OCCURRENCE REPORT: 67275

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Refs:
A. Board of Inquiry CC130312 15 Oct 80
B. 11500LT-130312 (DAOTNW 3-2) 10 Apr 81
C. 1010-130312 (DAEM 3-2) 8 May 81
D. 6681-8-2 (DPM 4) 8 Apr 81
E. DCIEM 3614F-02 (MLSD) 16 Jan 81
F. QETE QA7362L 11 Nov 80
G. NDHQ DAOTNW 5045 072103Z Apr 81
H. DAEM 1010-130312 8 May 81

1. Injury Level: Black - Fatal
2. Aircraft/Operated By: CC130312
3. Aircraft Ownership: 429 SQN / 2587 / 8 WG /
4. A. Location: - 8 MILES WEST OF CHAPAIS QUE -
Latitude: N49-48
Longitude: W075-7
4. B. Date/Time: 151800Z OCT 1980
4. C. Phase of Flight: IN-FLIGHT - LOW LEVEL (BELOW 1000 FT), HOVERING, DIP, WET HOIST
5. Damage Level: Destroyed / missing
6. Personnel Injured: , AIRCREW, Black - Fatal
, AIRCREW, Black - Fatal
, AIRCREW, Black - Fatal
, AIRCREW, Black - Fatal
, AIRCREW, Black - Fatal
, AIRCREW, Black - Fatal
, AIRCREW, Black - Fatal
, AIRCREW, Black - Fatal
, AIRCREW, Yellow - Serious
, AIRCREW, Yellow - Serious
7. Mission Type: SEARCH AND RESCUE AND/OR MED EVAC.

8. Description: The crew of Rescue 312 departed Val D 'Or, Quebec for their assigned search area between Matagami and Chibougamou. They descended to low-level and conducted a visual search from Chibougamou west to Chapais and then west to a logging camp identified as Camp 8. Enroute to Camp 8, at approximately 750 feet above ground level the left spotter reported a possible contact in a river. The aircraft commander, in the right seat and in control of the aircraft, descended to identify the sighting. After orbiting the river at approximately 400 feet above ground and ascertaining that the reported contact was not the object of the search, the aircraft commander initiated a climbing left turn to regain search track and altitude. At 1355 hours local time a Trans Quebec helicopter reported sighting a C-130 which had crashed near a small lake. A Canadian Forces rescue helicopter arrived on site at 1450 hours and airlifted two survivors to Chibougamou. There were 8 fatalities.

13. Flight/Ground Conditions: CONTACT - VISUAL FLIGHT VFR/VMC (GROUND REFERENCES)
14. Light/Weather Conditions: DULL DAY, SLEET OR FREEZING RAIN
15. Alighting Conditions: UNPREPARED, ROUGH UNPREPARED SURFACE (TREES/DITCHES ETC)
16. Aircrew Information: ; Time on Duty Last 48 Hrs: hrs, Day of Occurrence: hrs; Flying Hours Last 48 hrs: hrs; Past 30 Days: hrs; Total on Type: hrs; Grand total: hrs.
 ; Time on Duty Last 48 Hrs: 15 hrs, Day of Occurrence: 6 hrs; Flying Hours Last 48 hrs: hrs; Past 30 Days: hrs; Total on Type:

hrs; Grand total: hrs.
; Time on Duty Last 48 Hrs: hrs, Day of Occurrence: hrs; Flying Hours Last 48 hrs: hrs; Past 30 Days: hrs; Total on Type: hrs; Grand total: hrs.
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; Time on Duty Last 48 Hrs: hrs, Day of Occurrence: hrs; Flying Hours Last 48 hrs: hrs; Past 30 Days: hrs; Total on Type: hrs; Grand total: hrs.
18. Aircraft Maint Data: TSN Aircraft: CC130/312, 0 hrs, TSI: 299 hrs, TSO: hrs, CF349: , CF543: , Civilian Journey Log: , Inspection: #7 OR 8 PERIODIC OR "B"
20. Component Information: ENGINE WUC: SER NUM: 105450 NSN: TSN: TSO: TSI: 299 PERIODIC TSII: , Part List:
22. A. Investigation: Prior to striking a small hill the aircraft's right wing tip cut a narrow swath through a cluster of trees 60 feet high. The tree cut indicated a right bank of approximately 40. At impact the aircraft was in a nose high attitude with 20 of right bank established. The ground scars and wreckage distribution indicated slow forward speed with the bulk of destruction occurring as a result of post impact fire.

The flight data recorder on 312 was unserviceable on the day of the occurrence and reconstruction of the flight was made possible only through the testimony of the two surviving crewmembers. From this testimony and subsequent discussions with Lockheed test pilots, the following scenario was developed.

