

Copy #2

B-908 Crash
Operations Report

CONFIDENTIAL

The CAA has concluded, in its "Salient Points of Investigation Report on CAT's B-908 (C-46) Crash", dated 15 July 1964, that "based on the substantial wear and tear of left control cable and the overspeeding of left propeller ... normal time maintenance for the aircraft was not attentively carried out and ... there was also indication of improper handling on the part of the pilot". The purpose of this report is to review the finding by CAA of "improper handling on the part of the pilot", first referring to the conclusion of CAT's "Maintenance Report" and then examining the general considerations of piloting an aircraft such as the C-46 type, explaining the training and checks of the pilots of B-908, and finally examining the possibility of "improper handling" by the pilots.

CAT's "Maintenance Report" points out that CAA's finding that there was "substantial wear and tear of left control cable and ... overspeeding of left propeller" is not only contrary to available significant technical evidence of positive reliability and to the statements of eyewitnesses but also contrary to the reports of American experts and laboratory analyses. The "Maintenance Report" also notes there is in fact no evidence of any kind uncovered to date that there was any mechanical trouble of any nature at the time of the crash. If the "improper handling" found by CAA refers to handling of the mechanical trouble reported as a finding by CAA, as it seems to by its context, then the conclusions of CAT's "Maintenance Report" alone show a crucial fault in the reasoning used by CAA. Nevertheless, the possibility of any manner of improper handling by the pilots, whether of the mechanical troubles suggested by CAA or of other mechanical troubles or of handling of any other nature, should be analyzed.

C-46 aircraft such as B-908 incorporate dual provision of the equipment and controls vital to the safety of the aircraft. The aircraft has dual sets of controls, which can be operated by either of the two pilots. Each set of controls further has dual means of positioning the control surfaces of the aircraft. It has two engines, although the aircraft can fly safely on one, and all cylinders of each engine, are fired by two, separate, electrical sources. It has radio and navigation equipment that provides several alternative means of communication and navigation under all conceivable flying conditions. There are four direct means (automatic or manual control, feathering, and a brake) to control the blade angle of the propeller, and hence propeller and engine speed. The hydraulic system has two engine-driven pumps, either of which is adequate to supply the system, and also has an auxiliary, hand, pump to supply pressure where vital for operation of aircraft components. Aircraft are unique in the extent of these and the other provisions made for safety in their design and therefore cannot easily be compared with the equipment used in other forms of transportation.

Aircraft pilots belong to a highly specialized profession. Professional pilots should be emotionally stable, have excellent health and have been educated to a standard which is considerably above average. Before a professional pilot can begin training and periodically during his career he must take rigid physical and mental examinations to insure that these qualifications are met. In the early stages of training a professional pilot devotes most of his time to intensive courses of study of aircraft and the technique of flying. Such subjects as theory of flight, power plants, meteorology, and navigation, in addition to the procedures for flying the first aircraft, are taught. The first aircraft the professional pilot flies is a small propeller driven one; gradually, he will progress in his career to piloting larger, multi-engined aircraft.

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Continuous study of aircraft and flying and the flight procedures for particular aircraft is necessary for professional pilots to remain qualified to fly. Their qualifications are periodically checked by written examination and by observation of their actual piloting of the aircraft under various simulated flight conditions. Their knowledge and performance of procedures to be used in such cases as engine failure at takeoff and inflight, runaway or overspeed propeller, fuel system failure, and emergency landing and evacuation is required to be correct. As the aircraft takes off on these "check" flights the pilot being examined must, for example, know the procedure for safe handling of engine failure so well that he can execute it without a moment's hesitation when the "check" pilot suddenly pulls back the throttle of an engine just at a critical point of takeoff.

Both Bengee Lin, the pilot-in-command of B-908, and M. H. Kung, the second-in-command of B-908, were selected, trained and qualified as professional pilots in the manner which has been described. Bengee Lin had flown 11,881 hours, of which 4,914 hours was flown in the C-46 type aircraft. M. H. Kung had flown 13,074 hours, of which at least 9,270 hours was flown in the C-46 type aircraft. Bengee Lin had 17 years of experience as a professional pilot. M. H. Kung had 19 years of experience as a professional pilot. The results of their most recent periodic physical examinations, their duty records, and the observations of their co-workers up to their departure on their last flight indicate both were in excellent physical condition and were neither tired nor emotionally disturbed.

Bengee Lin and M. H. Kung were so experienced that it was second nature for them to keep an airplane in the air or land safely in the event of malfunctions such as an overspeeding propeller or broken control cable. If such a malfunction occurred each and both would be expected to immediately react and counter the malfunction almost subconsciously.

The CAA report, however, finds that "there was ... indication of improper handling on the part of the pilot. To examine the possibility of "improper handling on the part of the pilot" causing the crash, it is necessary to trace the course of B-908 just prior to the crash. The aircraft had taken off south from Sui Nan Airfield and turned to the left 180° to proceed north to Taipei. Several competent witnesses observed the takeoff and initial climb and stated that the aircraft behaved normally. The Control Tower operator watched the aircraft until it passed to the northeast of the airfield at which time one of the pilots called the tower and advised they were climbing on course and would see them tomorrow; the operator observed that everything was normal. A number of ground witnesses saw the aircraft as it approached Feng Yuan, which is north of Taichung. The consensus of reports by these witnesses is that the aircraft was travelling to the north when it suddenly made a sharp turn to the west and started to descend at a rapid rate from an altitude of 1200/1500 feet, based on the time from takeoff and statements of witnesses. Within 20 to 30 seconds it hit the ground at about a 30° angle with the left wing low,

Assuming this crash is believed by CAA to be the result of "improper handling" of an overspeeding propeller it has not been explained in what respect both pilots failed to properly execute the procedures prescribed. An overspeeding propeller does not of itself have a substantial effect upon the performance of the aircraft. The aircraft would continue, on course, while either pilot executes the prescribed procedures. Since the phenomenon of an overspeeding propeller is much more crucial in the takeoff regime and is manageable under such circumstances, had it occurred at the comfortable altitude and flight regime of B-908 it would be little cause for concern.

