his aircraft. As the argument goes, engine malfunctions in a Sabre portend greater danger than engine malfunctions in other jet aircraft. But, regardless of the pros and cons, each case is its own emergency and only a ground inspection can provide the answer. So don't trust your luck, if things are not just right land immediately.

THROTTLE BEND

The Sabre was
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occurred. JPT was
The pilot advanced
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sor stall. He imme
and glided down to l
idle. At 18,000 buff
so the throttle was advanced and normal engine operation resumed.

BLOW

In another case of practice air fighting the pilot retarded the throttle to "what I thought was the idle position" and after completing a 360° turn advanced the throttle. Nothing happened. The pilot informed the section leader of the situation and squawk emergency. At 27,000 feet he attempted a relight on normal fuel system. The relight was successful.

Both these Sabres were landed without further incident. In the first case "materiel design" was a contributing factor. In the second case the conclusion of the investigators was that the pilot had pulled the throttle around the horn and pushed it back again without fully realizing what he had done. However, both incidents were "pilot induced" which brings us to the point of all this, the remarks of one of the COs concerned: "The increase in the number of flame-outs, hang-ups, and compressor stalls appears, in most cases, to be the result of rough handling of the throttles. It would be preferable to prevent rather than correct this situation. Perhaps the OTU could lay greater stress on the correct and sensible use of the power control lever."

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T-33 RUNS INTO ROCKET

The pilot of a T-33 was prepared to attack number one target with a salvo of eight 5 inch rockets. The roll in was initiated at 7000; the dive angle was 45 degrees. The rockets were fired at 3400 feet and pull-out completed at 2800 feet. After completing the pull-out, the pilot noticed that two rockets were still attached to the port wing. He attacked the target again and the rockets fired normally.

The aircraft was landed and, during inspection, a diagonal hole and depression approximately three inches long was noticed in the leading edge of the starboard wing. In addition, there were scratches across an area some 12 inches wide on the lower surface of the wing. The damaged area conformed in shape to the fin of a 5 inch rocket. A search of the target area produced two rockets that had struck the ground in a manner that suggested that they had fallen without the normal stabilization.

The rockets had been tier loaded and a possible explanation is: "when the lower rocket fired during the salvo firing, by some chance, the upper rocket sheared and was carried forward with the lower rocket, then broke loose and was struck by the leading edge of the wing." A possible cause, rockets incorrectly mounted.

BE WITH IT BOY

A very experienced pilot landed a T-33 150 feet short of the runway. The left wheel touched down and the D door was torn off causing damage to the horizontal stabilizer, the port flap and the port mainplane.

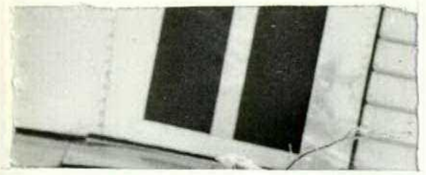
The pilot, an instructor with 1665 hours on jets, and 793 hours on type was carrying out a practice square pattern GCA. The weather was clear to broken, visibility 15 miles and the wind was given by the GCA operator as 20 mph gusting to 30. The aircraft had 280 gallons of fuel on board. After going through GCA limits the airspeed was reduced to approximately 125 knots for the landing. The rpm was set at 50% and when approaching the runway the aircraft settled to the ground. Throttle response was ineffective so the aircraft landed short.

After the accident, it was discovered that the wind speed wasn't 20 gusting to 30 but was in fact, 30 gusting to 45. GCA were using wind conditions that were reported one hour previously. The unit accident report stated that the pilot approached at the minimum IAS for the existing conditions, that is fuel load and wind gradient, and had he known about the true wind conditions he no doubt would have increased his approach speed to compensate for the situation.

This is the same as saying that when you plan a cross country using met winds and find yourself out of fuel short of your destination, blame should be shared by the met man. The report also stated that the runway was short (6200 feet). If 6200 feet is considered short when landing into a strong wind, we should change the dash 1.

Surely a pilot with this man's experience doesn't have to be led around the circuit. This business of undershooting is a serious problem, and is racking up too many accidents. No matter how we approach this accident, the pilot just wasn't with it.