The aircraft commander began his left climbing turn at approximately 115 knots. As he turned through 90 he increased the aircraft's bank angle to 45. During this turn the aircraft experienced what the first officer described as a stall buffet. It is not known whether this stall buffet occurred as a result of the aircraft commander attempting to recover a nose drop during the turn or as a result of using excessive bank angle and "G" loading for the speed available. In either event, from this point to final impact, the crew alternately experienced stall buffet and wing drop.

Informal discussions with Lockheed test pilots suggest that, given the aircraft's weight, speed, and configuration, a correct stall recovery technique by the pilot should have resulted in an effective stall recovery. The first officer recalled attempts to recover from severe wing drop in the stalled condition but could not verify that the elevators were unloaded in an attempt to unstall the wings. It is presumed that as the wings achieved level flight the stall speed was reduced, the aircraft was capable of flight, and the aircraft commander attempted to climb. The attempted climb restalled the wings and the cycle was repeated.

The possibility of elevator trim failure was investigated. Reference F reported that the elevator trim actuator and the elevator trim screw jacks were serviceable prior to impact. The testimony of the survivors confirmed that there were no violent or unusual forces prior to impact. The flight engineer was attempting to regain his seat during the left turn and subsequent stall and would most definitely have been aware of any unusual aerodynamic forces. Therefore, elevator trim failure is not considered a factor in this accident.

The first officer and flight engineer escaped the wreckage through the left hand direct vision (DV) window.

DFS COMMENT

This accident might have been prevented had the pilot immediately recognized the initial stall symptoms and followed proper stall recovery techniques, a view that has been endorsed at all levels. However, the fact remains that had the pilot conducted his route rejoin procedure with an adequate speed margin his recognition of and recovery from a stalled condition would not have been required. The assigned cause factors relate to these most obvious factors.

What is not as clear is to what degree the influx of pipeline pilots into the squadrons and the associated lowering of experience levels influenced this accident. Comd ATG considered it sufficiently so that he assigned a corresponding resources cause factor. The Acting Comd Air Command disagreed, indicating that squadrons are manned in accordance with established Air Command policy and that safe implementation of that policy is the responsibility of operational commanders. The difficulty with cause factors of course is that they pose a "black or white" choice: you either assign them or you don't. However, the same does not hold true for follow-up action, where many shades and nuances are possible. If desired follow-up action is not engendered by the assignment or acceptance of a cause factor it must be triggered by some other means, generally by creating an awareness that a problem, although perhaps not causal, does exist. In almost every Board of Inquiry we find such related findings and recommendations, a practice that lends strength to our system and optimizes the gains derived from the Board Members' efforts. Reviewing comments may follow similar patterns. Cause factor or not, the important thing is that appropriate action is taken.

There is considerable evidence that the influx of pipeliners is posing substantial managerial problems and major concerns to field commanders. The question is not whether pipeliners are acceptable in principle but how they are going to be trained, supervised, monitored, and guided. The rate at which the CF is trying to regain the PLT PML is such that many Squadron Commanders fear they will or already do have insufficient billets for seasoned pilots to administer the requisite training and supervision. Certainly the plea of CO 436 Sqn in paras 7 and 8 of his remarks is a very eloquent one that cannot be ignored. Similar views have been expressed by many other CO's. In assessing the viability of policies the views of the CO's we so carefully select to carry them out must be given some credibility. As well, their apparent ability or inability to implement such policies must become part of the equation. Thus, when strong concern is raised over experience levels one is led to the question of whether that concern is specific to the accident or of a more general nature.

Was the aircraft commander careless in the handling of his aircraft? Indications are he was, quite aside from wrongly determined minimum speeds. He simply handled the aircraft too aggressively as evidenced several times, and placed it outside the safe envelope. It is noteworthy that this pilot was known as a capable but rather aggressive type who strongly desired employment in fighter ops. As well, he had just returned from participation in a Maple Flag exercise, a scenario in which decisive manoeuvring is the key. To what extent his experience there and his penchant for fighter ops influenced his handling of the SAR mission, flown at much lower speeds, can only be surmised, but it is doubtful that sheer carelessness was the only factor. Rather, it would seem that the careless handling was a manifestation of lack of judgement and emotional control. Multiplicity of CC130 roles enters the picture also. Underlying these points is the question of adequacy of experience level: by Air Command definition the pilot was "experienced", but at an arbitrary level that may denote experience in motor skills rather than in the judgement that can only come with time and seasoning. Are the first tour aircraft commanders in our transport squadrons capable of requisite judgement and ready for their -responsibilities? Other air forces are faced with similar experience problems but allow their pilots to specialize in TAC, strategic airlift, etc, avoiding the highly demanding multiple role concept. Has our transport pilot training package been sufficiently adjusted to cater to the reduction in pre-wing training hours, the influx of pipeliners, the lack of a journeyman's environment (ANS Dakota's), the lack of an OTU? Is there an established continuation training syllabus for transport pilots, an established set of priorities, eg. training vs ops, for squadron commanders to apply when faced with conflicting taskings? Does the manning model in fact provide sufficient billets for seasoned pilots to provide the requisite training and standardization programmes? The lowering of experience levels perhaps has been more traumatic for ATG than for other Groups, as ATG used to be comparatively rich in experience. To safely cope with these new challenges will require the concerted efforts of all concerned, and the answers to such questions as are posed above should be the concern of all levels of Command. The grave concerns expressed by the CO 436 Sqn, the BComd, and Comd ATG demand sober reflection and constructive dialogue from top to bottom.

