FLIGHT COMMENT

JANUARY • FEBRUARY
1972

Comments

The requirement to report aeromedical problems is stated in CFP 135B, chapter 10. In a recent case the initial and supplementary reports were not addressed to the Canadian Forces Environmental Medicine Establishment. This agency which has responsibility for investigating aeromedical problems cannot act if they are not aware of an occurrence.

A report on the purchase by International Nickel of a second Twin Otter for use by its exploration division at Sudbury includes the information that a glass-fibre bomb-shaped vehicle, containing survey equipment, can be lowered from the aircraft by a winch. The vehicle is suspended by a 500-foot rubber-covered steel cable and will be towed at 120 m.p.h. How would you like to meet one of those on a low level cross-country?

In a recent incident a CF5 pilot found himself dicing with hail in the top of a CB. He had filed for FL330 but was assigned FL250 and when he requested higher approaching the bumpers, ATC were unable to comply because of other traffic. The point that comes to mind reading incidents of this nature is that as pilots we must ensure that requests for altitude changes are accompanied by clearly stated reasons why. We cannot expect Air Traffic Controllers to know all aircraft flight limitations, the conditions existing in cloud along the route, or when an aircraft is about to enter cloud.

A Dak crew taking off at Winnipeg not long ago, got a surprise when a light pickup truck crossed the runway in front of them. Apparently this was one of the first takeoffs on the runway after it had become active, and although the driver heard the Tower's transmission to "hold", he failed to comprehend the message. He later stated that he "did not expect to see any aircraft on the runway". Which goes to prove that all ground hazards are not found on the ramp.

Cover photo courtesy Capt G.E. Mayer, CFB Portage La Prairie.

CANADIAN FORCES HEADQUARTERS — DIRECTORATE OF FLIGHT SAFETY

COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

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Responsibilities — What are Yours?

It would only make matters worse if I attempted to define the term responsibility since the dictionary does that, and in flying operations seldom if ever are situations exactly the same. Therefore, to generalize would only defeat my purpose of asking the question, "How does the word apply to you, and more specifically, to the aim of flight safety?"

I don't think you will be surprised to learn that a great number of aircraft accidents and incidents highlight the fact that too many people don't know their responsibilities – even when they have been laid down. Even worse, many people accept responsibilities and then fail to carry them out. On the other hand, there are those who know their responsibilities, but in the so-called interest of getting the job done take on too much without considering the ramifications; apparently only realizing that they have gone too far when something serious goes wrong.

It is not possible in this editorial to examine all aspects of delegating, accepting and discharging responsibilities, however I feel that it is essential that people concerned with aircraft operations know what they are expected to do and how it is supposed to be done. In the first instance those who assign the jobs are expected to spell it out, but it remains your basic responsibility to be sure. Don't assume – make certain.

COL R. D. SCHULTZ
DIRECTOR OF FLIGHT SAFETY

Introducing The Twin Otter

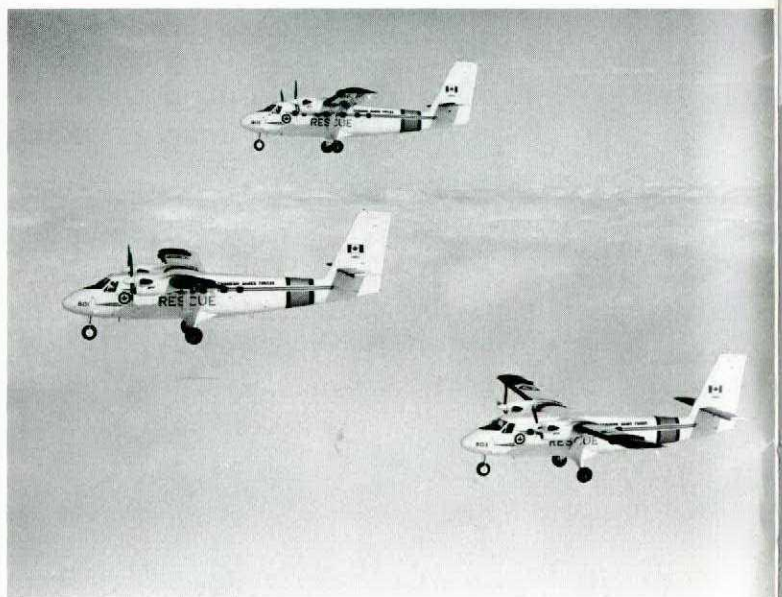
Capt J. A. Martin
ATCHQ

The Dehavilland Twin Otter is the latest addition to the Canadian Forces inventory, and to Air Transport Command. A flight safety officer can't help but be delighted at the acquisition of eight off-the-shelf triphibian airframes with a proven record of reliability, and the "Twin" has established just such a record of performance in a variety of military and commercial roles throughout the world.

Plans call for the Series 300 DH-6 to be employed as a Search and Rescue and light transport vehicle. Four aircraft have been assigned to 424 Transport and Rescue Sqn at Trenton and four to 440 Sqn - two in Edmonton and two on permanent detachment at Northern Region Headquarters in Yellowknife. Nowhere will the Twin Otter be more severely tested than near the Arctic Circle during extreme cold weather operation.

The task of converting Dakota aircrew has been undertaken by 426 Training Squadron. Conversion to the land-based operation of the aircraft has already been completed and ski and float conversion will soon be underway. The squadron has also been involved in the type-qualification of the numerous technicians essential to effective servicing and maintenance. The comprehensive knowledge of aircraft systems taught at 426 Sqn is a cornerstone of the ATC Flight Safety program.

With the introduction of the Twin Otter, flying instructors must reemphasize the techniques and hazards inherent in triphibian operations. Considerations ranging from wake turbulance at major airports to the problems of judging height over glassy water, and landing in re-



mote areas of the north will be routine for our pilots, and mission requirements may frequently call for our crewmen to service and maintain their aircraft under adverse conditions. A conscientious attitude applied to the full spectrum of operations will be the key to preventing accidental loss of resources. It's no secret that the flight safety record of the original Otter has been less than ideal, and every effort must be made to ensure that the Twin Otter maintains the high standard achieved by other ATC aircraft.

From a pilot's viewpoint, I was impressed with the airplane. It handles well, has a modern avionics package, and is a surprisingly stable platform. Minor modifications to instrument lighting and re-marking of compass increments are presently being considered for safer night and IFR flights. A double engine flame-out after takeoff is improbable, but not inconceivable, and although we plan to eliminate the possibility of a Murphy soon, an extra degree of caution is needed by operators during the initial power reduction. Wheels-up landings are prevented by an ingenious device known as a fixed landing gear, and the float or wheel landing gear option is equipment that can only be interchanged on the ground. As a result, float landings on the asphalt are going to be more difficult - but not impossible.

The fact that the bird isn't unbreakable has already been brought home with a crunch - the result of a heavy landing on the nose-wheel. The aircraft sustained "C" category damage, but fortunately there were no personnel injuries and the accident provided a good lesson on how to prevent a recurrence.

There is certainly no denying that the Twin Otter is intrinsically simple. And yet, why do simple aircraft invariably compile a higher accident rate than their more sophisticated counterparts? The answer can only be laid at the doorstep of complacency. The very simplicity of the machine paves the road to inattention and carelessness.

A conscientious effort on the part of aircrew and technicians to eliminate "personnel-factor" accidents is essential for those associated with the Twin Otter, just as a similar attitude is necessary for those who fly and maintain larger aircraft. The traps are always there, waiting to be sprung on the man who devotes anything less than his full professional skill, technical knowledge and experience to the task at hand.

Captain Martin joined the RCAF in 1964 and received training on Chipmunk, Harvard, and Expeditor aircraft. He instructed for three years at 3 FTS Portage La Prairie and subsequently spent two years at 442 T&R Sqn, Comox, where he flew the Albatross and Buffalo. In May 1971, he began his present tour as SOFS-2 at Air Transport Command HQ Trenton, where he maintains flying currency on the Twin Otter.

20,000 letdowns ...

Career Milestones

Two CF radar controllers reached milestones last summer as each completed his 20,000th radar approach. Below, Sgt J.A. Laberge of Goose Bay ATC has his log book signed by Maj Wm. Koeischer, a USAF KC97 aircraft commander, who flew the approach.

Sgt Laberge joined the RCAF in 1942. He began his career in radar as an on-the-job trainee in 1950 and graduated as a qualified controller directly from OJT. Over the years Sgt Laberge has been stationed at Churchill, Bagotville, Gros Tenquin, Saskatoon and St. Hubert.

At the same time in Bagotville, Sgt G. David was conducting his 20,000th run - Quebecair Flight 310. Above, Captain M.A. Lapointe is shown congratulating Sgt David on the occasion.

Sgt David has been a radar controller since re-enlisting 14 years ago. Beginning at Rockcliffe in 1952, subsequent transfers have taken him to Goose Bay, St. Hubert, Cold Lake and Zweibrucken.

Good Show

Tower controllers:
Pte L.K. Neher
Cpl R.G. Cloney

Maj W.J. Carpenter

Cpl J.P. Jocksch
Capt EA Young
Lt D.N. Henderson

Capt I.R. Young

WO LH Kent
Lt DR Marchement

Helicopter crew:
Capt J.R. Delaney
(in cockpit)
Capt J.A. Morrissette
Sgt T.J. Condon

MAJ W.J. CARPENTER
LT D.R. MARCHEMENT
W.O. L.H. KENT
CAPT E.A. YOUNG AND CREW

Maj Carpenter was on duty in the Cold Lake Tower when the pilot of an American civilian aircraft enroute to Fort McMurray and points north radioed for assistance. The pilot, accompanied by his wife, had encountered deteriorating weather conditions. He reported that after getting into the poor flying weather, he had climbed to visual conditions between layers where he was experiencing disorientation and navigational difficulties.

Maj Carpenter determined that the aircraft was fully equipped for instrument flight (the pilot unfortunately, was not) and because of the poor weather, and limited facilities available at Fort McMurray he advised the pilot to land at Cold Lake.

In response to the developing emergency, a Dakota piloted by Capt E.A. Young took off. The Dakota crew were provided with radar control by Lt. D.R. Marchement and they soon established visual contact with the civilian aircraft, after which they were used continuously to maintain contact and to re-establish contact whenever the civilian pilot lost sight of the rescue aircraft.

The lack of a visual horizon was causing frequent disorientation and loss of control for the inexperienced pilot. Maj Carpenter's suggestion to him to use the Dakota as a reference for straight and level flight was accepted and, although there were several more "lost contacts" with resultant "out of control" situations, recovery to Cold Lake was making good progress. At approximately 9 miles from Cold Lake the aircraft became separated once again and WO L.H. Kent, operating the precision approach radar, established contact and talked the pilot down through cloud to "visual" contact with the airfield at 3 miles. However, just when a landing at Cold Lake seemed assured, the aircraft ran out of fuel and the pilot was forced to make a belly landing in a field 2 miles short of the runway. From there he and his wife were quickly delivered unhurt to Cold Lake by the Base helicopter.

The entire sequence of events in the rescue lasted approximately two hours. During that time, in response to the impending disaster confronting the civilian pilot, this team of CF personnel demonstrated outstanding skill, coordination and professionalism.

CAPT. T.D. SPRAGGS

While demonstrating a confined-area sequence at an altitude of 100 feet above ground, airspeed 30K, Capt Spraggs asked his student to adjust the carburetor heat. The student inadvertently moved the mixture control lever instead, resulting in a sudden engine failure. Capt Spraggs immediately entered autorotation and carried out a successful forced landing in a pasture after avoiding a line of brush.

Capt Spraggs' professional reaction to an extremely hazardous situation averted serious damage to his aircraft and injury to himself and his student. By his quick response he demonstrated to his student - under actual conditions - the high qualifications of CF pilots.

Capt T.D. Spraggs

MCpl W.A. Hannam

MCPL W.A. HANNAM

MCpl Hannam was flight engineer on a Labrador returning to Comox from an airevac to Vancouver. About 30 miles out of Comox, while engine topping checks were being carried out, the fire warning light on #2 engine illuminated when the engine was taken off the line and went out when #2 Engine Condition Lever (ECL) was returned to "fly". As engine temperatures and pressures were normal and no visual sign of fire apparent, the crew suspected a faulty fire warning system.

MCpl Hannam decided however to do a visual check on the engine and discovered two hot spots, one on the second stage case and one on the power turbine case. This prompted him to advise the aircraft commander to take #2 engine off the line. With his single engine performance marginal due to weight and temperature conditions, the pilot made a precautionary landing on a nearby island. Subsequent investigation revealed a cracked first-stage nozzle on #2 engine.

Through his timely decision to investigate and his accurate appraisal of the situation MCpl Hannam undoubtedly saved the engine from further damage and probably averted a serious fire in the aircraft.

Capt D.A. Guy

Lt J.C. Tulipan

Sgt R. Fralic

Lt J.G.R. L'Ecuyer

Cpl R. Allard
Cpl D.R. Deveau

CAPT D.A. GUY

Capt Guy was at approximately 20 feet and 20 knots on a routine takeoff in a CH112, when the collective linkage separated at the lower bell crank collective control. The main rotor blades immediately went into full pitch causing a rapid decrease in rotor RPM, and the aircraft pitched violently to the left. Capt Guy warned his crewman to brace himself and managed to level the aircraft just prior to touch-down on the taxi way.

This skillful and quick reaction to an in-flight emergency undoubtedly averted a serious accident.