In this case the pilot kn
and each relied on th
specific instructions, i.e
forms. Such entries are
both the aircraft and yo
results.

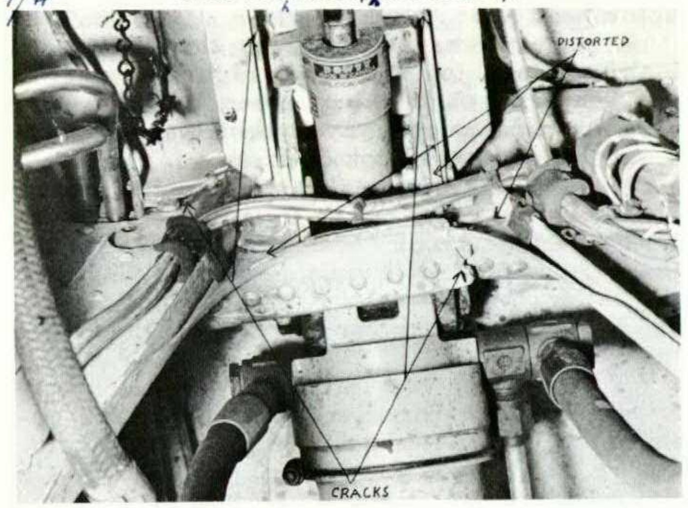


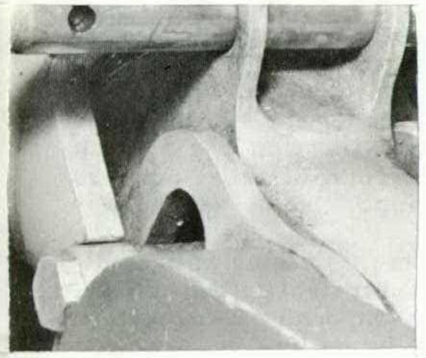
WHAT WILL HAPPEN . . .

If the undercarriage is lowered at greater than the maximum permissible airspeed? The pictures tells the story.

Due to materiel failure in the selector, an undercarriage down selection occurred at 280 knots IAS.

CF100 nosewheel up lock assembly.





SAFETY MARGIN ZERO

The training flight was flight-planned to land at another airfield and return. The captain had very little experience on twin-engined aircraft. Upon closing the throttles for the first landing it was noted that the manifold pressure on the port engine of the Expeditor did not drop below 15". During the return flight the throttles were closed to check this condition. This time, the port manifold pressure hung up at 18" so the engine was feathered and a single engined landing carried out.

The unit commander has suggested that a better course to follow to avoid a swing on landing would have been to place the mixture control in idle cutoff after the landing was assured. From the flight safety end, we would suggest that the best course would have been to have had the throttle control checked after the first landing. It's only common sense to figure that the loss of one engine of a twin-engined aircraft reduces your safety margin to zero.

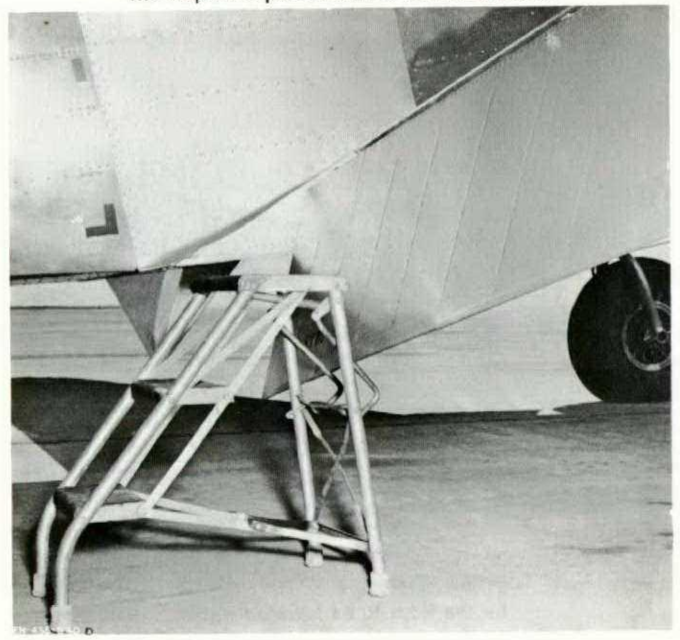
EXPEDITOR FLAP DAMAGE

During a three month period last summer, we collected more than a year's quota of damaged Expeditor flaps, four. Each accident occurred during a P.I. and the reason appears to be that the -7 EO requires three different trades to operate the flaps, instrument, electrical, and airframe.

