

ACCIDENTS INVESTIGATION BRANCH  
Department of Trade

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Tiger Moth G-APVT and  
Rollason Beta G-ATLY  
Report on the collision at Nottingham  
Airport, Tollerton, Nottinghamshire  
on 29 September 1973

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## List of Civil Aircraft Accident Reports issued by AIB in 1974

<i>No</i>	<i>Short title</i>	<i>Date of publication</i>
1/74	McDonnell-Douglas DC8 -- 63 CF N 801 WA and Aerospatial Caravelle 6 N 00-SRG approximately 10 nautical miles southeast of Lands End VOR, March 1973	April 1974
2/74	Piper PA 30 Twin Comanche G-AXRW at Shipdham Aerodrome, Norfolk, January 1973	April 1974
3/74	Slingsby T61A G-AYUO near Wycombe Air Park, Bucks., February 1973	May 1974
4/74	Viscount 802 G-AOHI at Ben More, Perthshire, Scotland, January 1973	May 1974
5/74	Owl Racer 65-2 G-AYMS at Greenwich Reach, River Thames, London, May 1971	May 1974
6/74	British Caledonian Airways BAC 1-11 at Corfu Airport, Greece, July 1972	May 1974
7/74	Wallis WA-117 Autogyro G-AXAR at Farnborough, Hants., September 1970	January 1975
8/74	AA-1 Yankee G-AYHD at Beverley Nursery, near Uxbridge, Middlesex, April 1973	July 1974
9/74	Cessna F172H G-AYDC near Humphrey Head, Lancashire, December 1972	June 1974
10/74	Beagle A.61 Series 2 (Terrier) G-ARZT near Tonbridge, Kent, August 1973	July 1974
11/74	Beagle A.61 Series 2 (Terrier) G-ATMS near Saltby, Leicestershire, August 1973	July 1974
12/74	Piper PA-30 (Twin Comanche) G-ASLD at Newchurch, Isle of Wight, May 1972	August 1974
13/74	Tiger Moth G-APVT and Rollason Beta G-ATLY at Nottingham Airport, September 1973	January 1975
14/74	Cessna F172H G-AVHI in the sea 44 nm east of Wick, Scotland, December 1973	October 1974
15/74	AESL Airtourer T6/24 G-AYMF near Lands End, Cornwall, June 1972	September 1974
16/74	Piper PA 28-140 G-AVBM near Dursley, Gloucestershire, August 1973	September 1974
17/74	Avions Pierre Robin DR 360, Robin Knight G-AZOX at Biggin Hill Aerodrome, Kent, July 1973	November 1974

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18/74	Piper PA 23-250E Aztec G-AZIF near Great Sampford, Essex, January 1972	November 1974
19/74	Chipmunk DH C1 Series 22A G-ARCR at Windlesham, Surrey, September 1973	November 1974
20/74	Jodel D117 G-ZFK at Doncaster Aerodrome, April 1973	December 1974
21/74	Societe Aeronautique Normande Jodel D117 G-AVEI at Brixham, Devon, September 1973	January 1975

Department of Trade  
Accidents Investigation Branch  
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30 May 1974

*The Rt Honourable Peter Shore MP*  
*Secretary of State for Trade*

Sir,

I have the honour to submit the report by Mr G C Wilkinson, an Inspector of Accidents, on the circumstances of the collision between Tiger Moth G-APVT and Rollason Beta G-ATLY which occurred at Nottingham Airport, Tollerton, Nottinghamshire on 29 September 1973.

I have the honour to be  
Sir  
Your obedient Servant

W H Tench  
*Chief Inspector of Accidents*

Accidents Investigation Branch  
Civil Aircraft Accident Report 13/74  
(EW/C469)

<i>Aircraft (1):</i>	Tiger Moth G-APVT
<i>Engine:</i>	Rolls-Royce Gipsy Major 1
<i>Registered Owner:</i>	Mr R M Kilvington
<i>Operator:</i>	Barnstormers Ltd
<i>Pilot:</i>	Mr B Shaw – Killed
<i>Passenger:</i>	One – Killed
<i>Aircraft (2):</i>	Rollason Beta G-ATLY
<i>Engine:</i>	Continental C90 - 8F
<i>Registered Owner:</i>	Rollason Aircraft and Engine Co Ltd
<i>Operator:</i>	Tiger Club
<i>Pilot:</i>	Mr E F Burgess – Killed
<i>Place of Accident:</i>	Nottingham Airport, Tollerton, Nottinghamshire 52° 55'N 01° 04'W, 138 feet amsl
<i>Date and Time:</i>	29 September 1973 at 0943 hrs

All times in this report are GMT

## Summary

Both aircraft were positioning so as to join the circuit for landing at Nottingham Airport.