LT J.C. TULIPAN

Lt. Tulipan and his student had just completed a flapless touch-and-go in a Musketeer and were at 400 feet on the climb out when the engine failed. Reacting quickly, they completed an FMS check, declared an emergency and moments later successfully force landed in a grass field. Subsequent investigation revealed that the sudden loss of power had been caused by a mechanical failure of the carburetor.

Lt. Tulipan's professional handling of this critical emergency prevented a possibly serious accident. He demonstrated to his student - under actual conditions - the high standard of professional competence required of Canadian Forces pilots.

SGT R. FRALIC

Sgt. Fralic was performing a routine visual inspection on a Tracker which had returned from detachment, when he noticed the left elevator trim tab assembly in the "up" position - an abnormal position when the gust locks are installed. After dismantling the unit for further inspection, he discovered the threaded adjustment end of the tab control rod completely free of the control rod. The lock nut had apparently loosened and backed off, allowing the threaded fork to elongate and strip the internal threads of the rod assembly.

Although no similar defects were found in other aircraft, the attention to detail and alertness demonstrated by Sgt Fralic in detecting an obscure, but major defect, averted a possible serious in-flight control problem.

LT J.G.R. L'ECUYER
CPL R. ALLARD
CPL D.R. DEVEAU

Lt L'Ecuyer was the duty tower controller at Goose Bay when he received word from the pilot of an inbound civilian aircraft that a distress call had been intercepted from another small aircraft, also heading for Goose Bay. The single-engine aircraft with two occupants on board was lost with only 30 minutes fuel remaining and the pilot was having difficulty speaking English.

Eighteen minutes after the first distress call, Lt L'Ecuyer using VHF/DF equipment, radar observation and issuing instructions in French and English, established a positive identification 22 miles east of Goose Bay. By this time the agitated pilot had lapsed entirely

GOOD SHOW

into French.

Cpl Deveau, the duty radar controller, was unable to communicate with the pilot in French, and realizing that he had at most fifteen minutes to get the aircraft on the ground, he secured the assistance of Cpl Allard as a translator. Although Cpl Allard was not qualified as a controller, he was able to translate and relay Cpl Deveau's instructions to the pilot, who with his confidence restored, complied with instructions to begin an immediate radar approach.

All seemed under control until Lt L'Ecuyer spotted the aircraft at 2 miles on final making a wheels-up approach. Realizing that the pilot had no fuel to make an overshoot, Lt L'Ecuyer quickly transmitted the gear warning in French on radar frequency and on guard. At the last moment the pilot lowered the gear and the aircraft landed safely with its engine beginning to falter.

Throughout thirty minutes of high tension, calling for quick, positive action by all concerned, this ATC crew responded with calm and efficiency, demonstrating professional CF controlling at its best. They undoubtedly averted the loss of the civilian aircraft.

CPL K.R. RYAN

Cpl Ryan was conducting an inspection of a Hercules mainplane during a Periodic and Progressive Structural Inspection Check. When he reached left wing leading edge, which had been removed for an electrical modification, he thoroughly examined the exposed area. In the course of this inspection he discovered a large crack in the attachment fitting for the external (pylon) fuel tank.

Cpl Ryan demonstrated professional skill and competence. His comprehensive check averted the possible serious consequences of a pylon tank breaking loose in flight.

CAPT T.C. SPURGEON   CPL J.A. TOMLINSON

As they were preparing to board their aircraft, Capt Spurgeon and Cpl Tomlinson observed a Buffalo returning to the ramp with one of its brakes on fire. They quickly obtained a dry chemical fire extinguisher from their own aircraft and ran toward the burning wheel. Cpl Tomlinson correctly positioned himself behind the wheel and extinguished the fire while Capt Spurgeon ensured that all systems in the aircraft were selected off. The two then remained at the scene to prevent personnel from approaching the overheated tire.

The immediate and correct reaction shown by Capt Spurgeon and Cpl Tomlinson in this dangerous situation probably prevented additional serious damage and possible destruction of the aircraft.

WO G.M. BULLARD

WO Bullard was flight engineer on a Hercules assigned to Canadian Forces Europe. Prior to a departure from Lahr he detected and reported fuel fumes in #2 bay. The explanation that this was a normal result of refuelling did not satisfy him so he wiped out the dry bay, resealed it and activated the fuel boost pumps for 15 minutes. Upon rechecking the dry bay, he again detected fuel fumes and this time he entered a major unserviceability against the aircraft. A lower wing panel was then removed and it was discovered that there was trapped fuel in the wing structure due to a leak from the condensate drain. The area was wiped out and after confirmation that there was no further leakage, the aircraft departed Lahr.

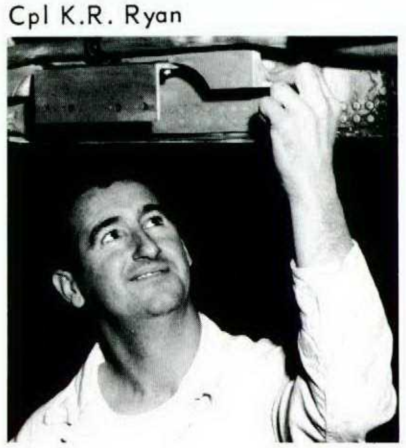
On the second enroute stop WO Bullard detected a bleed air leak and found that there was a hot spot on the leading edge of the left wing midway between #1 and #2 engines. He had the wing bleed air system isolated and the aircraft returned to Lahr without further incident.

On the following day, although a bleed air valve had been repositioned and the bleed air system was operating within tolerance with air supplied by the gas turbine compressor, WO Bullard was not satisfied with the rectification. In addition, he was concerned about the flight safety implications of a hot spot so near a previously suspected fuel leak. By operating #2 engine he demonstrated that there was still a hot spot in the leading edge between #1 and #2 engines and he re-entered a major unserviceability against the aircraft. Technicians removed a portion of the wing leading edge and discovered that there was a crack at the rear of the anti-icing duct, located directly ahead of a wing fuel cell. The sensor for the leading edge overheat warning, which activates at 200°F, is located inboard of the area where the crack was discovered and therefore the temperature at the crack could have risen considerably in excess of 200°F.

By his thorough knowledge of the Hercules systems and his perseverance in determining the exact cause of each unserviceability, WO Bullard demonstrated a high degree of professionalism and averted a possible in-flight emergency.

Capt T.C. Spurgeon
Cpl J.A. Tomlinson

Cpl K.R. Ryan



WO G.M. Bullard

The Case of the "Upside-Down" Bolt

OR *the dash four EO is no authority for assembly*

by Capt D. W. Rumbold

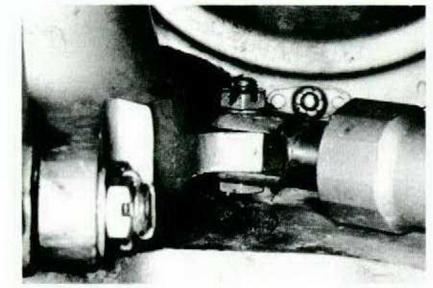
Landing away from home in a crosswind recently, one of our SOsFS noted that his T33 required extra left brake to keep straight, and that this condition persisted while taxiing in. Investigation revealed that the threaded end of a bolt which holds the shimmy damper in place had been rubbing against part of the nosegear. The resultant friction prevented the nosewheel from centreing.

The bolt was removed and installed inverted (see photograph #1). This head-downwards configuration allowed plenty of clearance between the bolt head and the nosegear; however, it was *contrary* to the installation shown in the dash 4 EO (see EO figure 70 - the bolt concerned is item 35, and is illustrated *head-uppermost).* Consequently, when the aircraft returned to home base, the bolt was reinstalled per the dash 4 EO illustration, but with the addition of a washer under the bolt head to increase the clearance between the threaded end and the nosegear (see photograph #2).

However, the story doesn't end there, because it was noticed at DFS that this bolt was made with an unusually thin head, and that it had a special Lockheed part number rather than an AN number (see item 35 on the parts list). Now why on earth would Mr. Lockheed go to all the bother of designing a special bolt for this installation when there are lots of standard ones around? That's right - you guessed it - a check of the original drawings showed that *this bolt was specially designed to be installed head-downwards* because the heads of standard bolts were too thick for the job.

So our dash 4 EO was proved to be wrong, and a Special Inspection had to be issued, coupled with an addition to the dash 2 EO to specify that this bolt must be installed head-downwards as shown in photograph #1. Fortunately, this incident did not have serious consequences; however it's not too hard to imagine a similar situation producing a disaster. What are the prime lessons to be learned from this occurrence?

- Dash-four parts lists must never be construed as authorities for configuration or assembly methods - only the dash two contains this authority.
- Be alert for hardware items with special part numbers - they're designed for a special job, which may mean they've got to be installed in an unusual way.



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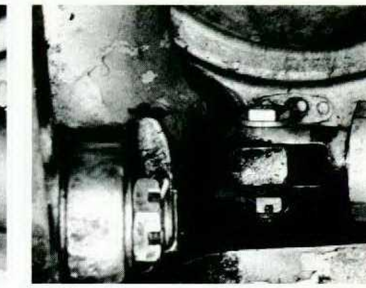

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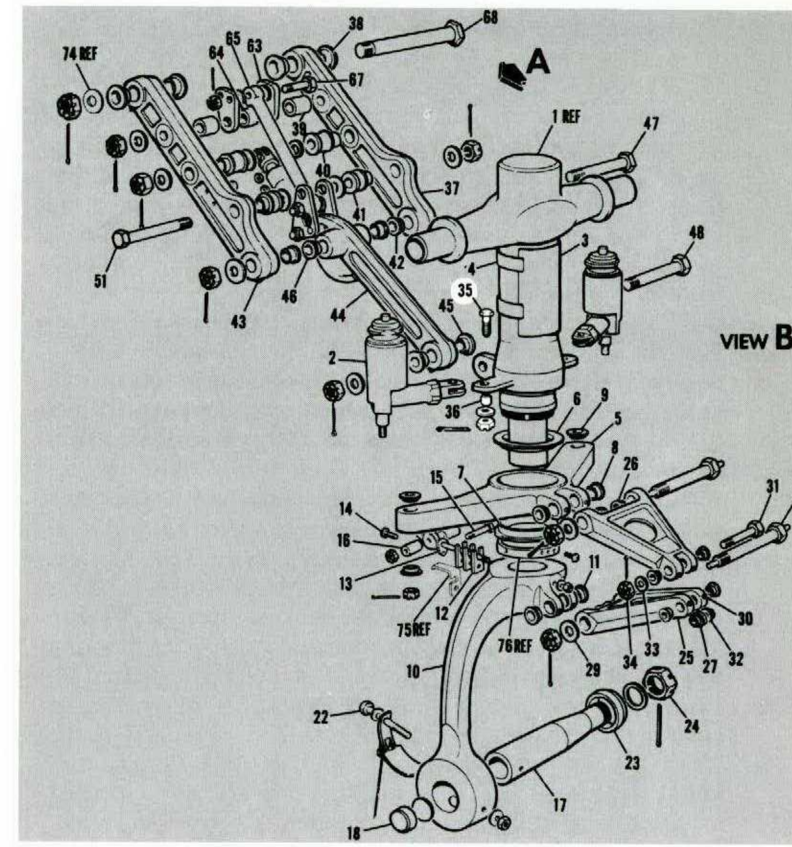
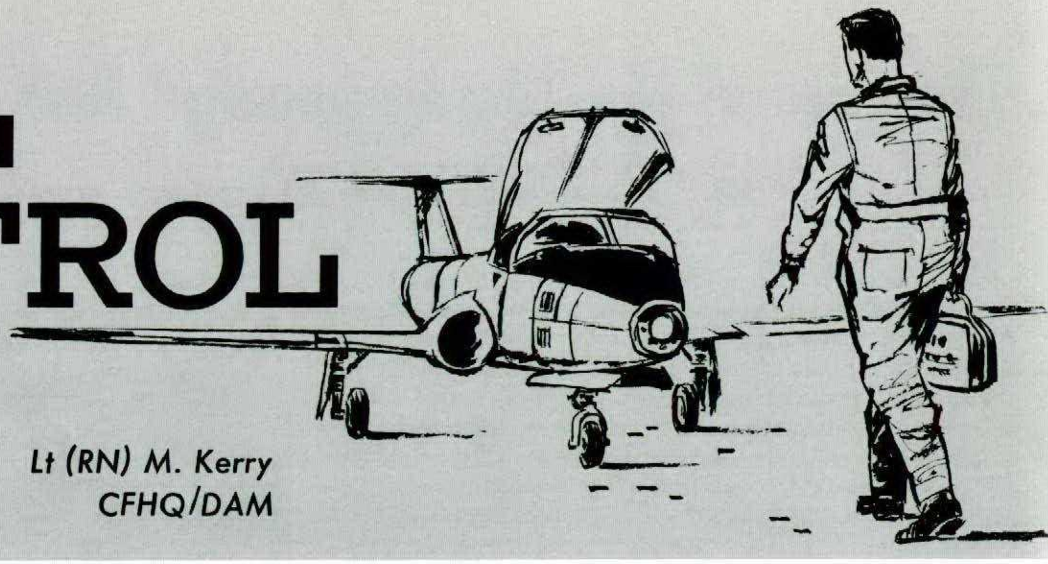


Figure 70 (Issue 1) Nose Landing Gear Strut

FIGURE AND INDEX NUMBER	GROUP: LANDING GEAR / MAJOR ASSEMBLY: NOSE LANDING GEAR STRUT — PART NUMBER	1234567 NOMENCLATURE	CODE	UNITS PER ASSY.
70 - 30	MS15001-3	..FITTING - TYPE 1 SURFACE CHECK LUBRICATOR		11
- 31	175175	..PIN - NOSE LDG/GR TORQUE ARM CENTRE MPI		1
- 32	207851-4	..SHIM - NOSE LANDING GEAR TORQUE ARM		1
- 33	175176	..WASHER - NOSE LDG/GR TORQUE ARM CENTRE		1
- 34	AN310-4	..NUT -		1
	AN380-2-2	..COTTER-PIN -		1
	AN310-9	..NUT -		2
	AN380-4-5	..COTTER-PIN -		2
- 35	LS580-5-24	..BOLT - GROUND BALL-BEARING (LAC)		2
- 36	175168-10	..BUSHING - LANDING GEAR		2
	AN960-516L	..WASHER -		

TOOL CONTROL



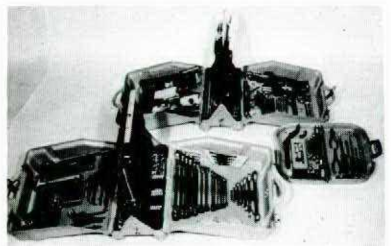
Lt (RN) M. Kerry
CFHQ/DAM

Tool control is on its way. All aircraft units in the Canadian Forces are going to be introduced to this new concept during the next five years. This decision resulted from studies conducted to assess the pros and cons of Tool Control in trials at CFB Portage La Prairie and CFB Shearwater.