Another issue that requires some mention is the assignment of a human factors cause factor by the Board, rejected by GHQ and ACHQ. Whether causal or not, it is evident that the aircraft commander had recently been subjected to a number of stresses that are not exactly typical of the average pilot and certainly far from the ideal. Although reviewing levels did not accept these stresses as causal, the time must come when the subject of human factors receives wider acceptance. In our investigations we readily determine THAT personnel erred, in judgement or through inattention, but not WHY. Yet unless we determine the why we will not be able to take appropriate preventive measures. Maybe it's because such measures will oft be difficult, perhaps even elusive that we tend to shy away from the human factors aspect. Yet it is likely that through better design the incidence of material failures will decrease in years to come, leading to a higher ratio for personnel cause factors. Obviously we will have to increase our efforts in that direction. In this particular accident the aircraft commander's personal life patterns may well have contributed to his aggressive flying, and his forceful personality to his crew's omission to point out repeated excursions from speed and handling parameters. As well, it has been established that the less experienced the pilot, the less his ability to cope with stress and fatigue, even with the normal stresses present on each flight. In turn, stress and fatigue adversely affect judgment. Human factors and experience levels thus present themselves throughout and must not be ignored.

As a final point, it is clear that the unserviceability of the Flight Data Recorder (FDR) could have posed a serious problem for the investigators. In fact, had there been no survivors the cause of this accident would have remained unknown, I not only denying us the benefit of corrective measures but also potentially leading to much unhealthy guess work, speculation, and rumor. Serious serviceability problems have been experienced with the Leigh Instrument Ltd Model 6A FDR since its introduction. Despite the specification of a 1,000 hrs Mean Time Between Failures (MTBF) criterion, agreed to by the company, the 6A model has demonstrated a MTBF of just over 100 hrs. No improvements were achieved until the recent introduction of a modified 6F/G model. The 6F/G is touted by many as a major improvement as its MTBF is increased three to five fold. However, three to five times very little still does not amount to very much, and a 400-500 hrs MBTF still falls well short of the 1,000 hrs MTBF specified and promised for the original 6A model. Although as of late last year failure statistics are no longer available, there is little expectation that the 6F/G will demonstrate significant reliability improvements in the future. Meanwhile, a number of 6A FDR systems are having to be cannibalized to maintain serviceable sets for the Boeing 707's and for transatlantic Hercules flights. Whether similar steps will be necessary for the 6F/G remains to be seen. As the FDR is a vital investigative tool, DFS will continue to pursue its initiative in working up a SOR for new, reliable, state of the art FDR equipment as a matter of urgency.

23. Cause Factors: PERSONNEL PILOT (32A) CARELESSNESS The aircraft commander did not exercise due care in ensuring that the aircraft remained within its operation envelope during low level SAR manoeuvring while at the controls of the aircraft.
PERSONNEL PILOT (32A) TECHNIQUE The aircraft commander failed to take effective stall recovery action.
PERSONNEL OTHER FLT. CREW INATTENTION The first officer did not adequately monitor airspeeds nor advise the pilot when the airspeed decreased below a safe margin.
24. Preventive Measures: (SEE DETAILED DESCRIPTION - 2) The testimony of the first officer suggests that the aircraft commander may not have recognized the initial stall buffet and may not have employed a proper stall recovery technique. It was recommended that the new C-130 flight simulator be designed to facilitate the practising of stall recognition and stall recovery. The

specifications for the new simulator include a requirement to indicate stall buffet and stall warning at +/- 2 knots of the actual speed. Actual stall speed
will also be accurate to +/- 2 knots. This performance should result in
the desired training capability.