The Tiger Moth had contacted Air Traffic Control (ATC) by radio and been given permission to join the circuit. The Beta, which was not equipped with radio, was seen to approach from the south, make a turn close to the Tiger Moth and then collide with it.

Both aircraft crashed killing both pilots and the passenger in the Tiger Moth. It is concluded that the Beta collided with the Tiger Moth because the Beta pilot did not see the other aircraft in sufficient time to take evasive action.

# 1. Investigation

## 1.1 History of the flights

### 1.1.1 *Tiger Moth G-APVT*

This aircraft was scheduled to take part in a flying display at Nottingham Airport on the afternoon of 29 September 1973.

After an uneventful flight from its base at Sibson Aerodrome, Peterborough, the pilot contacted Nottingham Airport on 122.8 MHz at about 0930 hrs when he was about 3 nm to the east. He requested permission to join the circuit and was instructed to join on the dead side of Runway 28 for a left hand circuit and given the airfield QFE. The pilot duly acknowledged this information.

Shortly after the initial radio call the Tiger Moth was seen by observers on the ground to be at an estimated height of 1,500 feet above ground level, flying from east to west parallel to and to the north of Runway 28. It appeared to be descending slowly, wings level, at a low groundspeed. At about the time it was abeam the landing threshold of Runway 28 it appeared to have levelled out at about 1,000 feet.

### 1.1.2 *Rollason Beta G-ATLY*

At about 0830 hrs on 29 September 1973 the pilot of this aircraft telephoned Nottingham Airport from Redhill and requested permission to land in a non-radio equipped aircraft. He asked for and received confirmation that an air display was due to take place in the afternoon. Permission was granted for the Beta to land at Nottingham and the pilot was given the runway in use – 28 left hand circuit and the airfield QFE. He replied that he would be arriving in 'about one hour'.

At approximately 0940 hrs the Beta was seen and heard just to the east of Nottingham Airport flying at high speed in a northerly direction. Its wings were level and it appeared to be descending from a height of about 1,500 feet finally levelling out at about 1,000 feet as it passed the landing threshold of Runway 28.

### 1.1.3 *The collision*

When the Beta was seen by the radio operator on duty in the control tower the Tiger Moth pilot was informed 'be advised non-radio aircraft approaching you fast to your left and astern'. The Tiger Moth pilot was heard to acknowledge this transmission. This was the last radio contact made with the Tiger Moth before the collision.

The Beta then made a turn to the left through an angle of about 90° so as to end up flying into wind on the dead side of the circuit parallel with Runway 28. Very shortly after completing this turn the left wing of the Beta struck the rudder and fin of the Tiger Moth and then the right rear

main plane strut. At this point a large portion of the Beta left wing became detached. The Beta propeller then cut through the top right wing outer panel on the Tiger Moth.

After the collision the Beta dived steeply into the ground rolling rapidly. The pilot was killed on impact. There was no fire.

For a few seconds after it had been struck by the Beta, the Tiger Moth continued to fly apparently normally. However, it then entered a spiral dive to the right which steepened progressively until it struck the ground. Both occupants were killed on impact. There was no fire.

The collision occurred in daylight with good visibility.

## 1.2 Injuries to persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Others</i>
Fatal	2	1	—
Non-fatal	—	—	—
None	—	—	—

## 1.3 Damage to aircraft

Both aircraft were destroyed by air and ground impact.

## 1.4 Other damage

There was no other damage.

## 1.5 Crew information

1.5.1 The pilot of the Tiger Moth, Mr Barrie Norman Shaw, aged 34, was the holder of a valid Private Pilot's Licence endorsed for Group 'A' single engine aeroplanes below 12,500 lbs maximum total weight authorised. He was assessed fit at a medical examination on 29 March 1972 and was not required to wear spectacles. He did not hold an R/T licence. Mr Shaw started flying in 1962 and at the time of the accident, it is estimated that he had accrued a total of 480 hours as a pilot, some 300 hours being in the Tiger Moth.

