



Loss Of Lincoln A73-11 at Amberley on 19 Feb 1948

This accident, which resulted in the loss of 16 crew and passengers, was one of the most disastrous in the history of the RAAF.

In fine weather, with rested crews, and what should have been a routine approach and landing after a pleasant transit flight from Laverton, Lincoln A73-11 was rapidly reduced to smoking wreckage with the loss of all on board. The investigation into the tragedy determined that the probable cause was a mal-distribution of the load, placing the C of G outside the approved aft limit.

The aircraft and crew were tasked to proceed from Amberley to Laverton to uplift some freight plus another Lincoln crew (who had, two days previously, ferried a Lincoln to Laverton for modification action). The aircraft, with two crews, was scheduled to return to Amberley the same day.

Freight details

The freight carried by the aircraft was to have a significant bearing on the accident. A Laverton manifest showed that 2,200lb of freight was carried - excluding personal luggage. Personal baggage carried was estimated to be 400lb.

- 6 Merlin cylinder blocks on bases (289 lbs each) 1734 lbs
- 8 gallons of dope
8 gallons thinners
18 gallons methylated spirits

4 gallons chromate thinners 400 lbs

- Miscellaneous freight 60 lbs
- Total weight 2194 lbs

The weather through out the day from Laverton through to Amberley was excellent with little cloud and light winds. During the afternoon, the conditions at Amberley were practically cloudless with a 10-15 kts sea breeze.

For the return trip to Amberley, A73-11 was to captained by the pilot who delivered the earlier Lincoln to Laverton, assisted by the pilot who flew the recovery aircraft A73-11 to Laverton.

The aircraft departed Laverton at 1415 hrs for Amberley. Aeradio position reports were received normally through out the flight, until 1734 hrs, when clearance was obtained to descend from 8000 ft preparatory to the landing at Amberley.

A short time later Amberley Flight Control cleared the aircraft for a straight-in approach RWY 05 at an angle of 45 degrees, turn right to align itself with the runway and commence to lose height on the approach - which appeared to be lower and faster than usual.

The aircraft touched down in a tail high attitude, approximately 300 ft after crossing the threshold. After travelling a short distance, the aircraft

then left the ground, rising to about five feet. From eyewitness reports, attempts were then made by the crew to force the aircraft onto the runway but this only resulted in three more bounces.

When about 600 ft from the upwind end of the runway, engine power was applied to make a go around. It is estimated by ground observers that, by this stage, the airspeed of the Lincoln had decreased to approximately 80-85 kts.

The Lincoln was then seen to climb slightly, level out at 100 ft, after which the nose of the aircraft rose sharply to place the aircraft in a climbing attitude of 40 degrees. After a further few seconds, the attitude changed abruptly to a climb of 80 degrees.

With all engines roaring presumably under full power, the aircraft attained an altitude of approximately 500 ft AGL when, with no forward speed, the port wing slowly dropped and the aircraft steadily accelerated until the port mainplane struck the ground in a vertical position. By this time the fuselage was parallel with the ground.

The aircraft caught fire immediately and, although the fire tender arrived shortly after the crash, the fire could not be sufficiently controlled to extricate the crew or passengers. The crash site was 400 yards from the end of RWY 05 and displaced approximately 100 yards left of the runway.

Examination of the wreckage

The engines were clearly capable of full operation. When the propeller dome assemblies from the four engines were removed it was determined that all propellers were in full fine pitch. Additionally, there was sufficient

evidence to conclude that all four engines were operating at or near full power at the time of the accident. Badly damaged propeller blades, bent in the opposite direction to rotation, were discovered, several blades being broken.

The empennage, particularly the elevators and associated trim tabs, were closely examined and nothing unusual was found. The flap system appeared to have been operated normally, other than for a minor adjustment between the flap position and cockpit indication.