A typical report gives the following sequence: A technician will place the steps at the trailing edge of the starboard wing, climb up on the wing and go about the business of his trade. A technician from another trade will enter the aircraft after no, or a hasty look around, and lower the flaps. If the flaps are down he will raise them. The steps will rock back as the flaps come up and then settle into place again and wait patiently for the flaps to be lowered. The excuse is always, "I thought the steps were clear of the flaps".

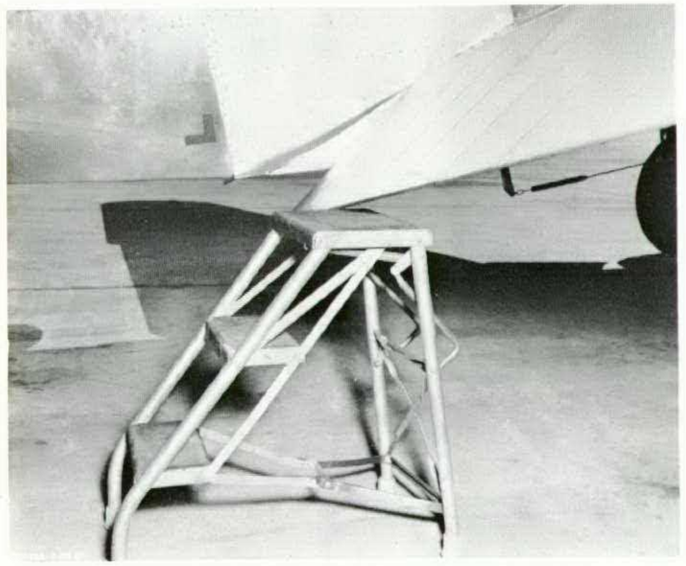
As long as three trades must operate the flaps, and as long as it is necessary to place the steps on the starboard side, some system should be worked out whereby every technician concerned will know the steps are there.

The steps are placed on the starboard side.



They rock back when the flaps are raised.

Settle into place and wait patiently . . .



. . . for the flaps to be lowered again.

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·board wing. In addition,
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formed in shape to the
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ıal stabilization.

CONTINUITY IS ESSENTIAL

While a H5 helicopter was on a tactical exercise, the rotor brake became unserviceable. Replacement parts were not immediately available so, to keep the H5 in operation, the rotor brake was removed. The NCO in charge elected to prevent rotation of the main rotor by lashing the rotating star to the stationary star in the rotor head assembly.

A pattern was set whereby the NCO would lash the stars together each night and remove the lashings each morning. The pilot was aware of this arrangement. Everything was fine until a new ground crew took over.

The NCO taking-over was instructed on how to secure the rotor but he failed to remove the lashing the next morning because he thought the lashing should remain until he was notified that the helicopter was needed. The pilot arrived, did a hasty walk around inspection, then fired the beast up.

The ensuing investigation revealed the following discrepancies: unorthodox and unauthorized tie down used; ineffective warning device (a piece of grey rag); incomplete walk around in view of the pilot's knowledge of the situation; and NO ENTRIES in the L14 . . .