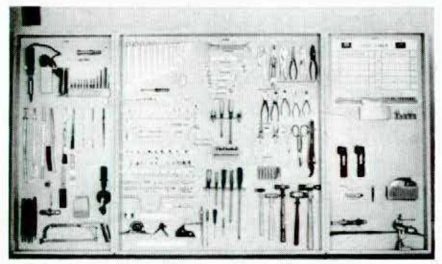
The main difference between Tool Control and the present system of tool administration is the method of distributing tools. The idea is to issue a good tool kit to an aeroplane or to a workbench rather than issue a number of smaller kits to the tradesmen who are employed on the aircraft or bench. Tool control kits are carefully designed to contain sufficient general and special tools to meet most of the aircraft's needs without recourse to the tool-crib. The tools, which cover the requirements of all trades, are kept in special lockable containers with a discreet silhouetted stowage for each item. Every tool is marked with a colour code which identifies it with the kit to which it belongs. There is no room in the system for private tools of any kind. Technician's kits are returned to supply sources, and personnel are not allowed to use tools other than those of Tool Control Kits.

When aircraft maintainers hear about Tool Control for the first time they often ask: "Why bother? Is the trouble, expense and paperwork really necessary? After all, the conventional tool organization has been working satisfactorily for years." This is a natural reaction because most new ideas that are forced upon us involve considerable effort to implement, and some of these ideas are not even beneficial. In this case the conventional system is highly unsatisfactory and any proposal for improving it should be considered seriously. Grave doubts are cast on the present system whenever someone misplaces a tool in an aircraft. Such tools are usually recovered without inconvenience, but there are many occasions when time is wasted or sorties abandoned while tool searches are carried out. Less common, but always tragic, are the accidents which result from short circuits, jammed controls or engine damage caused by misplaced tools. It was research into methods of preventing tool-FOD which led to the idea of Tool Control about ten years ago.

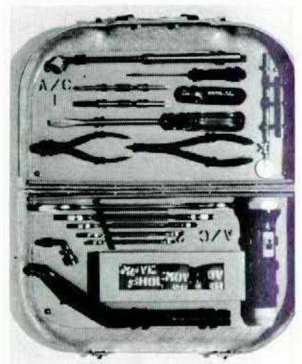
CFHQ and Command Headquarters are establishing a list of priorities so that aircraft units can be converted to Tool Control in a sensible order. The design of systems is the responsibility of AMDU at CFB Trenton, who will investigate units individually. AMDU will decide the number of kits required, the contents of each kit and the types of container. All of their decisions will be made in consultation with the maintenance personnel of the unit concerned. Kits will then be assembled at Trenton and issued to units.



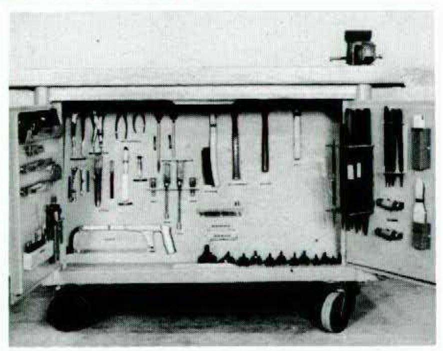
◄ ▲ Portable Tool Control kits for Sea King aircraft.



Cabinet Tool Control kit



Contents of Sea King kit. This kit flies with the aircraft.



Modification kit.

In any aircraft unit that has undergone the conversion, complete control can be exercised over all tools and every item is accounted for when a job is finished or when a shift change takes place. If a tool is misplaced its absence is immediately apparent and the area of search is small. On completion of the job the aircraft cannot be assessed serviceable until the supervisor signs that he has accounted for all tools.

Tool Control is very popular with all who have used it. From the technician's point of view one of the reasons for this is the fact that a first class kit is available to him right where he wants it. The inclusion of special-to-type tools such as fuel keys and torque wrenches means few trips to the tool crib. The only tools not included are usually those which are too large or too fragile, such as electrical test-sets.

Tool Control achieves its intended purpose of virtually eliminating tool-FOD. Additionally it has been found to offer other benefits. For example, when technicians are off duty their personal kits are temporarily reduntant, but with Tool Control all kits are available at all times. Statistically this means that the number of tools required by a unit is reduced to about one third of the number with conventional kits. This provides a considerable long term financial saving.

Certain aircraft such as helicopters and the larger types of transport aircraft often require tool kits to accompany them on deployed operations. A Tool Control Kit is far more suitable for this than a collection of tools from technicians' kits.

Other advantages include accessibility and suitability of tools, easy management and prompt replacement of unserviceable tools. Their merit is added to the flight safety and economic benefits to make Tool Control an effective and worthwhile scheme.

Lt Kerry joined the Royal Navy in January 1954 and completed a five year electrical apprenticeship. As a petty officer he worked on RN aircraft ashore and afloat and was selected for officer training at Dartmouth. He subsequently went to sea in the Far East as a midshipman and then to engineering college. Before coming to Canada on exchange duties he was the engineer officer of a Gannet squadron in HMS Eagle.

TO ERR

People are human and therefore subject to committing errors. If we fail to accept this, then accidents will continue to happen.

If Joe Airman, working on the flightline, has the feeling that every time he makes an error he is going to have his finger stuffed in the pencil sharpener, then the chances are that we will never know about his mistakes until we dig them out of a smoking hole.

We have to make sure that we impress upon everyone that occasional mistakes will happen. While we cannot condone errors, we must leave the door open so that individuals will feel free to come in and admit that they need help or that it just isn't possible to complete the task properly in the time allotted.

The key to the problem lies with the supervisor. If he is the type that paces the flightline with a big whip and snarls at everyone who commits an error, then he is setting up a situation conducive to an eventual accident. Or he might be an ops officer who gives all the pilots the impression that he won't accept any deviations in the schedule and, therefore, they might end up flying a bird that maybe isn't just right.

There are some people who work better under pressure but most psychologists agree that a relaxed atmosphere is the best way to realize maximum production. When an individual lives in constant fear of being nailed to the wall if he commits an error, you can bet your bottom dollar that you will never hear about any problem area unless you happen to stumble on it.

Fear of recrimination has probably cost us many a pilot. A commander who has a policy that heads will roll if you bash an airplane has perhaps caused a delay in the ejection sequence when there was no hope of salvaging the situation. It is a welcome feeling when the boss says "people are my most important resource and if something happens that you think dictates leaving the bird, get out and live to fly another day."

The point that must be clearly understood is that, while we don't condone mistakes, once one has been made, let's clear it up and prevent the chain of events that leads to an accident. No one is perfect, so we must realize that, as long as we perform at a job, someday, somehow we will make a mistake. What we have to establish is a climate in which the individual can go to his supervisor and admit he erred. Then we cannot only correct that mistake, but we can take the measures necessary to insure that the same man will not commit the same error again.

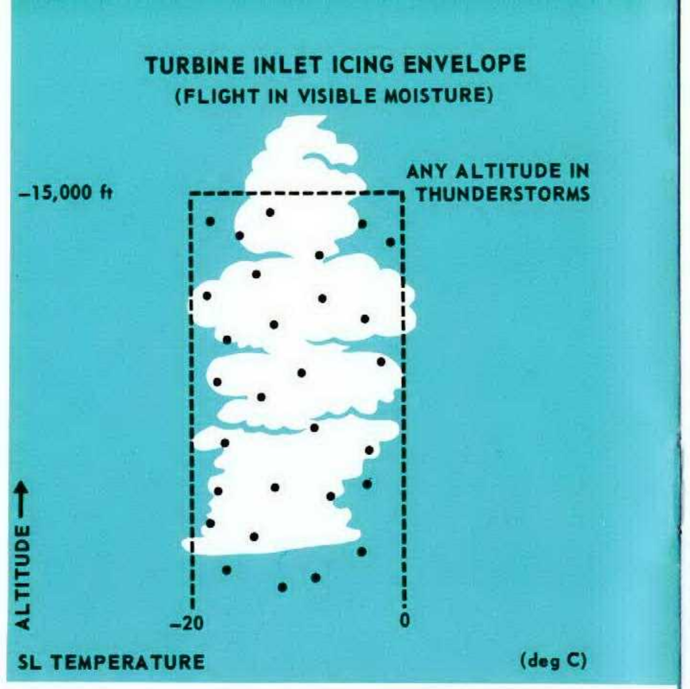
Basically, what we have said here is that good supervision can prevent accidents. And that is the only kind of supervision we can afford.

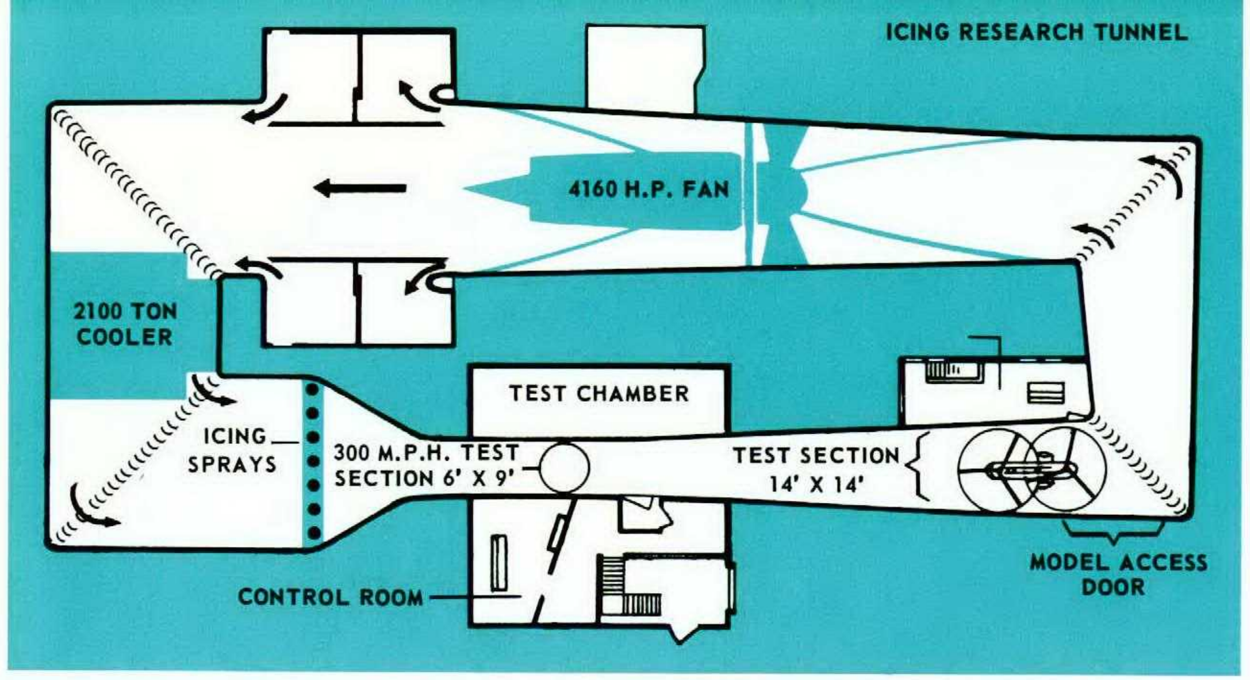
adapted from USAF AEROSPACE SAFETY

Turbine Engine Inlet Icing

by Barry Tully

Anti-ice systems give full protection, say the engineers, but combination of clouds and freezing temp. below 15,000 feet continue to trap the unwary, and the engines suffer the damage.





Icing envelope can be duplicated under lab conditions at NASA'S Lewis Research Center Tunnel generates airspeeds to 300mph, freezing temp, water spray to ice up engines, wing sections, radomes, etc.

