

ACCIDENTS INVESTIGATION BRANCH
Department of Trade and Industry

Nipper T66 Mark 3 G-AVKT
Report on the accident at Burton Constable
Hall, Yorkshire on 19 August 1972

List of Civil Aircraft Accident Reports issued by AIB in 1973

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1/73	Douglas DC3 PH—MOA at Southend Airport, June 1971	February 1973
2/73	Bolkow BO 208C Junior G—ATVB near Hambledon, Surrey, January 1972	February 1973
3/73	Beagle 206 Series 2 G—AVAL at Chouppes (Vienne) near Poitiers, France, March 1971	May 1973
4/73	Trident I G—ARPI near Staines, June 1972. Report of the Public Inquiry	May 1973
5/73	Jodel DR 1050 Ambassadeur G—AYEA in Bridgwater Bay, Somerset, March 1972	May 1973
6/73	Fournier RF 4D G—AXJS in the sea about ¼ mile northeast of Skateraw, Kincardine, October 1972	June 1973
8/73	Nipper T66 Mark 3 G—AVKT at Burton Constable Hall, Yorkshire, August 1972	August 1973

Department of Trade and Industry
Accidents Investigation Branch
Shell Mex House
Strand
London WC2R 0DP

24 May 1973

The Rt Honourable Peter Walker MBE MP
Secretary of State for Trade and Industry

Sir,

I have the honour to submit the report by Mr N S Head, an Inspector of Accidents, on the circumstances of the accident to Nipper T66 Mark 3 G-AVKT which occurred at Burton Constable Hall, Yorkshire on 19 August 1972.

I have the honour to be
Sir
Your obedient Servant

V A M Hunt
Chief Inspector of Accidents

Accidents Investigation Branch
Civil Aircraft Accident Report No 8/73
(EW/C 419)

Aircraft: Nipper T66 Mark 3 G-AVKT
Engine: One Ardem Mark 10
*Registered Owners
and Operators:* Messrs W K Charles
S Meadley
B Smith
Pilot: Mr W K Charles – Killed
Passengers: Nil
Place of Accident: Burton Constable Hall, Yorkshire
Date and Time: 19 August 1972 at 1410 hrs

All times in this report are GMT

Summary

Whilst giving a demonstration of paper streamer cutting at an air display the aircraft stalled during a steep turn and struck the ground. The pilot was killed and the aircraft was destroyed. Fire did not break out.

1. Investigation

1.1 History of the flight

Nipper G-AVKT was one of the three aircraft which had flown from Paull Airfield near Hull, to give an air display before members of the public in the grounds of Burton Constable Hall. For the display the pilot took with him several toilet rolls to be dropped as streamers.

After taking-off the aircraft climbed to about 800 feet. A paper streamer was dropped; the aircraft then made a 180° turn and manoeuvred into a position to cut the streamer with its wing. After dropping several streamers and successfully cutting them, the aircraft started a run at a lower altitude, estimated to be about 200 feet, and another streamer was dropped. With engine power on, the nose of the aircraft was seen to rise and a steep turn was started to the left. However, when passing through about 60° of the turn, bank increased to about 75° and the nose dropped; the aircraft then dived steeply to the ground.

From a cine film taken by a witness it can be seen that the angle of dive was about 70°. Just prior to the impact this angle decreased slightly but the aircraft then made a flick-roll to the left through 180° and struck the ground inverted. The position of the crash was about 150 yards from the nearest public enclosure.

1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Others</i>
Fatal	1	—	—
Non-fatal	—	—	—
None	—	—	—

1.3 Damage to aircraft

Substantial.

1.4 Other damage

Nil.

1.5 Crew information

Mr William Kenneth Charles, aged 33, held a valid Private Pilot's Licence endorsed for Group A aeroplanes together with assistant flying instructor, instrument meteorological conditions and night ratings. His last medical examination was in July 1971. It was a condition of his licence that he should wear spectacles to correct for distant vision (and that he should have available a second pair) whilst exercising the privileges of the licence. No spectacles were found on the pilot or at the scene of the accident but these may have been removed from the area during rescue operations.

Mr Charles had been a founder member of the Hull Aero Club and an assistant flying instructor since December 1970. His total flying experience was 850 hours, 69 of which were on the Nipper aircraft. He had flown 93 hours in the previous 30 days including 17 hours on the Nipper.

1.6 Aircraft information

The Nipper Mark 3 is an ultra-light, single seat, aerobatic monoplane. It has a welded tubular steel fuselage with an all wood single spar wing and the aircraft is stressed to + 5g and - 2g limitations. The engine is a flat four Ardem of 45hp driving a two-bladed fixed pitch wooden propeller. G-AVKT was constructed by Cobelavia in Belgium in 1966 and brought to England by the Nipper Aircraft Company Limited in 1967. After being transferred to the British register it was subsequently re-registered in the name of its current owners in March 1972. The aircraft held a valid Special Category Certificate of Airworthiness for private flying and had been kept in an adequate state of repair and maintained in accordance with the engine and aircraft maintenance manuals. There is no evidence of unusual incidents or serious defects having occurred throughout the aircraft's life. According to the maker's handbook the power-on stall in level flight occurs at 32 mph. Although a stall warning device was fitted, because of an electrical fault the system had been disconnected prior to the accident flight.