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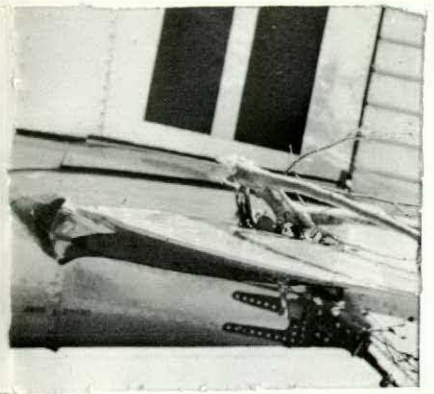
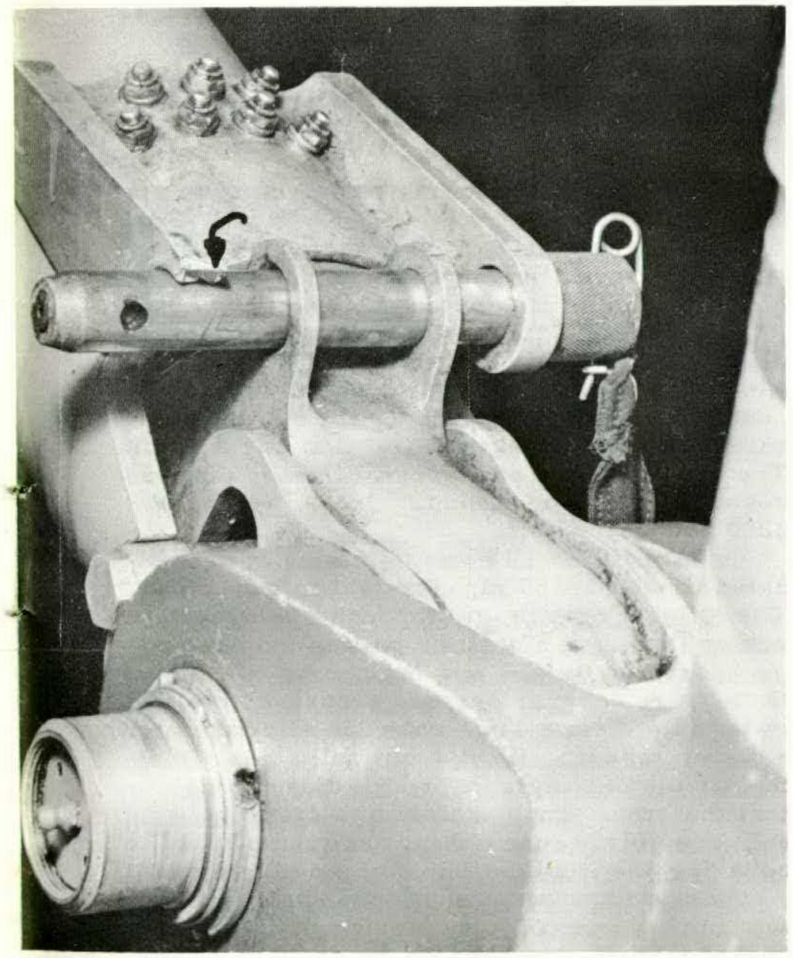
ort of your destination.

In this case the pilot knew, both crews knew, and each relied on the other to act without specific instructions, i.e., entries in the proper forms. Such entries are the means of protecting both the aircraft and yourself from unpleasant results.



BOGIE WITH A TWIST

Following a normal landing, the Argus was taxied to the marshalling area where a 180° turn was made to position the aircraft. Brakes were applied in the normal manner, engines shut down, DC power source connected, and the hydraulic pressure unloaded. When the pressure was unloaded the port main gear light indicated an unsafe condition and the horn sounded. The groundcrew tried to insert the safety pin in the port radius strut but it would pass through only three of the four holes.



The aircraft was jacked and, as the weight of the aircraft was taken off the port undercarriage, the outboard lug on the radius rod snapped off. Hydraulic pressure was applied to move the undercarriage into the down and locked position.

A thorough investigation revealed that the undercarriage doors were out of rigging but could not find the reason for the down lock coming unlatched. Difficulty with the safety pin was caused by the twisting of the pivot bogie during the turn. Cause assessment was primary - Aircrew, - secondary, - Ground.

The factors affecting the primary assessment were: The pilot was relying on the horn to indicate that the turn was too tight, whereas good handling technique should ensure that speed and radius of turn will not place undue strain on the undercarriage. After completion of the turn the aircraft was not allowed to roll in a straight line to relieve the twisting moment on the undercarriage imposed by the turn. And the hydraulic system was unloaded before the safety pins were inserted.