Inlet icing is not a major problem in the operation of a modern turboprop or turbojet. Exposure to icing conditions is low and proper use of anti-ice protection virtually precludes the ice accretions which plagued early jets. Still, at least one executive jet has been lost due to inlet icing. FOD from ice is common, and ice has nasty characteristics which concern the prudent pilot: it builds up fast, it can occur before visible exterior ice, and it can strike two (or even four) engines simultaneously, frustrating attempts to design in safety through redundancy.

There are minor differences of opinion about just what are the conditions that produce turbine inlet icing, but NASA's Lewis Research Centre in Cleveland (which did most of the applied research on the subject back in the 1950s) say that the conditions are: visible moisture (clouds, rain, sleet, etc.) between the ground and 15,000 feet and a temperature range from slightly below freezing (say, 28 deg. F) down to just below zero deg. F (or - 5 to - 18 deg. C). There is one significant exception to this, but, in general, clouds beyond the higher altitude (and lower temperature) limits have insufficient liquid moisture, content to present an icing threat and, of course, the moisture remains liquid above the higher temperature limits.

The great exception to this neat icing envelope, says Lewis, is cumulonimbus clouds. Strong vertical air currents in the thunder-bumpers can throw super-cooled moisture (in quantities sufficient to cause inlet icing) to altitudes as high as 40,000 feet. As a further conservative hedge, Lewis engineers recommend to manufacturers using the laboratory's icing research tunnel that tests be made beyond the defined icing range to cover any exceptional instances of ice formation.

Most of the ice protection design parameters of U.S. jet engines are based on work done at Lewis. Their icing research tunnel is a 4000-hp wind tunnel, rigged up with a 21-ton capacity refrigerator and an icing spray. A six by nine foot test section accommodates jet engines, wing sections, radomes and other ice-prone objects to airspeeds of 300 mph.

Inlet icing, according to Lewis engineers, can occur before any visible accretion of ice appears on aerodynamic surfaces. This situation is most likely at high engine and low flight speeds. A hovering turbine helicopter is the best example of this, but an executive jet on takeoff and climb also meets the description. When icing does occur on an unprotected engine it forms on the intake lips, inlet guide vanes, compressor centre body and even on the blades themselves. Inlet screens were found to be most susceptible to a quick accumulation of ice. When in position, these screens could completely ice up an engine in one minute.

When icing did occur, the effect was to slowly decrease the amount of air available to the engine. The result in the cockpit is a loss of thrust - visible on rpm and EPR gauges - and an increase in tailpipe temperature. Any attempt to regain thrust by pushing the power levers forward only aggravates an already overrich fuel situation. Compressor stall also can occur.

After ice build-up has been allowed to occur, getting rid of it - either by turning on ice protection systems or flying into warmer air - can cause further damage to the engine. When the ice particles strike the first stage compressor considerable damage can occur. Normally this FOD will not cause an engine failure, but several instances - particularly on military aircraft - have been reported wherein the compressor stage has shattered, destroying the engine.

Engine ice protection comes as standard equipment with any civil jet, in that it is a certification requirement. (Full all-weather protection, on the other hand is optional on some jets, unavailable on others and most operational executive jets are restricted from dispatching into known icing conditions). For the powerplant, however, the FAA requires that ice protection be such that the aircraft can operate in icing conditions without power loss or damage to the engines. Small flakes of ice can be ingested if they do not damage the powerplant.

Typically, the inlet guide vanes and nacelle lip are heated internally by compressor bleed air turned on at the pilot's discretion. In theory, at least, these calories - if turned on when encountering icing conditions - will prevent the accretion of ice in the inlet. Turbojet operation in the icing range is usually highly transient occurring for the most part during tunnel IFR departures and on instrument approach.

Some jets (the Lear Jet, for example) incorporate an ice detector probe (in the engine inlet forward of the guide vanes). This is wired to a warning light in the cockpit, but is not intended to absolve the pilot from the responsibility of turning on engine anti-ice upon entering icing conditions. Some pilots distrust ice detectors, preferring to wait until some visible evidence of ice presents itself.

The reasoning is that increased fuel consumption caused by tapping the compressor bleed is too much of a penalty to pay on the mere speculation of an icing threat. One pilot said that he uses the nose of the wing tank on his Jet Star as an ice detector.*

The loss of at least one executive jet, a Lear Jet that went down in Lake Michigan, was attributed to failure on the part of the pilots to turn on the engine anti-ice. Other evidence of ice damage has been discovered on pre-flight inspection of the compressor face and on engine overhaul. According to the experts, if a significant accumulation of ice is allowed to build up, it is virtually impossible to get rid of it without some damage to the engine.

Most executive jet designs have reported instances of engine damage due to ice ingestion, but in virtually all cases, they cite pilot failure to use anti-icing, either soon enough, or at all. These bleed air systems are quite similar, taking hot air from the rear compressor, and routing it forward to hollow guide vanes and the lip itself. The procedures, too, are quite similar, with only minor variations. The Jet Star and Sabreliner call for engine anti-ice in freezing range/visible moisture conditions and furnish performance charts to show EPR limits with anti-icing bleed on. The Jet Star, on climb-out for example, would use 0.02 reduction in EPR with temperature limits remaining constant. Most serious performance loss, of course, is on takeoff. Again, referring to Jet Star charts: the use of anti-icing bleed equates to an effective increase of 15 deg. C ambient. Hence, pilots are reluctant to use it on takeoff, unless there is runway to spare.

Pilots must also remember to keep sufficient power on the engine to provide hot air flow through the inlet system. On a let-down (or perhaps holding at reduced power) it is possible to decrease power to the extent that anti-icing flow is insufficient. Normally the pressurization demands will ensure sufficiently high power settings, but, some jets have warning lights to show when too little air is being routed to the inlet.

Another area of potential ice damage to turbojet engines is ice deposits breaking off other parts of the aircraft. This is a design problem peculiar to aft-mounted powerplant installations, and there is little the pilot can do except observe extreme caution upon encountering wing ice.

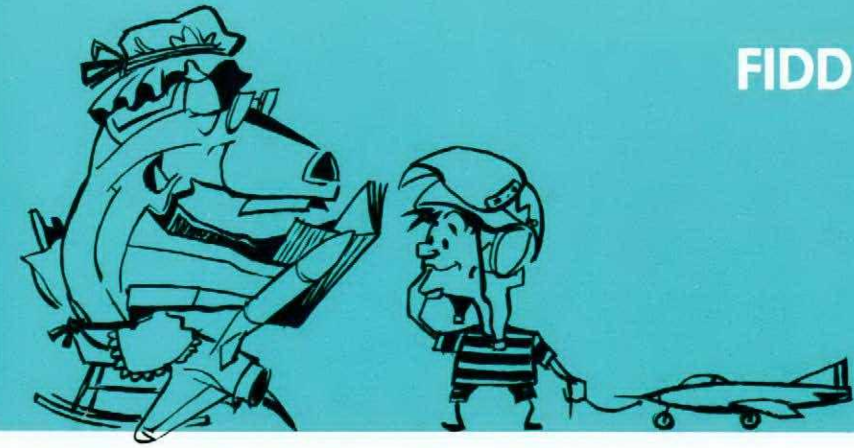
The danger exists when ice accretion occur on the wings, during letdown for example, and then the plane suddenly enters an air temperature warm enough to cause a sudden break-up (and slough-off) of the ice. This ice can damage the compressor sufficiently to cause engine failure or (and the more likely) cause enough damage so that compressor stall will occur upon application of increased power. This is one unofficial theory of the cause of an accident at Muskegon, Mich. This accident concerned a Lear Jet on an instrument approach to Muskegon which encountered simultaneous loss of power on both engines and hit down short of the airport.

Turboprops of more conventional (i.e. centrifugal flow, straight-through, fixed-shaft) designs have a greater tolerance to icing than either axial flow jets or reverse flow turboprops. The engine inlet must be protected (bleed air), just as the prop (thermal electric), but the inertial separation of the centrifugal compressor affords additional ice protection for the Allisons, Darts and TPE 331s. This natural resistance is fortunate considering the greater exposure of turboprops to icing conditions.

But enough engines have been damaged to show inlet icing to be an ever present threat, unforgiving of cockpit complacency.

Courtesy: Business & Commercial Aviation

**Since engine inlet icing can occur before any visible accretion of ice occurs on aerodynamic surfaces, it would seem prudent to activate engine anti-ice devices prior to entering anticipated icing conditions, in accordance with recommended procedures in the appropriate aircraft operating instructions.*



FIDDLE

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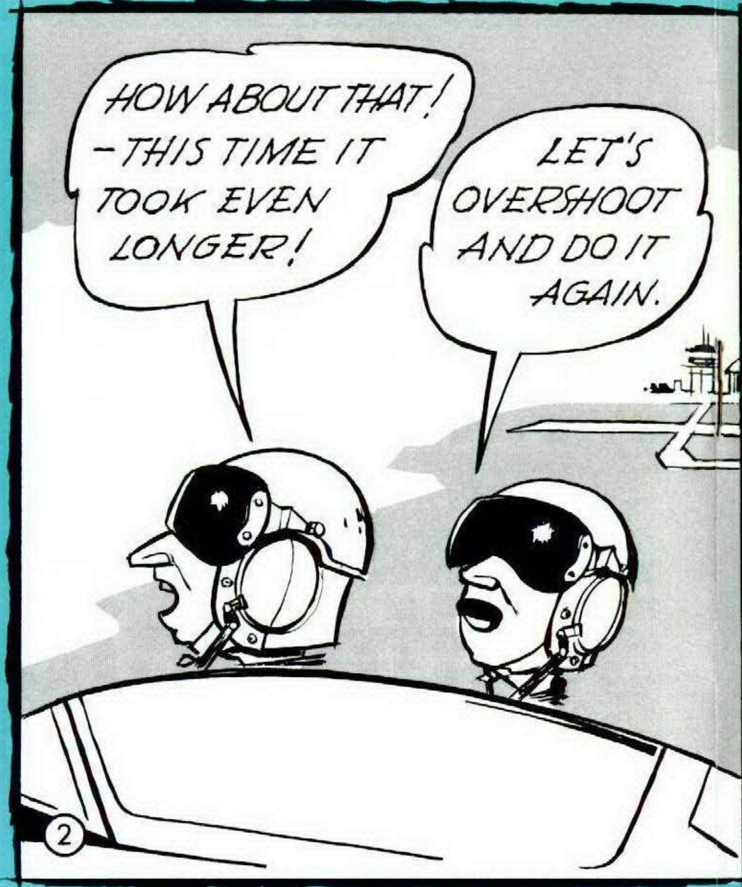
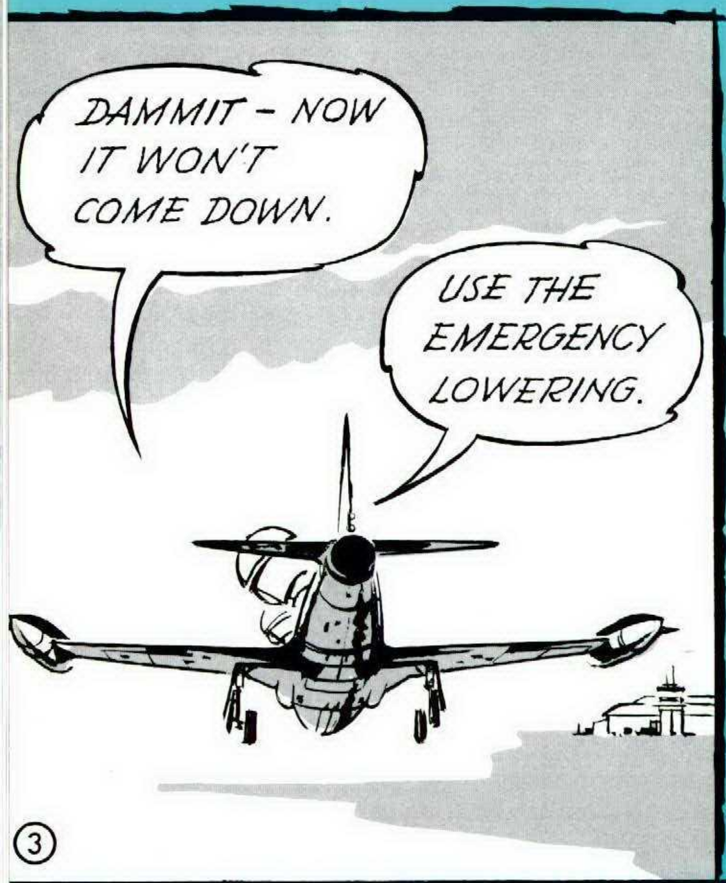
AIRSOP'S FABLE

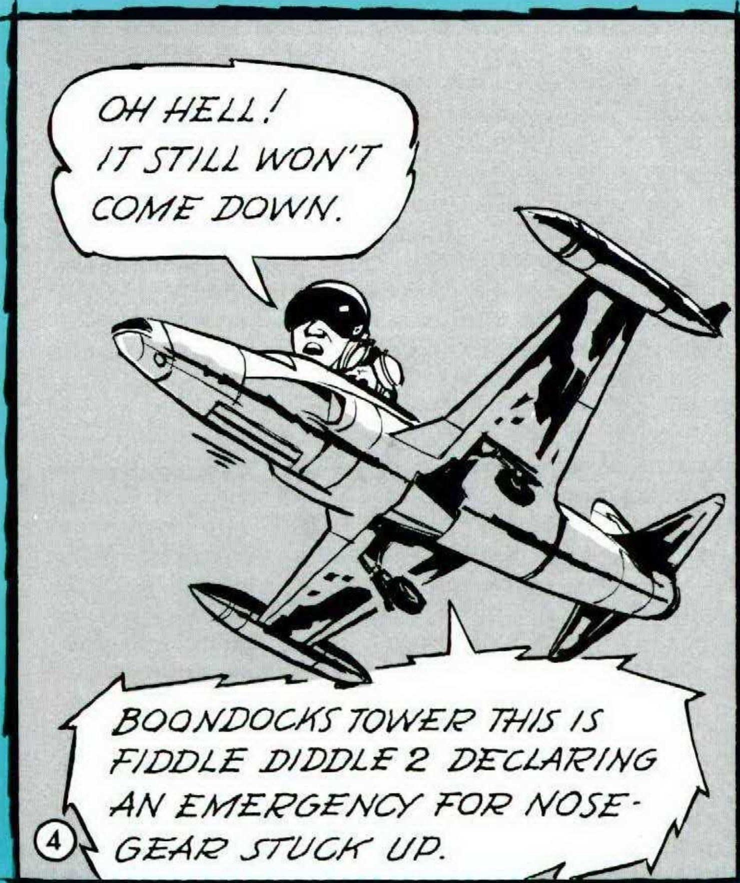
EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT BEING OVERLY HELPFUL*

OOPS- FUDDLED UP!

