

OCCURRENCE REPORT: 68443

Flight Safety incident reports are produced under the authority of the Minister of National Defence (MND) pursuant to Section 4.2 of the Aeronautics Act (AA), AND in accordance with A-GA-135-001/AA-001, Flight Safety FOR the Canadian Forces. They are prepared solely FOR the purpose of accident prevention AND shall not be used FOR legal, administrative OR disciplinary action.

FSIS 68443 29 MAR 1985 AIR ACCIDENT

Status: amended supplemental sent

BFS 030 30/MAR/1985 06:00
68443 CAR 11/APR/2005 10:52

Unclassified

Refs:

- A. CF211 CF130330/331 30 MAR 85
- B. 1010-130330/331 (CADO) 25 SEP 85
- C. 1011-130330/331 (DTHEM 2) 24 SEP 85

1. Injury Level: Black - Fatal
2. Aircraft/Operated By: CC130330
CC130331
3. Aircraft Ownership: 435 SQN / 17 WING / 3435 /
435 SQN / 17 WING / 3435 /
4. A. Location: - ON BASE AT NAMAQ -
Latitude: N53-40
Longitude: W113-28
4. B. Date/Time: 290215Z MAR 1985
4. C. Phase of Flight: IN-FLIGHT - FORMATION
IN-FLIGHT - FORMATION
5. Damage Level: Destroyed / missing
6. Personnel Injured: , OTHER, Black - Fatal
, 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, Black - Fatal
7. Mission Type: AIR SHOWS/PRACTICES/DISPLAY
AIR SHOWS/PRACTICES/DISPLAY

8. Description: CC130 MID AIR COLLISION: TWO CC130'S HAD A MID-AIR COLLISION WHILE PERFORMING AN OVERHEAD RECOVERY AT 1500 AGL TO RUNWAY 29, AFTER PERFORMING A FORMATION FLY PAST. ALL TEN CREW MEMBERS SUFFERED FATAL INJURIES ON IMPACT WITH THE GROUND. BOTH MAIN WRECKAGES AND THE SURROUNDING AREAS SUSTAINED MAJOR FIRE DAMAGE WHICH DELAYED POSITIVE CREW IDENTIFICATION.

13. Flight/Ground Conditions: CONTACT - VISUAL FLIGHT VFR/VMC (GROUND REFERENCES)

14. Light/Weather Conditions: TWILIGHT (DAWN/DUSK), GOOD VFR

16. Aircrew Information: ; Time on Duty Last 48 Hrs: 5 hrs, Day of Occurrence: 3 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.

; 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: 12 hrs, Day of Occurrence: 9 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.

; 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: hrs, Day of Occurrence: hrs; Flying Hours Last 48 hrs: hrs; Past 30 Days: hrs; Total on Type: hrs;
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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.

17. Non Aircrew Pers Info: OTHER, Time on Duty Last 48 Hrs: hrs, Day of occur: hrs

18. Aircraft Maint Data: TSN Aircraft: CC130/330, 0 hrs, TSI: 387 hrs, TSO: hrs, CF349: , CF543: , Civilian Journey Log: ,
Inspection: #3 OR 4 PERIODIC OR "B"TSN Aircraft: CC130/331, 0 hrs, TSI: 195 hrs, TSO: hrs, CF349: , CF543: , Civilian

Journey Log: , Inspection: Supplementary

20. Component Information: ENGINE WUC: SER NUM: 109228 NSN: TSN: TSO: TSI: 387 PERIODIC TSII: , Part List:

ENGINE WUC: SER NUM: 109246 NSN: TSN: TSO: TSI: 387 PERIODIC TSII: , Part List:

ENGINE WUC: SER NUM: 109815 NSN: TSN: TSO: TSI: 387 PERIODIC TSII: , Part List:

ENGINE WUC: SER NUM: 109234 NSN: TSN: TSO: TSI: 387 PERIODIC TSII: , Part List:

ENGINE WUC: SER NUM: 109225 NSN: TSN: TSO: TSI: 615 PERIODIC TSII: , Part List:

ENGINE WUC: SER NUM: 109249 NSN: TSN: TSO: TSI: 615 PERIODIC TSII: , Part List:

ENGINE WUC: SER NUM: 109445 NSN: TSN: TSO: TSI: 615 PERIODIC TSII: , Part List:

ENGINE WUC: SER NUM: 109248 NSN: TSN: TSO: TSI: 615 PERIODIC TSII: , Part List:

22. A. Investigation: On 29 Mar 85, 435 Sqn along with other Edmonton based squadrons, was tasked to carry out a fly-past over the Officers' mess at CFB Edmonton in commemoration of the 61st Anniversary of the RCAF. The formation fly-past, in order, consisted of three CH136 Kiwas, three CH135 Twin Hueys, one CH147 Chinook, two CC138 Twin Otters and three CC130 Hercules. The Hercules formation positions and aircraft registration numbers were: Trucker Lead, 130330; Trucker Two, 103331, and Trucker Three, 130333.