In mitigation of this assessment, however, it must be noted that AOIs for the Argus are not sufficiently explicit. This deficiency is being corrected.

The secondary assessment was prompted by the fact that the aircraft was marshalled in a manner that would allow this type of accident, the first of its kind, to occur.

(Difficulty in inserting the safety pins after a turning manoeuvre has been experienced on other occasions. Now, because of increased hind-sight, the EOs are being amended. Perhaps fore-sight by someone who had experienced this difficulty might have caused the EOs to be amended before an aircraft was damaged.—ED)

DON'T ENCOURAGE TROUBLE

During the takeoff run the torque on number three engine dropped to 150 psi. Before the Argus could be landed three overshoots were carried out. After landing the aircraft was taxied to the hangar and shut down.

The loss of torque was due to the failure of number one PRT. Considerable damage was caused by flying debris. The cause, pending strip inspection, is assumed to be oil starvation. Whether or not any damage was caused by allowing number three engine to run throughout the whole episode—from torque drop to shutdown—will also be determined by the strip inspection.

The initial cause, materiel failure, is beyond the crew's control. Allowing number three engine to run after noting the torque drop was not a wise decision. In this case there was no need to use number three engine at "partial power" and, by so doing, the crew was encouraging a much more serious situation to develop.

SMALL CHANGE

The estimated cost of this accident was $2.00 plus 2.6 man hours. The aircraft involved was an Argus worth several million dollars. So why all the fuss? Well, let's get the facts.

The Argus was being jacked for retraction tests. All jacks and the tail steady trestle were in position. The nose jack was raised more quickly than the wing jacks and the tail of the aircraft was lowered onto the tail steady trestle damaging the bracket and skin and shearing some rivets in the area.

Investigation revealed that the shear bolt (AN 3DD26A) in the tail steady trestle had been sheared prior to this accident. The fact that it was sheared was not detectable by visual inspection.

The fuss is about two sentences in the accident report: "The primary cause of this accident was disregard of EO 05-120A-2..." and "Consider closer attention to detail and general condition of ground handling equipment should avoid this type of damage to aircraft". So here we have it again... surface ... a lack of attention to formed in shape to the
accident. . A search of the target
(Here's how "little" ;kets that had struck the
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cerned, we cannot hel

HOW ARE YOUR TAKEOFFS?

For the pilots who were trained on and work from surfaced runways, this sad tale will sound like bush league flying. But don't go away too soon—you might be surprised at the similarity of the problems involved.

For takeoff, the weather conditions were clear, visibility 15, temperature 74° F, and the wind at 14 mph straight down the runway. Field conditions were not so good. The runway was a short 800 feet and takeoff direction was up hill. The runway ended at a grove of trees and was covered with long grass. Gross weight was 2230 pounds.

On takeoff the L19 was climbing at an indicated airspeed of 50 mph straight into the trees. The pilot chose to go through the tree tops rather than risk a stall by pulling the nose up.

According to EOs and Light Aircraft School there were several serious errors committed by the pilot: He did not make due allowance for a heavy takeoff. He did not fully appreciate the effects of temperature. He did not consider that the trees would shield him from the wind and, possibly, cause a downdraft. He failed to consider the implication of an up hill takeoff.

Other points were mentioned, but, by now, the importance of considering ALL factors before takeoff should be obvious. In this case,

It's temperature, weight, and wind that separates the trees from the twigs.

as in many others, it was poor planning that separated the trees from the twigs.

Just one more point before you leave; how do your takeoffs stack up against the tables and graphs in AOIs? Do you really know how to use them?

PIASECKI PERSONALITY

During shutdown, the pilot disengaged the rotors from the engine and, when the rotor speed slowed to 30 rpm, shut off the boost control. As he reached to lock the collective pitch lever down the vibration of the engine caused it to spring to the full up position. This in turn applied full throttle to the "unloaded" engine and an overspeed ensued.