*IT HAS ITS UPS AND DOWNS







MORAL

LEAVE WELL ENOUGH ALONE

MOST SNAGS

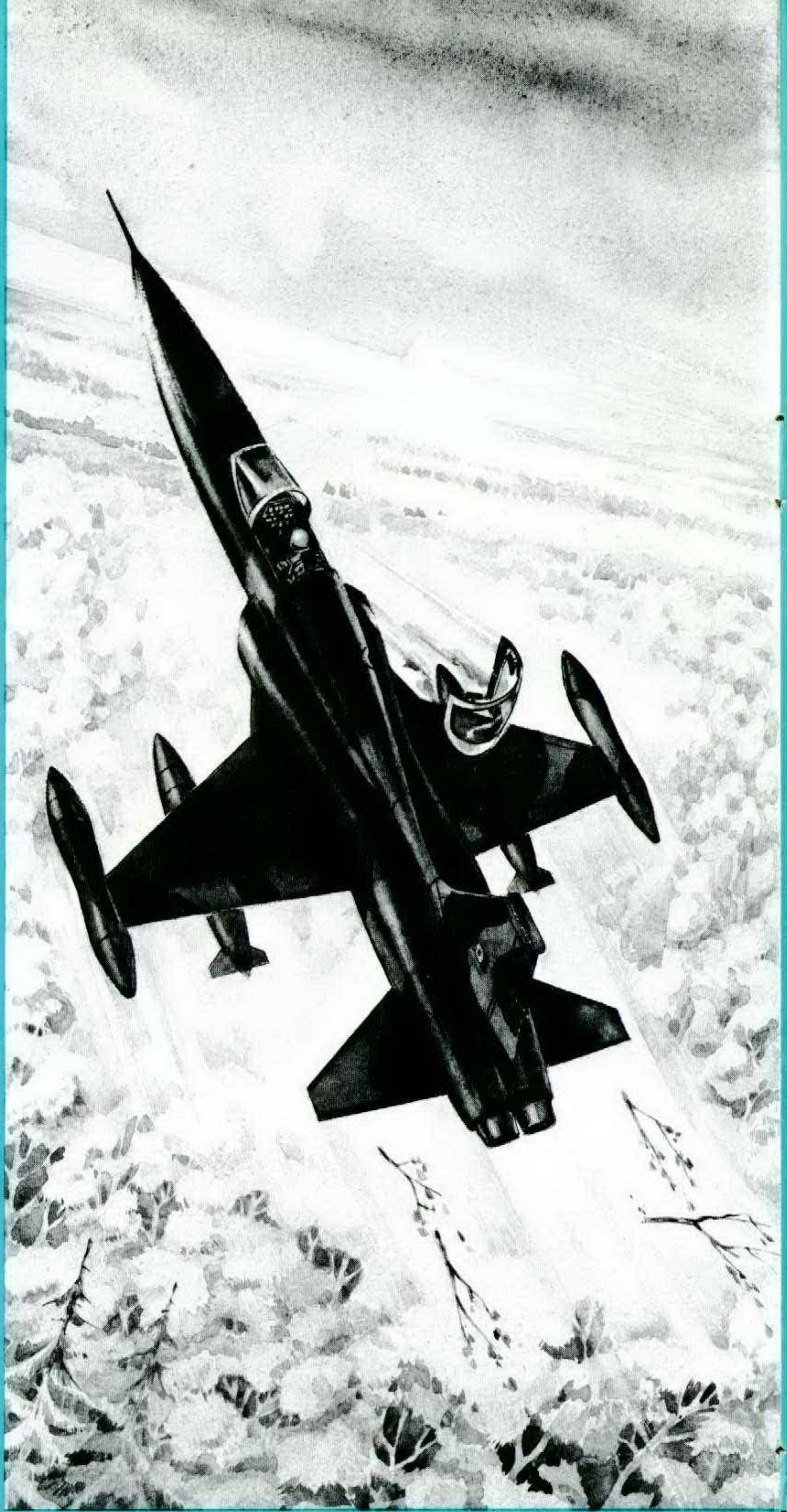
ARE BEST SOLVED

ON THE GROUND

•

Where's The Target?

From time to time we are fortunate to be able to present first-person accounts of aircraft occurrences. This gives our readers a chance to share in others' experience - and perhaps to acquire from them in the process, some of the learning that goes hand in hand with such an experience. A related article on page 16 examines air-to-ground weapons training, emphasizing the known hazards associated with conventional weapons delivery methods. Our thanks to this pilot for permission to print his story.



It was 0855 and my briefing was to start at 0900 for an interdiction mission. You always arrive 5 minutes early just in case the briefer will let you in. It worked, by 0900 I'd had the briefing and all the maps were set up ready to plot. Thirty minutes later I left the room satisfied that the mission would be relatively simple and that all I had to worry about was delivering the level and 10° skip bombs. I had already signed out and preflighted the aircraft so I walked right out and climbed in. I had computed a 0953.57 takeoff to hit a 1040 TOT (time on target). I strapped in and before I started up I taped my watch to the mirror for heads up time of day timing and a chronograph to the instrument panel for elapsed time. The aircraft had just had a new clock installed and I didn't trust it.

After an uneventful takeoff, I hacked and settled back for a routine nav mission. My first major checkpoint was at about the 3:50 mark, but when I arrived there, low and behold, instead of being right at 1 mile it was a mile to the left. I corrected left 5° and it turned out to be right on. I hit my first turning point and started heading approximately due south. The second and third turning points came along as planned. Then the fun started. The final run-in to hit the PUP (push up power) at 1040 was fairly difficult to navigate. I was running early so I came back on the speed and then, at the 38-minute mark, I realized I had not needed to make a correction - I had looked at the wrong watch! I pushed the power up and started praying that I had enough time left to make up the difference. As it turned out, I was 7 seconds late hitting the PUP. Having spotted the almost indiscernible PUP I continued for a moment and pulled up at PUP plus 3 seconds to try and acquire the simulated target. As I pulled up I looked left and all I could see was green trees. No target! Finally I saw it. It was back about 120° and 2 miles away. I started pulling around the corner and then decided I wasn't going to be able to hack it. I swiveled my head towards the front, rolled level and simultaneously hit the A/Bs as I realized my nose was far too low.

The CF5 sinks fairly fast but my sink rate was decreasing and I thought I'd just hack the bottom. Well I almost did and in the process I discovered that the aircraft makes a great pulp wood cutter! I knocked the tops off two trees with the rear feathers and started to climb away. My first thought was "how in the hell am I going to explain this?" The aircraft started banking left and I discovered that I didn't have any aileron control. I used rudder to level the wings and the nose started to sink. No choice. I had to pull the handles. I remember pulling the right and then looking for the left. (An old T-Bird habit). I squeezed the right trigger and watched the canopy go. My visor was up and I instinctively closed my eyes and immediately had a floating sensation. I felt something hit my back (the buttsnapper), then a gentle tug of the chute opening. Glory Hallelujah! The system worked. I opened my eyes and saw a fireball directly in front of me. I looked down, saw the trees, closed my legs and hit. The time from the aircraft's first tree impact to now was 8 seconds. I had less than a second in the chute! Talk about being at the bottom of the envelope.

I sat there swinging in my harness still thinking "How do I explain this one?" when it occurred to me that it would be best to take stock of the situation. So I removed my mask and tossed it to the ground. Ground! Hell, ground was 16 feet below me. I tugged at the parachute harness and it was secure. The chute was right over the tree, a large spruce and there was no way to climb down it. It took me a while to decide that I'd have to slide down the seat pack lanyard. Then I remembered the seat pack was still attached so I deployed it. I wrapped my legs firmly around some branches and put one arm through the chute harness - then I undid the harness. I tied the seat pack lanyard to the harness and proceeded to slide down.

It wasn't as simple as it all sounds however. In my great cunning before releasing the tree with my legs and letting go the harness with my right arm, I had wrapped the lanyard firmly around my left hand. I then let go. Yes, it hurt! I almost had my only injury right there. After I extricated my mangled left hand, I slid to the ground with relative ease.

Surveying my situation from that vantage point, I remembered the old survival adage that it's better to smoke than cry so I pulled off my helmet and lit a cigarette. Do you have any idea what a cigarette tastes like with a completely dry mouth? Foul! Foul! I heard somebody yelling, asking if I was okay so I croaked back "Yes". No answer - must have been my imagination.

I reached over for my seat pack contents and dislodged the pin on the dingy. Whoosh! The noise scared the hell out of me. I then sat down on the pack cover and rummaged through the kit contents. While I was busy at that I heard a shot, then another. Suspecting that it was a hunter nearby who had seen the crash, I grabbed for my flare gun and fired off a pyro. Bang! And right away I got an answering shot. Bang! I kept this up for four flares and then silence from the hunter. Later on I discovered that the shots from nearby hadn't come from any hunter. I had been engaged in a small contest with my faithful aircraft which in its dying gasps was firing off 20mm cannon rounds.

By this time I had finished a couple of cigarettes and I had nothing to do. The people at survival schools always say keep busy so I decided to chop some wood for a signal fire. Just prior to this I had pulled out my survival beacon, the URT 503, and complied with the instructions. I couldn't see any test light so I figured it wasn't working, but I left it turned on and hung it in a tree. Now I could definitely hear yelling in the woods and I replied by blowing my whistle to direct people to me. I had the whistle in my mouth so I could suck on it and get some saliva going.

A CF5 dual had by this time homed in on my 503 and was doing his best to drown out the anguished pleas from my whistle. Not only that, he was being followed by a ghost! Listen sometime to a low flying jet as it passes over trees. It trails a passage of air which rustles the tree tops giving an eerie sensation.

I figured a helicopter would be along shortly so I began looking around for a suitable landing site. There was none close to me. Then some local inhabitants arrived. They looked up at the parachute and then down at the ground among the trees. Then one of them turned to me and asked where the pilot's body was. Ego deflation! I informed him quite politely that I was the pilot. A small conversation then ensued and we were joined by more locals. This elderly chap, Frank, asked me why I was waiting around the area and I told Frank that I was waiting for the helicopter and asked him if there were any cleared areas close by. He said sure, there was one near the crashed aircraft.

I decided to hike over to the clearing (200 yds away) and check it out. The woods in the area were fairly dense and it took us about 15 minutes. Halfway to the aircraft I heard the helicopter homing in on my 503. I had left it near the parachute. They hovered around the tree looking for me or my body and tried to see if I was still in the chute. Eventually they decided to move over towards the crash. One of the locals scrambled up to the top of one of the spruces and waved the helicopter over to us. We were now in the crash area. The clearing, referred to by the local was really only the crash site itself. The helicopter finally spotted my BRIGHT ORANGE Mae West and ORANGE squadron cap and lowered the belt to pick me up. So I shook hands with Frank and ascended into the sky where I was greeted by the smiling faces from Base Rescue. ■

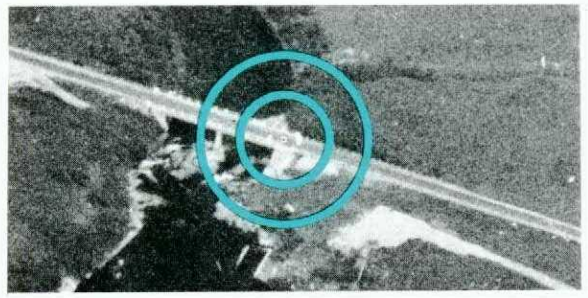
How Low is Low?

The following incident report was submitted by a Chipmunk pilot: "WHILST FLYING LOW STRUCK SMALL HUT. AIRCRAFT LOST LEFT OLEO . . ."
Just how low is low? It sounds as though it could almost be categorized as a taxiing accident – unless of course the hut was airborne at the time.