The three CC130s, following the other formations, were to overfly the Officers' Mess at 300 ft AGL and then recover, utilizing a right hand turn to position themselves downwind for Runway 29. The fly-past was in "vic" formation with approximately 150 ft wing-tip spacing. The three aircraft then positioned themselves for a "Battle Break" VFR recovery on Rwy 29. They reformed in echelon right with a wing span separation of about 150 ft.

The briefed Battle Break procedure called for an initiation at 250 ft above ground level (AGL) at an indicated airspeed of 250 knots. At the break point, abeam the tower, Lead would establish a 10 pitch attitude, roll left to 60 of bank with 2 "G" applied throughout the manoeuvre while reducing power to flight idle. The aircraft would turn through 180 degrees and rollout on downwind at 1000 ft AGL. The second and third aircraft would follow flying the same profile utilizing a three-second break interval to provide procedural separation in the turn and appropriate spacing downwind.

At approximately 50 deg of turn and 1000 ft AGL, Number Two contacted the underside of Lead, resulting in an in-flight break-up and uncontrolled crash of both aircraft.

The investigation revealed that the Battle Break manoeuvre performed during the recovery was not a formally recognized or published procedure. It had been performed many times over the years by CC130 pilots and the safety of the manoeuvre was never questioned at Squadron or higher supervisory levels. During the break procedure, the preceding aircraft disappears from sight of the following aircraft from the initial pull-up until approximately 30-45 of turn, and there were no procedures developed or practiced outlining the actions to be taken should a follower aircraft not re-acquire the preceding aircraft by a given point in the manoeuvre. Without a published "how to", the aircrew performing the manoeuvre had to depend on informal training provided by other pilots who had previously performed the procedure. As a consequence, techniques differed among the designated air display pilots and a manoeuvre which depends on standardization to provide procedural separation had not in fact been standardized.

The profile of the Battle Break to be used was briefed prior to the flight; however, the importance of a standardized pull-up, bank angle and "G" application were not emphasized nor was the hazard associated with not flying the correct profile stressed. No mention was made regarding visual re-acquisition of the preceding aircraft or the actions to be taken if visual contact was not regained.

The Flight Data Recorder (FDR) from aircraft 330 (Lead) was recovered and NRC Ottawa was able to provide a flight path analysis using that FDR along with the one from aircraft 333 (No.3). The Number Two aircraft, 331, did not have an FDR installed because of an earlier airfoil ejection problem. USAF assistance was requested and provided to reproduce the flight paths of the three aircraft on their visulator weapons systems simulator at Little Rock AFB. The Board of Inquiry investigation determined that the Lead aircraft did not fly the briefed Battle Break profile, in that the turn was delayed and the required G-force was not applied. Number Two aircraft flew approximately the briefed profile and very likely flew into Lead without re-acquiring visual contact.

23. Cause Factors: PERSONNEL MANAGEMENT/GHQ INFORMATION/COMMUNICATION The absence of a policy with respect to air display manoeuvres allowed the planning and conduct of an unpublished procedure that was not recognized as being inherently dangerous.

PERSONNEL SUPERVISION/UNIT COMPLACENCY 435 Sqn supervisory personnel assigned pilots to perform an unpublished manoeuvre in the CC130 for which they were inadequately trained, and which was not recognized as potentially dangerous.

PERSONNEL PILOT (32A) TECHNIQUE The lead pilot deviated from the briefed Battle Break profile to the extent that the designated time, vertical and horizontal separation between Lead and Number Two was lost.