The necessity of locking the collective pitch control down before turning off the boost is a point that is stressed when training helicopter pilots. The EOs, however, do not make this point clear—a deficiency that is being corrected.

This brings us to the personality of a Piasecki. It seems that the pilot had discovered that the machine on which he was trained did not need to have the collective control lever locked down. This led to a bad habit—not locking the control before shutting off the boost—that he carried over to the Piasecki in question. And, of course, the helicopter objected.

A REAL KICK

Here's fact to give thought to:

"Normal landing in a 14,000 lb aircraft at the recommended 120 KIAS...the kinetic energy your aircraft has at touchdown (neglecting residual idle power) is 8,950,000 ft-lbs, enough to knock a seven-ton elephant 638 feet straight up!"

Flight Safety Foundation

LETTERS TO THE EDITOR

Transient Facilities

The letter you recently published written by F/L L.B. Benson suggesting that the R.C.A.F. adopt the U.S.A.F. Duncan and Heinz system of inspecting transient facilities is, I think, a first class idea. I have been a flight engineer on C119 aircraft for several years and during that time I have been through most R.C.A.F. stations, both in Canada and overseas.

One problem that I have had is finding out who looks after beds and bedding. This would not be so bad if a station kept to the same system. After a trip through I would know who looked after what. Along with this problem is the one of finding a bed to sleep in. It matters not that you were up at four o'clock and will have to be up at five the next morning, at some stations finding a bed is a wearisome task. All this may seem a subject apart from air safety but surely a man who has had a good night's sleep is less likely to make another statistic.

Fuelling is also a problem at times. To list a few of the binds: waits up to two hours for a fuel tender and then find the hose contaminated with jet fuel, trucks with grounding wires missing or no plug on the wire, nozzles that leak, jam in the open position or have dirt caps that are not secured to the nozzle, and, finally, the truck driver who does not know how to operate the truck's pump mechanism.

Oil can present its share of problems. Could not the dispenser, or what have you, be kept in a warm place along with at least one spare drum in the winter time? What can be more frustrating than finding an empty dispenser in a warm hangar and the full oil drums laid out in the snow?

Why not introduce a critique form to be filled in by transient flight engineers and crewmen where these sort of things could be listed? A few stations do have a form now, why not standardize them and have them throughout the air force?

Cpl R. C. Hutton
436 (T) Squadron

(Transient servicing and accommodation would appear to be more of a problem than we realized. If anybody else has examples such as put forth by Cpl Hutton, something can be done about it. So if you have a beef, let's hear it.

This business of accommodation is a bad one. Suggest units look into the problem on their stations.—ED)

Touche

The September - October issue of your very fine magazine was read with the usual avidity for good sound information. Normally, after noting points of interest to my trade I would pass the magazine to some other anxious information seeker and let him enjoy some good reading; but this time, I must rebel. In other words, "trade wise", I have been rubbed the wrong way.

For the past year or more, due to umpteen UCRs originated by aircrew as well as groundcrew, we have been attempting to solve all the problems associated with oxygen masks, exhalation valves, mask tubings and inhalation valves for the benefit of the aircrew, to make their flights safer and to ensure their speedy return to home base. We have had the patience and devoted co-operation from specialists at AFHQ and Institute of Aviation Medicine, we have spent long hours pondering over oxygen problems and what to do to solve them, and yes, even you, have encouraged our efforts (See "OXYGEN" of your May - Jun 59 issue page 18) in trying to eliminate all the hazards that are common to oxygen equipment in general. Then, boldly, on the front cover you display with apparent approval, the very thing lying on the ground readily accessible to dust, grit and foreign matter which are all potential causes of trouble.