The total engine hours were 578 and total airframe hours 620, of which 140 were flown since the last renewal of the certificate of airworthiness. The fuel load prior to the air display was approximately 5 gallons of 80/87 Avgas and the weight of the aircraft at take-off was 630 lb. The centre of gravity was within the permitted limits.

1.7 Meteorological information

The weather was fine and had no bearing on the accident. The wind at the time of the accident was estimated at less than 5 knots.

1.8 Aids to navigation

Not applicable.

1.9 Communications

Not applicable.

1.10 Aerodrome and ground facilities

Not applicable.

1.11 Flight recorder

Not fitted or required to be fitted.

1.12 Wreckage

Examination on the scene of the accident showed that the aircraft had struck the ground in a near inverted attitude whilst rolling to the left. The fuel tank had split open and there was a large area of grass contaminated by fuel. One of the toilet rolls which was intended to be used as a streamer was found close to the wreckage.

Detailed examination of the wreckage revealed no evidence of pre-crash failure or malfunction. The engine air intake was set to 'cold' and the fuel cock and ignition switches were in the 'ON' position. The condition of the sparking plugs and the fuel and lubrication systems indicated that the pre-crash condition of the engine was satisfactory.

There was no evidence of a bird strike or pre-crash malfunction of the engine or flying controls and the general condition of the aircraft indicated that it had been well maintained.

Because of the high impact loads, both of the pilot's shoulder harness straps and one of the lap straps attachment cables had failed.

1.13 Fire

There was no fire.

1.14 Survival aspects

The accident is regarded as non-survivable.

1.15 Tests and research

The possibility that the flying controls had been obstructed by a loose toilet roll in the cockpit was investigated. Using an aircraft of the same type it was found that it was possible for a roll to fall from a stowage position on a ledge in the wing root into the pilot's lap and then lodge behind the control column. If this occurred it prevented full rearward movement of the control column, and although the roll could be easily and quickly removed, in some circumstances it might delay control movement sufficiently to cause an accident. However, it was found that rearward movement of the control column against a roll left characteristic indentations on it. No such indentations were visible on the roll found near the wreckage.

1.16 Medical aspects

In the opinion of the pathologist who carried out a post mortem examination of the pilot, there was no evidence of a medical condition which could have contributed to the accident. Death was due to multiple injuries.

2. Analysis and Conclusions

2.1 Analysis

The evidence of witnesses at the scene of the accident indicates that the aircraft stalled during a steep turn at about 200 feet. A cine film taken by one witness shows that the stall was followed by a steep dive. This flattened out slightly as 'nose-up' elevator was applied but, with the resulting increase in 'g' loading, the wing stalled again and the aircraft rolled 180° to the left and struck the ground inverted.

The examination of the aircraft revealed no evidence of pre-crash failure or malfunction or of any obstruction having occurred with the flying controls. It is therefore relevant to consider the circumstances leading to the stall.

For the demonstration, after releasing a paper streamer it was necessary for the pilot to make either a steep turn or a stall turn to position the aircraft on a reciprocal heading. Initially the streamers were released at about 800 feet and at that height the manoeuvre could be performed with reasonable safety. However, when carried out at 200 feet it becomes much more critical. Not only is there less height in which to correct any error or misjudgement, but less time is available to complete the turns before the streamers descend too low.

According to the pilot's handbook for the type, the power-on stall occurs at 32 mph but at an angle of bank of about 75°, which was observed by the witnesses, it would occur at about 65 mph. Just before the turn the aircraft's nose was seen to rise and it seems likely that this resulted in a decrease in speed below 65 mph. The stall during the turn started the sequence of events and insufficient height was available for recovery to be effected from the ensuing dive.

Bearing in mind the manoeuvre which led to the stall it is considered unlikely that the accident would have been avoided if the aircraft's stall warning device had been operating.

2.2 Conclusions

(a) Findings

- (i) The pilot was experienced on the type and properly licensed.
- (ii) The documentation of the aircraft was in order and it had been properly maintained.
- (iii) An inadvertent stall occurred during a steep turn at a low height.

(iv) A further stall occurred during an attempt by the pilot to pull out of the dive which followed the earlier stall.

(b) *Cause*

The accident resulted from a stall during a steep turn at an altitude too low for recovery to be effected.

N S Head
Inspector of Accidents

Accidents Investigation Branch
Department of Trade and Industry
May 1973