(SEE DETAILED DESCRIPTION - 3) Testimony of the two surviving aircrew and one of the SAR training officers indicated that there may have been a lack of emphasis placed upon safe speeds to be used during low-level manoeuvring. It was noted that most SAR training is conducted at low aircraft weights and that the speed of 130 knots was generally used as a minimum speed rather than the prescribed computed speed based upon the 50% flap, 45 bank power off stall speed plus 20 knots. Minimum stall speeds are now being computed for all SAR training. In addition C-130 stall characteristics and recovery technique as well as minimum manoeuvring speeds and prohibited manoeuvres are now
receiving additional emphasis. The CAUTION at para 333 of CFACM 60-2605, Airlift Operation, Search and Rescue Manual has been changed to a WARNING with a view of emphasizing that the 50% flap 45 bank power off stall speed for weight plus 20 knots is a minimum search speed. A card has been produced on which to note Comd ATG the appropriate stall speeds for the weight of the aircraft during SAR operations and the minimum speeds are updated at regular intervals and are included in the pre-SAR checklist.

(SEE DETAILED DESCRIPTION - 4) The flight data recorder installed on 312 was unserviceable on the day of the accident. The RTC-6G flight data recorder being installed in those aircraft equipped with flight data recorders is expected to result in improved reliability and increased MTBF. NDHQ has also formed a committee to research future flight data recorder equipment requirements and recommend common operating procedures.

(SEE DETAILED DESCRIPTION - 5) The medical member pointed out that the location of this accident, and the travel arrangements required to arrive at the site, resulted in him not being present for the removal of the bodies. He also pointed out that the lack of proper medical direction to the local coroner resulted in unacceptable delays in the taking of toxicology specimens from the deceased. He recommended that in future accidents a flight surgeon be dispatched from the nearest unit to conduct the immediate post crash response requirements until the assigned medical member arrives on site. Air Command, Command Surgeon has actioned this recommendation and this procedure will be followed to the greatest extent possible in future accidents.

(SEE DETAILED DESCRIPTION - 6) The medical member noted that both survivors were wearing short sleeve T-shirts under their issued flying clothing. He recommended that all aircrew be reminded of the advantages of double layered clothing providing protection from aircraft fires. Air Command has now published ACO 9-55 Volume III Change 2/81 dated 15 May 81 which states that all Air Command aircrew should wear double layered clothing as directed by Group and unit commanders.

(SEE DETAILED DESCRIPTION - 7) The Board of Inquiry recommended that in light of the severity of the post crash fire future aircraft be equipped with crash- worthy fuel systems. The USAF have developed a modification which calls for the installation of Blue Reticulated Explosion Suppressant Foam in the fuel cells of their C-130 aircraft. Present plans call for installation to be completed by April 1984. The USAF modification is being closely monitored by NDHQ and consideration is being given to adopting the modification during the Progressive Structural Inspection (PSI) program or during the C-130E outer wing replacement program in 1984. A progress report is anticipated in the fall of 1981.

(SEE DETAILED DESCRIPTION - 8) The flight engineer was out of his seat just prior to impact and in the time available was unable to fasten his shoulder harness. He was rendered unconscious as a result of striking his head on the centre radio console. It was recommended that all multi-engine lap/shoulder securing devices be reviewed with the possibility of installing a quick-donning apparatus as standard equipment in
all CF aircraft. NDHQ is now staffing this recommendation and it is anticipated that a new lap belt, similar to the one used in the CC137 will be procured for the C-130.

(SEE DETAILED DESCRIPTION - 9) The Board of Inquiry recommended that the use of the C-130 for non-MAJAID SAR operations in southern Canada be reviewed. This recommendation received support at all levels. Ref B recognized that the C-130 was less than ideal for the primary SAR role in the Trenton region and pointed out that steps were being taken to remove it from that role. However, the employment of the C-130 in the primary SAR role has yet to be permanently resolved.

(SEE DETAILED DESCRIPTION - 1) The Board of Inquiry recommended that aircrew and various management levels develop an atmosphere wherein stress and the effects of stress can be discussed openly. Most international flight safety organizations recognize that by investigating the human factors involved in aircraft accidents a relatively stable accident rate may begin to decrease. In this particular Board of Inquiry the human factors cause factor was not supported by Group and Command reviewing authorities as it was considered that the role of life stress had been given disproportionate importance in the findings. Steps have been taken by DFS and DC IEM to both improve the post-occurrence human factors investigation and to develop a more precise vocabulary in GA-135 for describing the "why" of personnel cause factors. In addition the CO 436 Squadron and the Comd ATG agreed to continue to emphasize this aspect of accident prevention in their training and flight safety programs.

(SEE DETAILED DESCRIPTION - 10) The medical member was forced to borrow a Flight Surgeon's Accident Kit from NDHQ and recommended that all flying bases hold such a kit available for post accident use. The prototype kit is now under development by NDHQ.

(SEE DETAILED DESCRIPTION - 11) The CF ID discs were not found after this crash and it was presumed that they did not survive the extreme temperatures experienced in the post crash fire. In separate correspondence DFS requested that NDHQ/NDIB investigate the feasibility of developing a new ID disc which would have greater chances of survivability in a future accident of this nature.

25. Comments: DFS: Due to length, DFS Comments added to Investigation Narrative.