Sgt D. Pellerin
AMCHQ

(Ouch!—ED)

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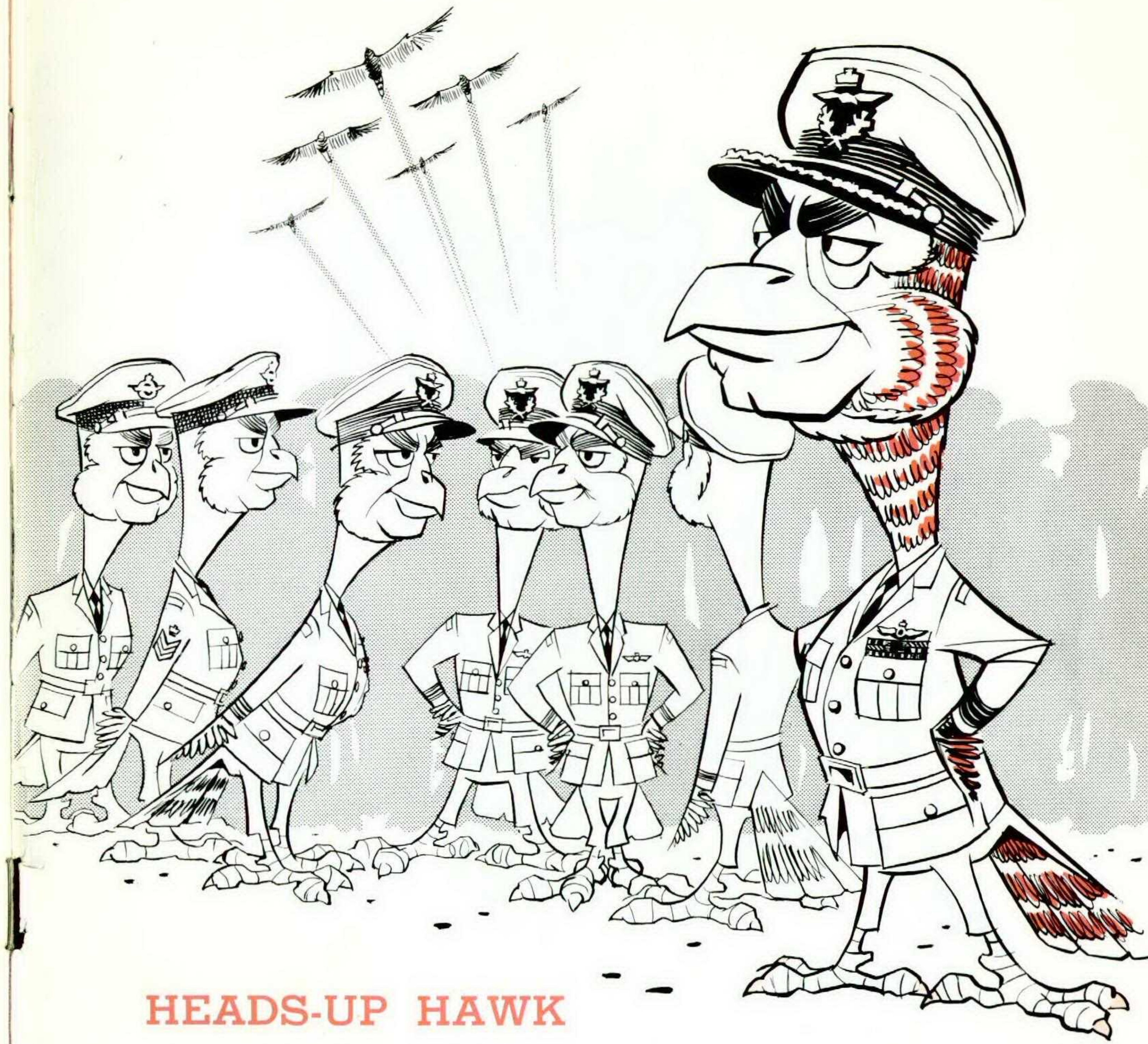
BIRD WATCHERS' CORNER