Air Clues

accident number 1

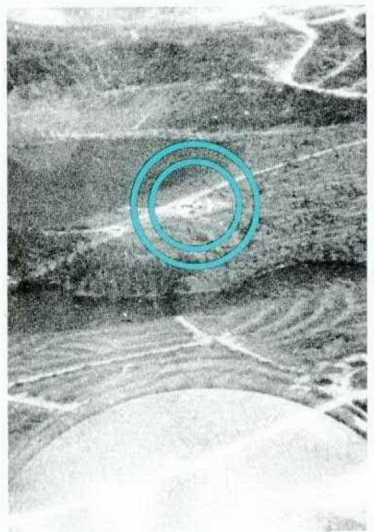
". . . as the pull-out was initiated I saw that I was lower than normal and my recovery was not going to be completed prior to reaching the shoreline. I applied maximum "G" but the aircraft struck the top of a large tree. As the aircraft climbed away, very loud bangs were heard from the aft section, accompanied by a loss of power, a high EGT and a reduction in RPM. The banging in the rear continued and shook the aircraft and a smell of fresh cut pine or spruce suggested ingestion of the tree in question. At 2000' to 3000' above ground the RPM was below 70% and the aircraft was abandoned at approximately 250 kts."

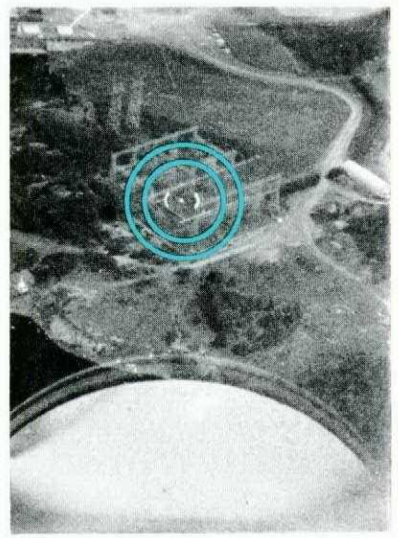


accident number 2

"The aircraft was turning very hard in a 15-20° nose-low attitude. As it rolled level, it crossed the highway in a slight nose-up attitude, but it was still mushing and then disappeared below the tree line. Approximately three seconds later I observed the aircraft climbing up over the treeline in a 60-90° left bank, 2-3° climb. I didn't hear it strike the trees. The aircraft crossed the highway still in a steep left bank, and flying very slow. At this point I heard a dull sound which sounded to me like A/Bs cutting in. The maximum height above ground during the pull-up I would estimate as 150 feet. The aircraft then started to gently descend just after it crossed the highway. Approximately 2 seconds after it crossed the highway, still descending, the aircraft rolled level and I saw the canopy come off and the seat come out. I saw the pilot separate from the seat, and descend. As he disappeared below the tree line, I saw the pilot's parachute deploy and then disappear. At that time, the aircraft had crashed and was burning."

On Target





Renewed emphasis on the use of air-to-ground conventional armament has put many CF pilots face to face for the first time with the hazards involved in real or simulated weapons deliveries. During 1971 the new experience resulted in narrow escapes for two of our pilots when they were forced to eject near to the ground after flying into the tree tops; others had near misses.

What we've learned about the hazards is significant in that our limited experience indicates trends similar to those of other air forces with more extensive conventional weapons delivery experience and statistics. Armed with that information it is possible to predict where weapons delivery training accidents can be anticipated and take preventive measures.

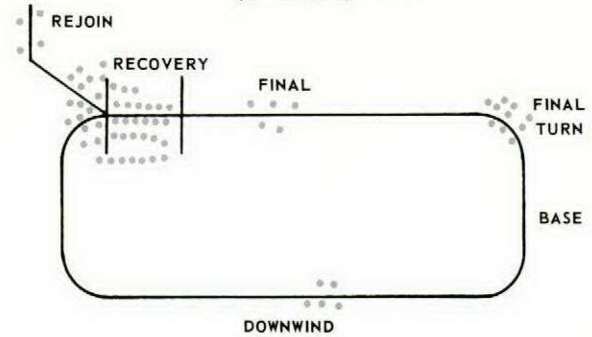
A recent article in TAC ATTACK outlined the results of a study aimed at determining where in the range traffic pattern accidents had regularly occurred. In addition, the review covered off-range accidents. The following are excerpts from TAC ATTACK:

"In conducting the five and one-half year study the following areas were considered:

- On range accidents from all causes
- On range accidents from pilot, supervisory, and miscellaneous causes
- Off range simulated weapons delivery accident causes
- Uncontrolled range (no range officer) accidents from pilot, supervisory, and miscellaneous causes
- Accidents by pattern location (all causes)
- Accidents by pilot experience

"The following diagram indicates the pattern dispersion of the weapons delivery accidents which comprised the study.

ACCIDENTS BY PATTERN LOCATION
(all causes)

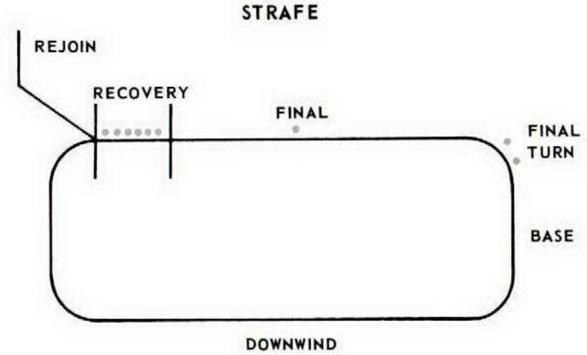


"It can be easily surmised that the lion's share of the range accidents occur during the recovery, a time when both the pilot's skill and the airplane integrity are taxed to the greatest degree.

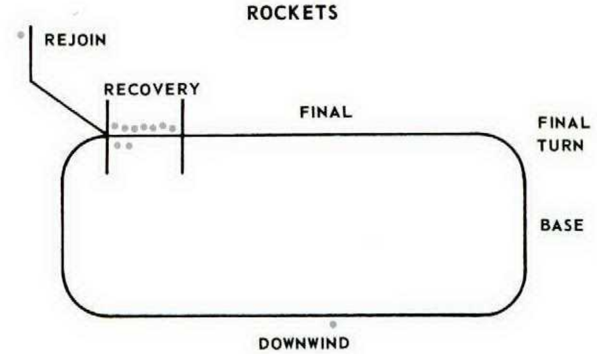
"The diagrams below indicate the weapons delivery accidents by event (materiel causes omitted). Eighty-eight percent of the weapons delivery accidents occurred within the four depicted, conventional weapons delivery patterns. (Note: Depictions are not necessarily associated with controlled range deliveries).

ACCIDENTS BY PATTERN LOCATION (PILOT/SUPERVISORY/MISCELLANEOUS)

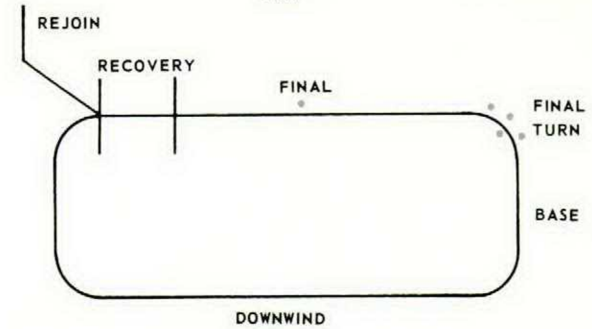
STRAFE



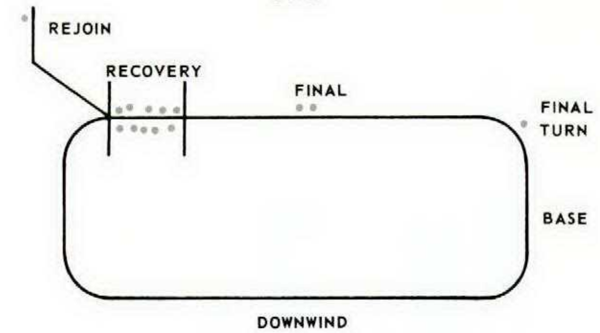
ROCKETS



SKIP



DIVE



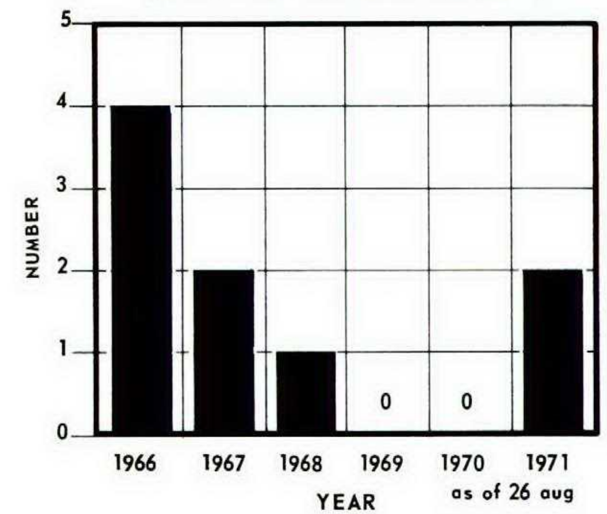
"In the skip bomb pattern it is interesting to note that the majority of the accidents occurred during the base to final turn, a manoeuvre wherein the pilot is making a low altitude, descending turn, and attempting to line up on a specific run-in course. Overshoots due to wind direction or miscalculation followed by an attempt to correct can be disastrous in this low altitude regime.

"A review of dive bomb accidents revealed that 69 percent of them occurred either off range or on an uncontrolled range. Pilots with minimum experience were involved in 77 percent of the dive bomb accidents.

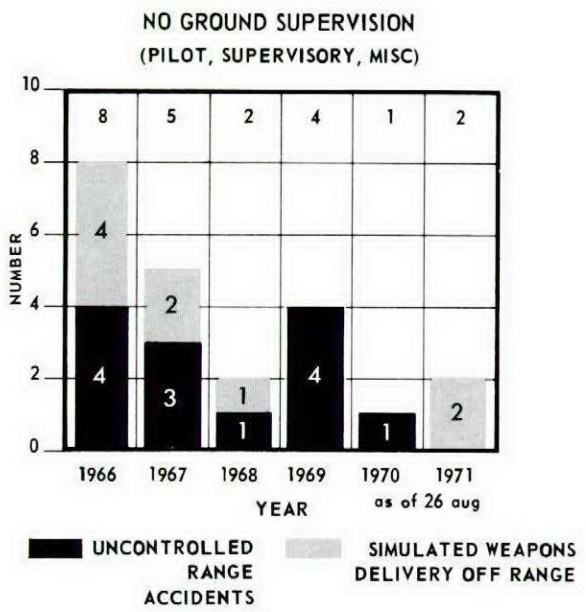
"During the review of all weapons delivery accident causes several mishaps began to stand out as consuming a disproportionate chunk of the overall total. Consequently, the following charts were developed to point out the increase in weapons delivery accidents where no ground supervision was required.

"The following chart indicates the number of off-range accidents that have occurred in . . . the past five years. These accidents are all pilot factor or most probably pilot factor and were off-range simulated weapons delivery that occurred during road recce or missions in support of the Army on a military reservation.

OFF RANGE ACCIDENTS
(SIMULATED WEAPONS DELIVERIES)



"The following chart reflects the total number of weapons delivery accidents where no ground supervision is required. It includes the total of off-range accidents plus those on-range accidents that occurred when there was no range officer present (tactical ranges). In all of these accidents, supervision of the flight is generated from within the flight and it is practically impossible for the supervisor to verify that proper dive angles, recovery altitudes, and other critical manoeuvres are being accomplished correctly by all flight members.



"The analysis revealed that over one-half of all non-materiel caused weapons delivery accidents occurred during off-range simulated delivery or uncontrolled range missions . . . no ground supervision.

"When viewed from a training requirements standpoint it becomes quite obvious that something is not quite right. Continuation training sortie requirements for ground attack tactics or armed recce are less than ONE-THIRD of the requirements for controlled range sorties. ONE-THIRD OF THE TRAINING REQUIREMENTS IS PRODUCING OVER ONE-HALF OF THE ACCIDENTS.

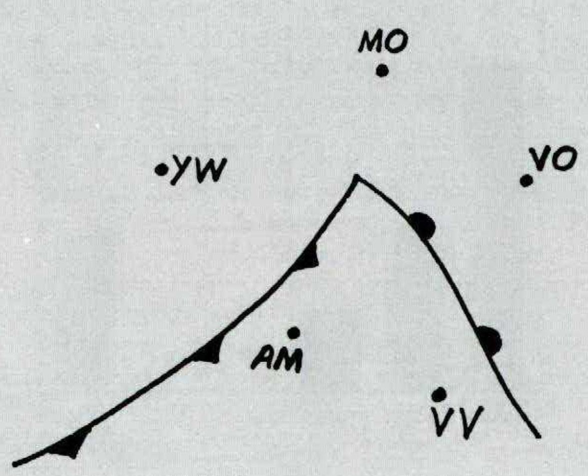
"The recovery accidents in the rocket delivery pattern are attributable, in large part, to the pilot's trance-like attention to the rocket trajectory resulting in a late recovery. These accidents can be prevented by constant re-education and supervision.

"The thrust of this analysis is aimed at the weapons delivery accidents that occur when no ground supervision is required. As shown, these events account for an alarming, out-of-proportion share of the weapons delivery accidents. There is little doubt that an experienced flight leader can plan, brief, and conduct a safe ground attack or armed recce mission under the existing guidelines. Take away the experience and it's a brand new ball game. A strengthened set of guidelines could enable the weaker or inexperienced leader to plan and execute a safe mission.