1.5.2 The pilot of the Beta, Mr Eric Francis Burgess, aged 50, was the holder of a valid Private Pilot's Licence endorsed for Group 'A' single engine aeroplanes below 12,500 lbs maximum total weight authorised. He was assessed fit at a medical examination on 8 August 1973 and was not required to wear spectacles. He was the holder of an IMC rating, an Assistant Instructors Rating, and a restricted R/T licence.

Mr Burgess was trained as a pilot in 1942 by the Royal Air Force and at the time of the accident had accrued a total of 1,801 hours as a pilot, some 4 hours 25 minutes being in the Beta.

## 1.6 Aircraft information

### 1.6.1 *Tiger Moth G-APVT*

The Tiger Moth is a single engine bi-plane with the crew located in two open cockpits in tandem. G-APVT was equipped with VHF R/T equipment.

The aircraft was correctly certified, the weight was below the maximum total weight authorised and the Centre of Gravity (CG) was within the permitted limits. The aircraft had flown a total of 6,551 hours since manufacture.

The fuel used was 100 octane Aviation gasoline. The paint scheme was bright orange with dark blue stripes on wing leading edges and fuselage sides.

### 1.6.2 *Rollason Beta G-ATLY*

The Rollason Beta is a small single engine, single seat, low wing racing monoplane. The cockpit enclosure is a one piece, frameless plastic moulding. The pilot's view is particularly good except directly ahead and below.

The aircraft was correctly certified, the weight was below the maximum total weight authorised and the CG was within the permitted limits.

The aircraft had flown a total of 509 hours since manufacture. No radio equipment was fitted.

The fuel used was 100 octane Aviation gasoline. The paint scheme was white wings and tailplane with red lower fuselage.

## 1.7 Meteorological information

The Meteorological office made an assessment of the weather in the Nottingham area at 0943 (the time of the accident) which was:

Surface wind:	260° at 15 knots.
Visibility:	over 10 kilometres.
Weather:	nil.
Cloud:	4/8 cumulus base 2,000 feet. Scattered cirrus above 20,000 feet.

The cloud base at Nottingham Airport was reported as 2,500 feet by the pilot of another aircraft. The condition of natural light was daylight. Weather was not a factor in this accident.

## 1.8 Aids to navigation

Not applicable.



## 1.9 Communications

Nottingham Airport is equipped with VHF R/T operating on 122.8 MHz. The pilot of the Tiger Moth made contact with the Nottingham R/T operator when some 3 nm to the east of the aerodrome. All subsequent R/T contact with Nottingham was normal and without incident.

There were no facilities at Nottingham Airport to record R/T communications with aircraft on 122.8 MHz.

The Beta was not equipped with radio.

## 1.10 Aerodrome and ground facilities

On the day of the accident Runway 28 was in use at Nottingham Airport, with a left hand circuit in force.

There is another shorter runway at Nottingham, 04-22. However, an air display was planned to take place in the afternoon of Saturday 29 September and this runway was not available for landings and take-offs on that date.

Practically the entire area to the south of Runway 28 and to the east of the control tower (see Appendix 1) was in use as a spectators enclosure with barriers, tents, carparks, etc covering the open spaces.

Nottingham Airport is licensed as an aerodrome by the Civil Aviation Authority. Licensed ATC personnel are not available at the aerodrome nor are they required to be so.

Seven people have been authorised to operate the private aeronautical ground station. In addition they have been given a short period of training to enable them to provide advisory information to aircraft using Nottingham Airport.

## 1.11 Flight recorders

There was no requirement for flight recorders on either aircraft and none were fitted.

## 1.12 Wreckage

### 1.12.1 Tiger Moth G-APVT

The aircraft was found in a nose-down, over the vertical attitude, with the leading edges of both left wings resting on the ground. Both right wings were severely damaged and the engine, propeller and fuselage ahead of the main landing gear were buried in the soil. The fuselage and tail section had been cut away, aft of the rear cockpit, during the rescue operation and was lying to one side of the main wreckage.