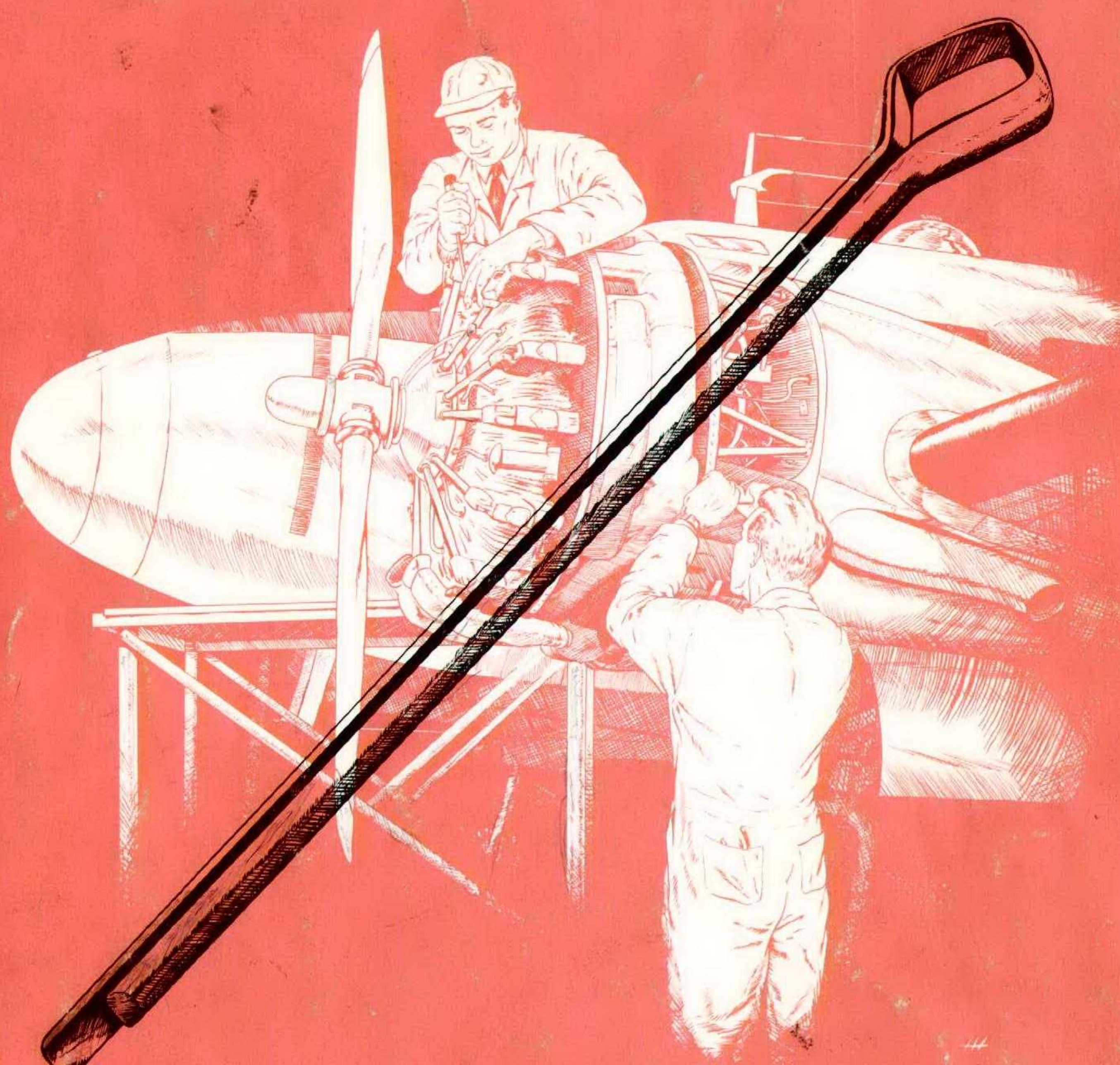
HEADS-UP HAWK

This bird is not a relative of the dodo. The lead bird has instilled into his flock a keen sense of responsibility. The results are far reaching. The species is increasing in number and some can be found in all parts of the globe. Their nesting grounds are easily recognized by the sharp appearance of the roost. The flocks that inhabit these nesting grounds are proud of their flying ability, and have not ruffled a feather for some time. They can look back on 1959 with a feeling of satisfaction, and are looking forward to an even better year in 1960.

We in DFS are privileged to join these rare birds in wishing you a

HAPPY NEW YEAR

A MINOR PART
MAY CAUSE A MAJOR ACCIDENT



CHECK UP COMPLETELY