"To cope with the weapon delivery accident problems, Headquarters TAC has taken the following actions:

1. Changes in the appropriate manuals have been written to provide the following minimum day recovery altitudes for ordnance deliveries (live or simulated) in Tactical Range/Close Air Support Training:
   - Dive angles 30 degrees or more - 1000 feet AGL
   - Dive angles of less than 30 degrees - 300 feet AGL or 1/2 of planned altitude loss for recovery, whichever is higher
   - Level deliveries - 200 feet AGL.
2. During off range ground attack tactics, close air support without a FAC, and armed reconnaissance training the minimum altitude has been established as 1000 feet AGL.
3. An evaluation is underway to determine the feasibility of raising the minimum delivery altitude for level skip bomb training from 50 feet to 100 feet and to restrict the final turn altitude on skip bomb deliveries to no lower than 300 feet AGL prior to rollout on final.

"It is imperative that sound safety practices be blended with operational requirements to form a basis for mission effectiveness."



How's your Wx?

Here are some actual weather situations. Your problem is to match the weather reports with the stations on the map.

A. 30⦶120⦶250⦶15+ 989/55/38/2314/947/CU1AC1CI1 728
B. E12⦶25⊕8 000/33/29/3405/952/SF7SC3 805
C. 20⦶E35⊕15SW– 026/33/25/1909/954/SC3SC7 713
D. E10⦶15⦶15 061/31/25/0110/963/SC6SC2 135
E. 20⦶E25⦶15 039/51/40/2226G42/962/CU3SC3 818

Answers page 21

On the Dials

In our travels we're often faced with "Hey you're an ICP, what about such-and-such?" "Usually, these questions cannot be answered out of hand; if it were that easy the question wouldn't have been asked in the first place. Questions, suggestions, or rebuttals will be happily entertained and if not answered in print we shall attempt to give a personal answer. Please direct any communication to: Base Commander CFB Winnipeg, Westwin, Man. Attn: ICPS.

QUESTIONS

Recently we have received several questions in response to "On the Dials" articles. We welcome these questions and although we do not profess to know all the answers, we will certainly research the questions and publish them along with the answers as soon as possible.

Question: What information is furnished by the radar controller on a radar monitored ILS?

Answer: The PAR monitor will issue the following advisories during a radar monitored ILS approach (front or back course):

- Distance from "Touchdown" point, at each one nautical mile interval from touchdown.
- Notice that the aircraft has passed the final approach fix.
- Position of the aircraft in relation to the final approach course and the glide path.
  NOTE: Glide path information is not issued during the back course approach.
- Warning of any situation which, in the controller's judgment is likely to affect the safety of the flight.

This PAR monitor procedure is used to monitor approaches made on ILS (front or back course) whenever the ceiling is 500 feet or less, or the reported visibility is one statute mile or less, or when the service is requested by the pilot.

NOTE: This is mainly a civil control procedure since the Canadian Armed Forces have only limited ILS installations. However, military radar has the capability of monitoring all approaches and is available on request.

This advisory information will normally be transmitted on the localizer voice feature, but when not available the primary Precision frequency will be given when the approach clearance is issued.

This is far from being a new procedure, however, the much improved voice feature of the ILS localizer has similarly improved its value as an approach aid.

Question: What is meant by the term Track Guidance Localizer (TGL)?

Answer: Localizer transmitters, operating in the VHF band 108.1 to 111.9, have been at several locations for track guidance purposes only. (Check the Penticton letdown plate in GPH 200). A Track Guidance Localizer does not have a glide path facility and is not associated with an airport runway.

Track guidance localizers have been assigned the abbreviation TGL for use in aeronautical publications and NOTAM message texts.

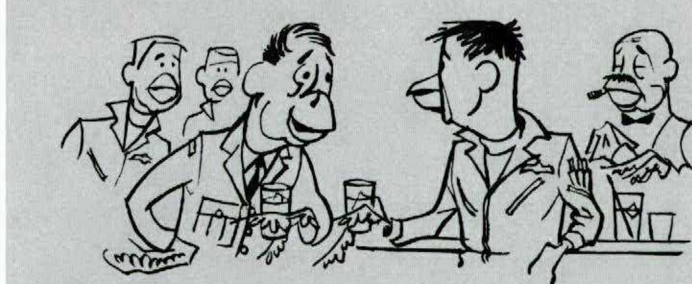
New Nav Aids for Canadian Airways

A program which commenced in 1971 and will extend over the next several years will provide a total of 36 UHF Distance Measuring Equipment (DME) transponders at various locations across Canada. Most of these transponders will be co-located with existing or programmed VOR stations, but a few will be used in association with Instrument Landing Systems in order to provide distance information to the runway threshold.

Advance notices of this nature are found in MOT Air Navigation Radio Aids Manual. To date, a DME transponder has been installed at Vancouver and is co-located with the ILS glide slope transmitter. This DME, as the name implies, provides distance information. In this case it is distance to touchdown, so don't get trapped - *it's distance only*.

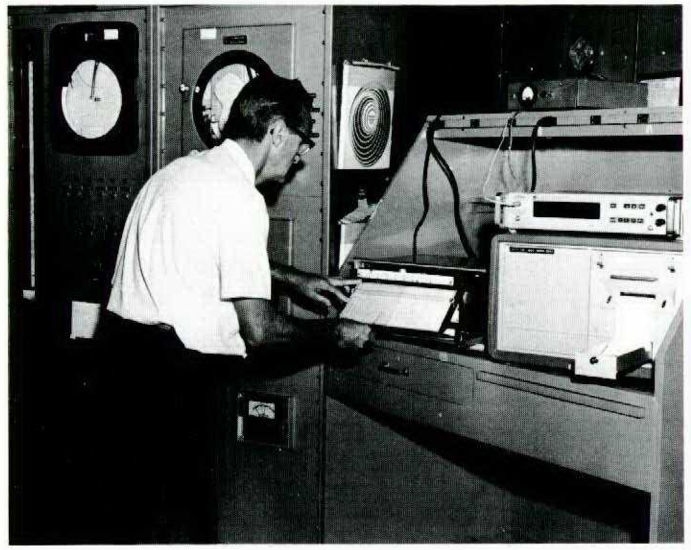
This will be an excellent approach aid for TACAN/ILS/ADF equipped aircraft, a good assist to TACAN/ADF aircraft, but will provide only limited information for TACAN only aircraft.

OVERHEARD AT THE BAR

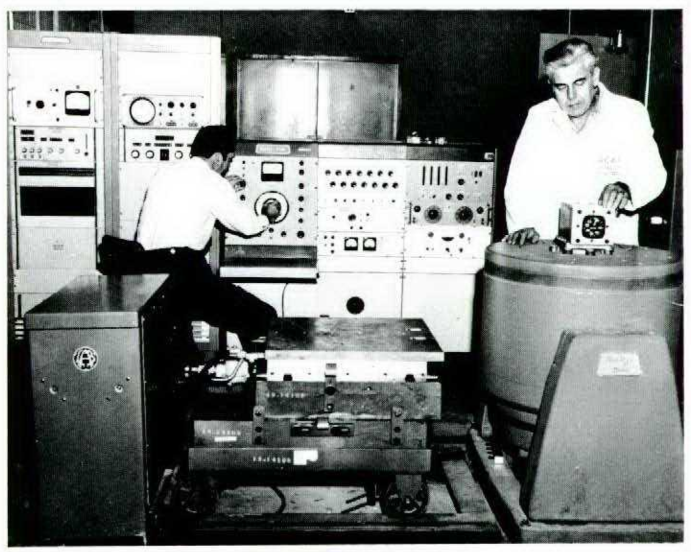


FSO:
"Do our pilots report incidents? Listen, buddy! I get half my incidents by reading through the L14s."

A precision pressure gauge being calibrated in the Applied Physics Lab by IE tech, Cpl. G. Cusson, prior to shipment to AMDU as a working standard.



Checking and recording humidity and temperature readings during calibration on a large walk-in environmental chamber.



AVS and civilian technicians vibration testing an airborne instrument in the durability laboratory. Vibration testing was prime criteria in determining the fault in the bomb release (see article).

quality engineering test establishment...

QETE

Environmental and Applied Physics Lab

Finding answers to questions - that's their job, and it's an infinitely variable one, ranging from how much sun it takes to fade your average new jolly green uniform or blister the peak on your new cap, to determining by means of a pulse shock tester, the ability of aircraft components to withstand hard landings. For the engineers and technicians of QETE's Environmental and Applied Physics Laboratories, it's all in a day's work.

The applied physics branch deals with aircraft instruments, photographic materials, photometry, optics, acoustics and nuclear radiation. They set up and calibrate all of the instruments involved in the testing of the various equipment which falls under these headings.

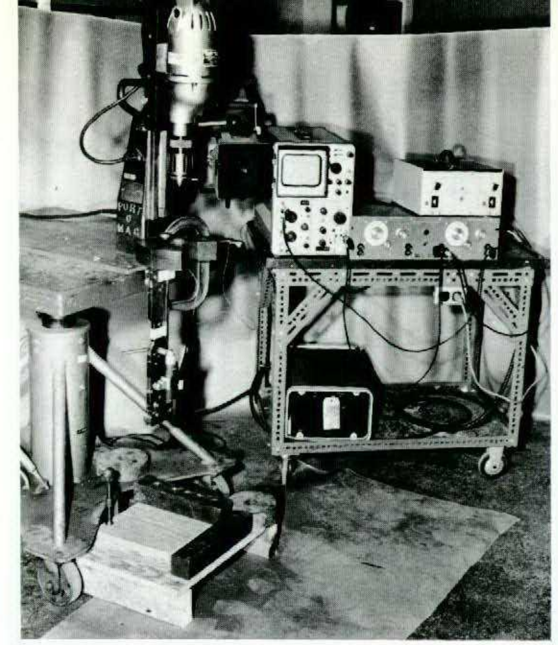
In their work, they are at the disposal of other organizations for immediate work on a wide spectrum of tasks. This means frequent calls to deal with problems involving more than one scientific field - developing test methods for example - and little time for pure physics.

In the environmental branch, chambers are utilized to test articles under climatic conditions, such as rain, sun, salt spray, water splash, sand and dust. Temperatures can be varied from −100°F to +700°F, the humidity from ambient to 95% relative humidity, and altitude from sea level to 100,000 feet. The environmental branch also deals with durability and has at its disposal a wide range of vibration and shock testing equipment. This equipment can be employed in the field of flight safety, for example in determining the cause of failures occurring during hard landings or perhaps turbulence. A recent mishap involving an Argus serves to illustrate how the lab and the directorates of Flight Safety and Aerospace Maintenance combine their efforts in problem solving.

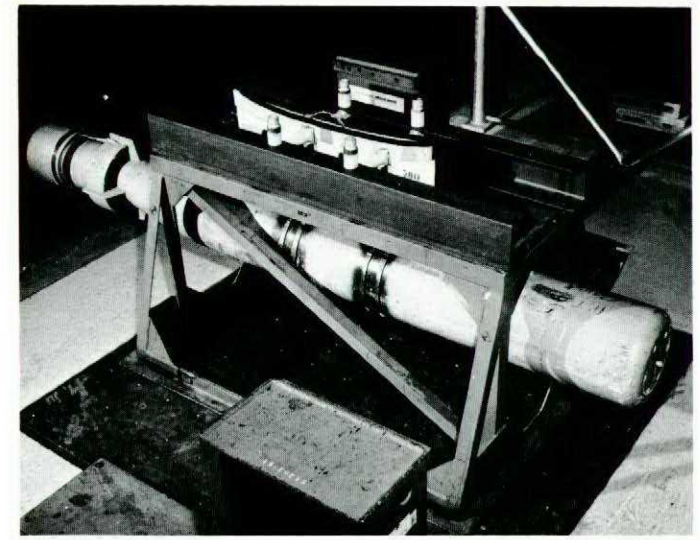
An Argus crew were shutting down at Roosevelt Roads after a flight from Summerside when they observed a torpedo drop heavily onto the tarmac as the bombay doors were opened. The suspect bomb release unit was subsequently returned to QETE where it was mounted on a special plate to simulate the mounting in the aircraft. Then the unit was attached to a vibration machine. Vibration in the Y axis (parallel to the forks of the mount) and the Z axis (parallel to the thrust axis of release), produced no results. However, when the plate was vibrated in the X axis (normal to the forks of the mount), the release mechanism triggered. The test was repeated three times and each time the results were the same. The inadvertent release could not be duplicated on another sample unit however. Both units were then dismantled and technicians found that the faulty unit had been incorrectly assembled. They corrected the fault and the unit subsequently checked serviceable on the vibration test.

The result: corrective action in the form of recommendations to the contractor to check for this fault on the assembly line, and another example of QETE's support role in DFS investigations.

Specified-pulse shock machine investigating impact resistance of airborne instrument to withstand hard landings and excessive "g" forces.



Vibration test of bomb rack. The unit functioned perfectly under heavy vibration when loaded with a dummy torpedo.



Set-up used in developing a drop test to detect faulty bomb release units in the field. A combination of floor materials and drop height was found which would trigger the faulty release while not affecting serviceable units.

Wx: Actual vs Forecast

Actual weather is inversely proportional to the forecast weather times the expectancy factor, which varies beyond control in perverse relation to your weekend (cross-country) plans.

Fitzsimmon's Hypothesis of Inverse Expectancy

Interceptor

Answers to Wx Quiz

A–AM B–MO C–VO D–YW E–VV

Gen from Two-Ten

CUH-1N, KNEE IN THE WINDOW The aircraft was hitched to a tractor and was all set for towing. Before the towing operation began, a technician climbed onto the roof causing the aircraft to suddenly nose down and the technician to lose his balance and put his knee through an overhead window.