Examination of the wings revealed that, whereas the two left wings were intact on ground impact, the right upper wing exhibited extensive pre-impact damage. A large piece of wing tip fabric together with sections of wing tip profile tubing, compression strut structure and portions of rear spar were found to be missing. In addition, the right wing rear interplane strut had been split longitudinally along its entire length and its aft section was missing from the main wreckage.

Failures of both front and rear spars in the right upper wing were consistent with overloading as a result of its spar tips having been deflected forwards. All damage to the right lower wing was consistent with the effects of ground impact. A large piece of wing fabric from the right upper wing was jammed against the left elevator control bell crank arm trailing over the upper surface of the left elevator. Attached to this fabric were a portion of wing spar from the right upper wing and the right wing slot centre hinge fairing.

Examination of the fin and rudder assembly revealed that the rudder hinge post had been deflected forwards and to the right breaking the fin rear spar adjacent to the upper hinge pivot and at the junction with the fuselage platform.

The rudder trailing edge showed evidence of an impact from the rear which had caused deflection, severe compression bending and fracture of the trailing edge profile tube at about the height of the top of the fin.

The impact had caused the rudder frame to become grossly distorted to the right. Smears of white paint were apparent on the rudder fabric and on the forward upper side of the right hand anti-spin strake.

All control cable attachments were secure to their respective control surface linkages and with the exception of the rudder and right hand slot the damage was consistent with the effects of ground impact.

The missing section of the right hand interplane strut together with portions of right upper wing rear spar were found in a field some 500 metres to the east of the Tiger Moth wreckage. The trailing edge of the separate portion of the strut showed signs of a heavy impact 15½ inches above the base of the strut. The impact mark indicated that it had been caused by the edge of an object which was horizontally level and moving in a direction 30° to the right of the fore and aft line of the Tiger Moth.

#### 1.12.2 *Beta G-ATLY*

The aircraft appeared to have dived into the ground vertically at high speed completely burying the engine and propeller in the ground.

The wing and forward fuselage structure was extensively fragmented. The fuselage had broken just behind the cockpit on ground impact leaving the tail section intact.

Some three feet of the left wing structure together with the left aileron was missing from the wreckage, together with a portion of left wing main spar. With the exception of the aft (carry through) aileron cable the continuity of all control cables was intact, after ground impact. The one cable failure was caused by overstressing consistent with the effects of ground impact.

Despite the effects of severe distortion caused by deceleration forces, both aileron and elevation attachments were satisfactory. Elevator and rudder bell-crank assemblies were also intact.

The missing portion of the left wing and sections of main spar were found some 800 metres to the east of the Beta wreckage adjacent to the detached pieces of Tiger Moth wreckage. Smears of orange and blue paint were found on the leading edge of the detached Beta wing section adjacent to where it had separated from the main wing structure.

When the Beta engine was excavated pools of petrol were found trapped in the heavy clay soil underneath it. Large pieces of blue and orange fabric, sections of Tiger Moth wing tip profile tube and a wing compression strut were also found embedded in the crater made by the Beta engine.

#### **1.13 Medical and pathological information**

Post-mortem examinations of the three casualties revealed no pre-existing disease or other medical conditions which could have contributed to the accident.

#### **1.14 Fire**

There was no fire in either aircraft.

#### **1.15 Survival aspects**

All three occupants of both aircraft were wearing full seat harness. In addition both the pilot of the Beta and the pilot of the Tiger Moth were wearing crash helmets. However, it is considered that the accidents were non-survivable.

#### **1.16 Tests and research**

None.

## 2. Analysis and Conclusions

### 2.1 Analysis

#### 2.1.1 *Airworthiness*

Both aircraft were properly loaded and had been correctly maintained in accordance with the pertinent maintenance schedules. The documentation of both aircraft was also in order. No evidence came to light indicating any pre-collision mechanical failures or malfunctions in either aircraft.

#### 2.1.2 *The collision*

The Tiger Moth was flying slowly on a steady heading. The Beta approached at high speed, initially on a heading of about 90° to that of the Tiger Moth. The aircraft then turned to the left and shortly after completing the turn struck the Tiger Moth. The only rational explanation for the collision is that the Beta pilot did not see the Tiger Moth in sufficient time to avoid striking it. A possible explanation for the failure of the Beta pilot to see the Tiger Moth in conditions of excellent visibility could be that his attention was concentrated on the large number of obstructions on the airfield, remembering that he was not familiar with Nottingham Airport.