Distribution of freight

Evidence was obtained from a witness who entered the aircraft at Laverton just before the engines were started. He stated that he saw, aft of the rear door, luggage or freight which was covered with engine covers placed either side of the toilet at a height of three feet. On either side of the fuselage ramp, forward from the rear door to the H-2S scanner, personal luggage was stowed. He did not observe the stowage position of the cylinder blocks or the four gallon tins of dope, thinners etc.

A Merlin cylinder block, identical with those carried in A73-11, was loaded into a Lincoln to determine the probable positions where they could be carried. It was found that it was impossible to stow the cylinder block any further forward than between the rear and main spars. However, the physical effort required and difficulty experienced in getting to this position, made it extremely improbable that this would have been done. Through further load experimentation, the most probable stowage positions of the cylinder blocks for take off at Laverton were found to be:

- Two blocks aft of the flap jack, with

- Four blocks aft of the H-2S scanner, or
- Two on and two aft of the scanner.

Similarly, the most logical position to stow the ten containers of dope, thinners etc, to prevent movement during the flight would be forward of the scanner. (Several were found in this position in the wreckage, others being recovered near the rear door).

As no mention was made in the aircraft manifest as to the weight of the personal baggage, it was assumed to be 400 lb, stowed in the aft well.

C of G considerations

The C of G limits laid down for the aircraft were a forward limit of 45 inches aft of the datum and an aft limit 66 inches aft of the datum. With the assumed load distribution the C of G for take off at Laverton would have been 67.4 inches aft of the datum (1.4 inches beyond aft limit). For landing at Amberley, the C of G would have been 71.4 inches aft of datum (5.4 inches beyond aft limit).

Cause of the accident

The accident was caused by a bad load distribution of freight and passengers for the landing, which resulted in the C of G being placed outside the aft limit. This situation occurred principally through the carriage of freight in an aircraft not designed for such a purpose.

It was possible for the aircraft to take off at Laverton and fly to Amberley with the C of G outside the aft limit of 66 inches. It is probable also, that with cruising power, the aircraft could be trimmed for level flight, albeit abnormally tail heavy.

Later, the aircraft captain made a straight-in approach at Amberley. This type of approach can upset a pilot's judgment in making an approach by coming in too low and using power to "drag" the aircraft to the runway. This generally results in a bad landing which in this case occurred, necessitating a baulked approach to be made.

When the undercarriage was retracted for the go-around, the C of G moved 1.6 inches further aft and, with flaps fully down, the engine power was increased to 2650 rpm/+12 psi boost. At this stage the nose commenced to rise; the pilot used full forward stick and trimmed the nose down in an attempt to lower the nose, without effect. Then, probably as a last resort, 3000 rpm/+18 psi boost power combination was used which only further accentuated the already critical situation. The aircraft then became uncontrollable and stalled at a height of approximately 500 ft, with a fuselage angle of 80 degrees to the horizontal.

Carriage of passengers

The carriage of 16 passengers in a Lincoln was in contravention of current orders. All pilots were aware of this order and the responsibility for compliance rested with the aircraft captain.

With the most convenient space for stowage of freight located aft of the bomb bay, it was natural that, if a Lincoln was used for such a purpose, this space would invariably be used, unless the captain was "C of G conscious" and educated his crew to be the same.

Lincoln handling trials

Handling trials were undertaken by ADRU to determine the stability and longitudinal control of the aircraft with

various flap settings at different C of G positions. As anticipated, during a baulked approach the aircraft had barely sufficient downward elevator for the crew to maintain for and aft control with:

- C of G at aft limit;
- Flaps fully down;
- Power combination 3000 rpm/+18 psi boost; and
- Speed allowed to decrease to 85 mph before going around.

Subsequent to these tests the following changes were made to Lincoln operating procedures:

- Aft C of G limit was revised being brought forward to 63 inches aft of datum; and
- When going around from a baulked approach, the drag portion of the flap was to be removed as quickly as possible to improve elevator control.