24. Preventive Measures: (SEE DETAILED DESCRIPTION - 1) THE INVESTIGATION REVEALED THAT THERE WAS NO FORMAL ATG AIR DISPLAY POLICY WITH RESPECT TO APPLICABILITY, METHODS AND RESOURCES. COMD ATG HAS INITIATED THE FOLLOWING PREVENTIVE MEASURES: A. CFACM 2600 ATG OPERATIONS GENERAL HAS BEEN REVISED TO PROHIBIT: 1) IMPROMPTU AIR DISPLAYS, LOW PASSES, BATTLE BREAKS, CLOSED PATTERNS AND UNBRIEFED DISPLAY MANOEUVRES; AND 2) FORMATION FLYING, EXCEPT AS OUTLINED IN APPROPRIATE ATG OPERATIONS MANUALS, UNLESS SPECIFICALLY AUTHORIZED BY COMD/DCOMD ATG. B. ATG SQUADRON COMMANDERS WILL ENSURE THAT: 1) SQUADRON FLYING ORDERS INCLUDE AIR DISPLAY ORDERS; 2) ONLY SPECIFIC AIR DISPLAY MANOEUVRES RELATED TO THE OPERATIONAL ROLE OF THE AIRCRAFT AS AUTHORIZED BY COMD ATG ARE FLOWN; 3) APPOINTED AIR DISPLAY PILOTS ARE THOROUGHLY BRIEFED AND TRAINED IN THOSE APPROVED MANOEUVRES; AND 4) ONLY THE NORMAL AIRCRAFT CREW COMPLEMENT ARE CARRIED DURING PRACTICES OR DISPLAYS UNLESS SPECIFICALLY AUTHORIZED BY THE SQUADRON COMMANDER. C. DIRECTION HAS BEEN GIVEN TO ATG BCOMDS AND SQUADRON COMMANDERS THAT: 1) FLIGHT AUTHORIZATION WILL BE ISSUED AT A LEVEL COMMENSURATE WITH RESPONSIBILITY AND ACCOUNTABILITY AND WILL BE LIMITED SOLELY TO THE ROLES AND MISSIONS FOR WHICH ATG AIRCRAFT ARE ASSIGNED; AND 2) SPECIFICALLY AUTHORIZED AIR DISPLAY MANOEUVRES WILL BE PROMULGATED IN APPROPRIATE MANUALS AND SQUADRON ORDERS.

(SEE DETAILED DESCRIPTION - 2) THE ADDITION OF AN ADMINISTRATIVE COORDINATOR POSITION ON FUTURE FLIGHT SAFETY BOARDS OF INQUIRY WAS RECOMMENDED. AIRCOM WILL INCLUDE IN FUTURE CONVENING ORDERS A STATEMENT TO THE EFFECT THAT ANY AND ALL LOCAL SUPPORT REQUESTED BY THE BOARD PRESIDENT WILL BE PROVIDED BY THE BASE OF OCCURRENCE. ADDITIONAL SUPPORT PERSONNEL OF THIS TYPE WILL BE CONSIDERED EX-OFFICIO MEMBERS OF THE BOARD.

(SEE DETAILED DESCRIPTION - 3) The Board recommended that FDR/CPIs be installed on the newest CC130s (aircraft 334 and 335) on a priority basis and that an interim CPI or ELT be fitted. Two portable URT 505s (ELTs) were installed in both aircraft on a semi-permanent basis in early Jul 85. FDR/CPI devices will be installed in the Feb to Jun 86 timeframe as part of the Canadian modification package.

(SEE DETAILED DESCRIPTION - 4) The Board recommended that the Air Command Surgeon develop an identification envelope to be attached to the CF2034 Medical Record of each aircrew member and contain fingerprints, current dental x-rays and footprints. This is being examined by the Command Surgeon.

25. Comments: DFS: In reviewing of the Board's assigned cause factors, the Commander of Air Command disagreed with the assignment of Personnel-Pilot-Inattention attributed to the pilot of the No.2 aircraft. The Battle Break manoeuvre was known to result in loss of visual contact with the aircraft ahead and since the lead aircraft did not fly the expected pattern, the cause factor pertaining to pilot-inattention was considered not valid; DFS concurs.

As well, the Commander of Air Command felt that the assignment of the Personnel-Supervision-435 Sqn-inattention did not satisfactorily describe the prevailing attitude that all was well with the Battle Break manoeuvre. Because it had been an accepted procedure for several years, its inherent danger was not recognized. The attitude prevalent among 435 Sqn supervisors was more appropriately reflected by a behavioral sub-category of "complacency". Again, DFS concurs with the rationale for this assignment. This accident was preventable in that complacency allowed the circumstances leading to it to exist for some time. A widely used, unpublished manoeuvre was performed by aircrew not properly trained to perform it and tragedy resulted. It is indeed unfortunate that no one in the organization recognized the inherent danger in a procedure that did not provide for continuous visual contact between pilots in a formation.

The preventive measures that have been instituted by ATG and endorsed by the Commander Air Command should ensure that this type of accident will not recur.