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Ample evidence is available to demonstrate the measure of control of propeller speed available to the pilots. In one case observed by several competent witnesses the left propeller of a C-46 began overspeeding at an altitude of only 200 feet shortly after takeoff and while the highest engine power was being utilized. The pilot simply retarded the throttle on this engine and the RPM immediately came down to within the allowable range. There was no change of course or altitude during this condition.

The great danger of an overspeeding propeller is not that it will upset the aircraft performance but rather that the propeller or its engine will be unable to withstand the higher than designed for stresses generated by the higher rotational or reciprocating speeds involved and so the propeller may fail, throwing parts into the vitals of the aircraft or, having become unbalanced by loss of a part, wring itself or its engine from the aircraft -- or the engine may come apart or seize possibly resulting in the propeller being thrown off or a fire started. Since it has been established by various investigators, including the CAA, that none of these things, which could result from improper handling by the pilots, happened to B-908, there then is no evidence to support a conclusion that "improper handling", had there been the propeller overspeed reported as a finding by CAA, caused the crash.

Assuming the crash is believed by CAA to be the result of "improper handling" of a broken or worn elevator trim tab control cable it has not been explained in what respect both pilots failed to execute the procedures prescribed. Even the sudden severance of one of the two cables controlling this control surface of the aircraft has only negligible effect on its position. The control surface could still be operated in one direction. In actual flight tests with both elevator trim tabs in the positions required for the extreme nose-up or nose-down attitude of the aircraft, simulating the most adverse consequences of elevator trim tab control cable breakage or wear, a pilot was able to control the aircraft easily without any deviation in course or change of altitude with only one hand on the yoke (which provides an auxiliary means of direct control of the position of the elevators). This evidence sharply contradicts any conclusion that "improper handling", had there been the wear or breakage of an elevator trim tab control cable prior to the crash as reported as a finding by CAA, caused the crash.

The stall characteristics of a C-46 aircraft are excellent under all conditions. The steep angle of descent along a relatively straight line provides ample evidence that the aircraft speed was far above the stalling speed and that there was no stall prior to the crash, and therefore also no improper handling in this respect by the pilots.

Since the seat of Bengee Lin, the pilot-in-command, was shattered into several pieces by the crash, it is not possible to state with any degree of accuracy whether he was strapped into his seat by the safety belt at the time of impact. It was his known habit to fasten the seat belt, however, so there is no basis for any conclusion that it was not fastened and consequently no basis for any conclusion that Bengee Lin was over confident or negligent. A signed statement by the CAT authorities who have been improperly quoted in this matter is attached.

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The CAA finding of "improper handling on the part of the pilot" then is not supported by any evidence of mechanical trouble which would require special handling, as the CAT "Maintenance Report" concluded. The CAA finding is also contrary to the factual details of the path of the aircraft, to the plausible reactions of both pilots, to the high qualifications and long experience of both pilots and to even CAA's findings of mechanical trouble. It is difficult to conceive what the pilots might have done, or failed to do, that would have resulted in the strange behavior and flight pattern of the aircraft after the normal departure from Taichung. The weight of evidence available to this time indicates strongly that the aircraft was intact, was functioning normally and was controllable up to the moment of impact. The settings of cockpit controls examined soon after the crash and during subsequent investigations showed no inflight mechanical emergency against which countermeasures had been taken and no preparation for an emergency landing, although the pilots were fully qualified and capable of making an emergency landing had it been required.

The flight pattern and absence of the typical immediate announcement by radio of mechanical difficulty strongly suggests the incapacitation or restraint of both pilots rather than improper handling on the part of the pilot or malfunctioning of the aircraft. In this light the CAA conclusion that the pilot, who epitomized the highest standard of his profession and was a credit to his nation, was guilty of improper handling is a bitter irony as well as a gross injustice.

Attachment to Operations Report

STATEMENT

Re: Control Yuan Investigation Report

"Mr. D. Teeters and Mr. D. Gluskin told us that Lin's remains were placed three meters from the pilot seat and his safety belt was still left on the seat. This indicates that Lin didn't fasten his belt before takeoff, otherwise the belt, if not broken, should have been found wrapped around Lin's body. Basing upon this, we can judge that Lin was over confident and negligent."

The above paragraph would have it appear that the Control Yuan members were responsible only for the last sentence and that we (Teeters and Gluskin) made the observation that the seat belt was not fastened. This is an incorrect assumption and we believe it needs clarification and correction.

The question asked was whether Capt. Lin's body was found in his seat. Our reply was substantially as follows:

The body was found approximately 10 feet from the center of the general area of the cockpit wreckage. Since the seat was completely destroyed and in several pieces it was impossible to state with any degree of accuracy whether at the time of impact Capt. Lin had been strapped in his seat.

It is of vital interest to all concerned that statements not be quoted out of context nor so altered as to destroy their validity.

While on the subject of safety belts, it is the custom of pilots to keep their safety belts fastened while flying. It was a known habit of Capt. Lin to do this, and there is no basis for any supposition that his safety belt was not fastened at the time of the crash.

s/ David B. Gluskin

s/ Donald E. Teeters