The investigation revealed that there was more to the incident than was apparent in the brief description: The clearance of the hangar doors was so low and narrow that it necessitated levelling the main rotors before moving the aircraft through. The situation was reflected in Squadron SOPs which called for a technician to climb to the roof and keep the rotors level for each towing operation. The large spacing between steps on the helicopter and no means of lateral support, an unsteady aircraft when ground handling wheels are mounted and extended, meant it was only a matter of time before someone would inadvertently break the nearby unprotected window.

Several changes in local procedures resulted from the mishap:

- New SOPs say that no one shall be on the roof while the towing wheel assembly is extended.
- A new procedure for levelling the rotor blades and stabilizer bar makes use of a pole clipped to the end of one rotor blade held by a tech as the aircraft is ground handled into the hangar.
- A UCR was raised recommending a protective bar over the window in the roof.

It is apparent from this occurrence that as long as inadequate hangars are used, resource losses of this nature will continue to plague us, despite conscientious efforts to prevent it by those who must cope, with such situations in their day-to-day work.

CF5D, CONTROL COLUMN RESTRICTION During the roll on a formation takeoff, the lead encountered a restriction in the aft movement of the control column. When the aircraft failed to rotate, abort action was initiated. While number two continued the takeoff, the lead brought his power back to idle, selected speed brakes and got a good drag chute. He applied wheel brakes with about 6000 feet of wet runway remaining, however both tires failed in quick succession and the aircraft skidded down the runway sideways, finally coming to a stop about 2000 feet from the end with the nose wheel off the side of the runway.

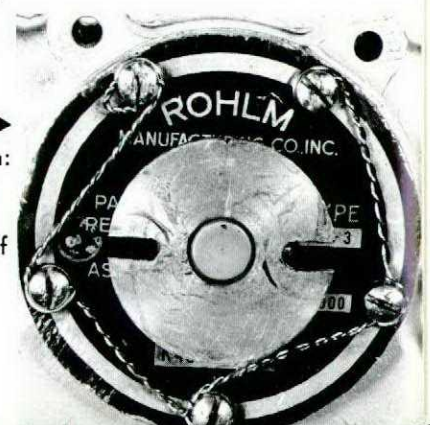
The investigation revealed that the pilot had stowed his personal luggage in the back seat and fastened it down with the seat harness. After it was packed he had windmilled the left engine to obtain hydraulic power in order to check the movement of the controls. When this showed that the luggage could restrict the full rearward travel of the control column, he repacked his luggage to ensure there was no restriction. Apparently the luggage shifted during the taxiing or takeoff roll.

The hazards brought to light by this incident led to orders being issued to CF5 squadrons directing them not to carry personal baggage in either cockpit of the CF5D. An equipment/luggage carrier test program has since been completed and carriers will be issued to the squadrons in the near future.

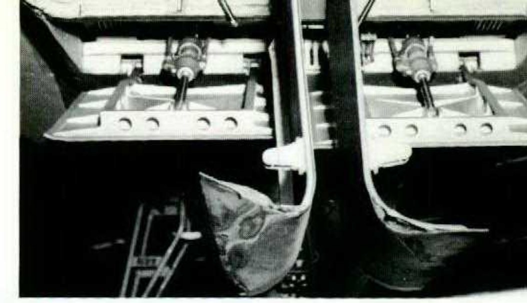
DAKOTA, "MURPHIED" FUEL SELECTOR The pilot was surprised to find both main fuel tanks almost full at the end of a flight, since these tanks had been selected "on" for most of the trip. His first reaction was to suspect the fuel gauges, however a dipstick check confirmed that the tanks were indeed full. Turning to the fuel selector, it was soon found that the selector had been incorrectly assembled by the contractor. The driver plate was 180° out of place on a rotating cam shaft (see photos). A replacement selector was found to be similarly "murphied". This was a case of old "murphies" coming back to haunt Dakota operators. Similar misalignments of this unit occurred back in the fifties.

While the problem is being corrected, messages have been sent to all operators advising them of the situation.

"Murphied" selector

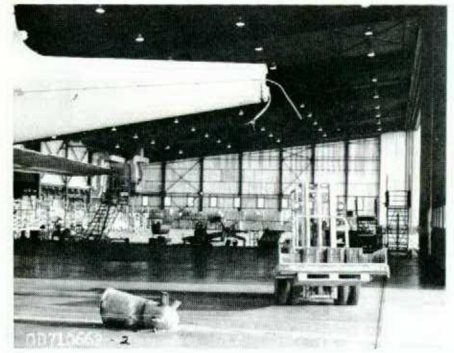


Correct installation: The punch mark on the cam shaft matches the position of the v-notch on the driver plate.



CF5, PREMATURE GEAR SELECTION During a touch and go, the pilot raised the gear prior to attaining safe flying speed. The aircraft settled to the runway, scraping both landing gear doors and the left elevator. The pilot was fortunate to eventually get airborne, and land without further incident.

This brush with disaster illustrates the well-established fact that strict adherence to published handling techniques is required at all times.



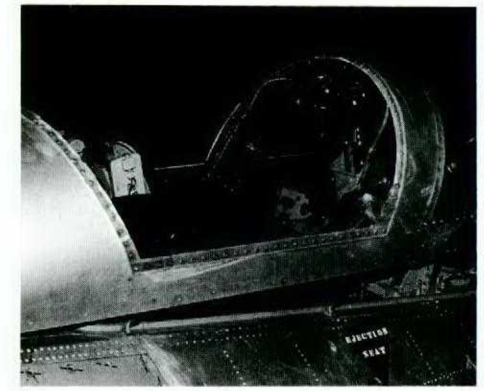
ARGUS, ATTACKED BY FORK LIFT After a last minute change in primary aircraft, a new back-up had to be quickly readied for flight – prior to the evening shift coming on duty, if possible. After the loading was completed, the fork lift driver's assistant left to bring the aircraft's log entries up to date, leaving the driver to return the fork lift to a previously interrupted loading operation. As he moved away, the driver failed to notice that the fork lift had not been lowered - until he knocked the MAD head off as he backed around the tail of the aircraft.

Local procedures for handling fork lifts have since been revised to require the presence of a safety man during all manoeuvres of the fork lift around aircraft and a sign has now been installed on the vehicle cautioning operators to lower the lift before driving about.

VOODOO, LOOSE PANEL During a snap-up attack at 22000 feet, 350K, the navigator's canopy suddenly shattered. The pilot immediately reduced airspeed to 230K and began a descent. A short time later the aircraft returned to base and landed.

On the ground, investigators found that the utility hydraulic panel was missing. One part of it had struck the canopy and other pieces were ingested by the right engine, damaging a number of compressor blades. Evidence showed that some of the "air-loc" fasteners on the panel had been left unlocked. This was missed by both aircrew and groundcrew on the various pre-flight checks.

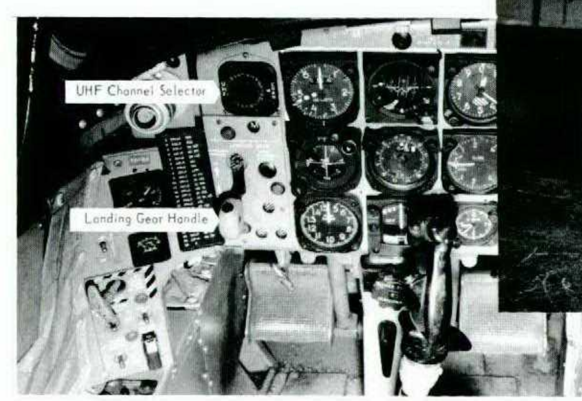
There has been an increase in recent months in reports of loose panels, and in most cases it's the old familiar story of interrupted procedures and incomplete pre-flight externals. Among the recent occurrences, this one probably brought the message home with the loudest bang.



TUTOR, UNANNOUNCED "G" Coming out of a vertical eight after practising their aerobatic sequences, the two staff pilots decided to call it a day and head back to base. While the pilot in the right seat was getting the bird heading in the right direction, the captain decided to call for landing instructions. However, when he reached for the UHF channel selector, he was surprised to feel the sudden pull of approximately 4 "g" – enough to pull his hand from the channel selector down onto the gear handle. The landing gear system functioned more or less as advertised – at 310 knots!

The captain immediately took control and reduced airspeed to below 175K. The right main gear indicated "unsafe" and had to be lowered by the emergency system, after which the captain landed the aircraft from a straight-in approach. The post-flight investigation revealed that the fairing door on the right main gear had been torn away.

The moral of this episode is that if you say you are going back to base, you might as well. The record is clear as it applies to impulsive, unplanned manoeuvres: They frequently lead to embarrassment – or worse.



VU 33: 1000+ Accident-Free Days

Maj G.D. Westwood, the CO of VU 33, and the UFSO, Capt R.H. Cowper, mark the occasion of the unit's completion of 1000 accident-free days. The squadron, which is based at Victoria International Airport, flew the MK I and MK III Tracker, as well as the T33 and the COD (a passenger version of the Tracker) during this period. As of 1 Dec 71 the total had increased to 1098 days.

Comments to the editor

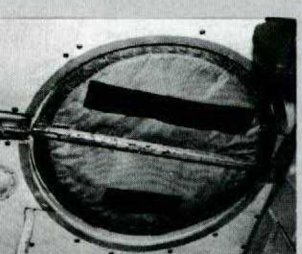
Hercules Hatch Murphied

Old foe Murphy has re-appeared. Using the cover of darkness, and the haste associated with operational requirements, Murphy recently succeeded in installing the forward escape hatch of a Hercules upside down.

This escapade occurred in the vicinity of CFB Trenton during Exercise Running Jump II and was not noticed until the aircraft failed to pressurize after takeoff. As a result, the crew were required to reduce airspeed to 120K and properly install the hatch.

As the photos show, these "masters of the perverse reverse" know no bounds when it comes to devising new and ingenious ways. I hope that Flight Comment can alert personnel to Murphy's presence because we are unable to foresee his actions.

MCpl J.H. MacPherson
Standards and Research
CFB Edmonton



Escape hatch correctly installed

Murphied hatch

Hair Nets?

I would like to bring to your attention a potential hazard apparent in your QETE article (Jul-Aug 71). I refer to the photograph of the gentlemen in the Hull Standards Lab wearing graciously long sideburns and associated coiffure. The way a person wears his hair is his business, however, when employed in an environment of this nature an attempt should be made to cover long hair. With the advent of longer hair styles I have noticed this situation becoming prevalent in civilian laboratories, clean rooms and associated high standard test facilities. We recently had an overhauled instrument fail the pre-installation test and it was later found to have dirt in the delicate jewelled movement. The FOD had been inadvertently sealed into the device during contractor overhaul.

I therefore suggest that stricter control be cultivated into this region with reference to EO-1-11A.

Cpl Larry M. Perpar
Aircraft Maintenance Research
CFB Moose Jaw

P.S. If someone is required to evaluate and scrutinize a cross section of these facilities, I can be made available.

The photographs in the article were taken in three fixed laboratories and in the mobile unit. These have different environmental conditions established to meet the particular measurement discipline and accuracy level requirements.

The Quality Engineering Test Establishment automatic counter is used periodically to count and size airborne particles in these facilities. It has confirmed during actual operational conditions that the fixed facilities in Hull fall well within the appropriate dust level (Instrument Society of America, recommended environmental requirements for Standards Laboratories). This level of cleanliness also meets special air cleanliness criteria for critical measurement (MSFC-STD-246A). The Mechanical Standards facility in Quebec City has just undergone a major upgrading program to achieve the Class 10,000 level in the primary standards area. On occasions when higher grade environmental control is necessary, determinations are made in a Class 100 clean workbench similar to those illustrated in an article in the Mar-Apr issue of Flight Comment. The particular projects illustrated in the Jul-Aug article did not require this special treatment.

Observations like yours have given rise to the most recent amendment to Engineering Order 05-1-2B which now limits the length of sideburns to a line drawn from the corner of the eye to the centre of the ear, and mustaches must be neat and trimmed and not bushy or extended past the edge of one's mouth. This document also covers acceptable hair styles.

If you should happen to be in the Ottawa/Hull or Quebec City areas, QETE would be pleased to show you the facilities in operation.

BIRD WATCHERS' CORNER

PROCEDURUM IGNORUS

The Procedurum Ignorus is best observed (and heard) in the nesting area where he is a renowned menace to birds at rest. This is the result of a propensity to learn maintenance procedures only once, after which he conducts all subsequent maintenance work from what he fancies is an indelible memory. Consequently, vital steps are inadvertently omitted and wrong procedures become the norm. The sound of tearing metal is the signal that old Ignorus is on another foray and that yet one more bird, supposedly being repaired, has been rendered unfit for flight. And those stomping feet you hear are the sounds of frustrated supervisors and safety birds trying to unravel the cause of such curious behaviour. Many birdwatchers believe that it is complacency, stemming from long experience on the job. Others attribute it to an aversion to books, particularly EOs. When you come upon the wreckage of one of the victims, lying sprawled on the ground, you'll be able to identify any of the Ignorus species in the vicinity by listening for the characteristic birdsong:

EOs-EOs I-NEVER-USE-THOSE

What does "NO POWER TO BE APPLIED" mean to you?

No Electrical Power?
No Hydraulic Power?
No Power?

Not knowing can be embarrassing — and expensive! If you don't know or don't understand — ASK!