Although the pilot of the Tiger Moth was advised of the approach of the Beta he was not able to take effective evasive action in the time available. Furthermore the Beta was approaching the Tiger Moth from behind.

The relevant Rule of the Air, No 18 covering the avoidance of collisions reads in part:

'When two aircraft are converging in the air at approximately the same altitude the aircraft which has the other on the right shall give way.

An aircraft which is being overtaken in the air shall have the right of way and the overtaking aircraft shall keep out of the way of the other aircraft by altering course to the right.'

Clearly the Beta should have kept clear of the Tiger Moth.

#### 2.1.3 *Airmanship*

2.1.3.1 The Tiger Moth: The pilot of the Tiger Moth appears to have carried out the process for joining the circuit at Nottingham in an exemplary fashion. He made the appropriate radio calls and positioned his aircraft in accordance with normally accepted procedures. The control tower was aware of his progress in the circuit and the Tiger Moth did not present a hazard to other aircraft in the Nottingham aerodrome circuit.

2.1.3.2 The Beta: The pilot of the Beta was aware that an air display was programmed to take place in the afternoon of 29 September. It is reasonable to assume that he would have considered the possibility of increased aerial activity in the vicinity of Nottingham Airport brought about by the impending display.

The cloud base was reported as 2,500 feet above the ground by another aircraft in the area at the time and was associated with good visibility. It would have been prudent under the prevailing circumstances (ie display and no radio) to have joined the circuit on the dead side after having overflowed the aerodrome, above circuit height, so that a visual check could be made of the state of the aerodrome surface, changes in runway in use etc. The ground track followed by the Beta would not have afforded the pilot a clear view of the landing 'T', however the two windsocks on the aerodrome would have indicated that Runway 28, the runway he had been advised as being in use when he telephoned, was most probably the correct runway to use.

The evidence points to the Beta having approached Nottingham at a relatively high speed from the south, letting down and crossing the circuit just to the east of the landing threshold for Runway 28 at circuit height. If the circuit had been congested, as well it might have been under the prevailing circumstances, this would have been ill advised as it could have caused a conflict with circuit traffic. In the event the two aircraft that collided were the only aircraft in the Nottingham circuit.

#### 2.1.4 *Aircraft radio equipment*

Article 14 of the *Air Navigation Order (ANO) 1972* and Schedule 6 to the ANO define the conditions under which radio equipment is required to be carried in aircraft. Judged against these criteria there was no requirement for either the Tiger Moth or the Beta to carry any radio equipment. However, both Nottingham Airport and the Tiger Moth were equipped with VHF R/T and were in radio contact immediately prior to the collision. There is little doubt that if the Beta had also been in radio contact with Nottingham the chance of a mid-air collision occurring between these two aircraft would have been greatly diminished if not removed altogether. The Nottingham radio operator was sufficiently alert to warn the Tiger Moth of the approach of the Beta and she would undoubtedly have advised the Beta pilot of the presence of other aircraft in the Nottingham circuit if two way R/T communications had been available between the Beta aircraft and Nottingham Tower.

Considering the number of general aviation aerodromes in and adjacent to the London Control Zone and Terminal Area which are used by aircraft not equipped with VHF R/T, the question arises as to whether it is timely for the regulations governing the carriage of radio equipment in light aircraft to be revised. To place the problem in perspective out of a total number of aircraft on the British Register of about 4,400 only some 700 do not carry radio.

The pilot of the Tiger Moth, an experienced display pilot, did not possess an R/T licence although he was demonstrably quite capable of operating the radio equipment in a competent manner.

As the majority of aircraft flying in the UK are fitted with R/T equipment and not all pilots have R/T licences, it follows that a number of aircraft are probably being flown by pilots without the proper qualifications. This being so, there seems to be a case to be made for the British Private Pilot's Licence (PPL) to incorporate a Restricted R/T Licence as an integral part of the PPL.

#### 2.1.5 *Air traffic control*

Rule 57 of the *Schedule to the Rules of the Air and Air Traffic Control 1972* requires that an air traffic control service (ATCS) be provided at an aerodrome if (a) the aerodrome is situated within a control zone and has two way radio communication with aircraft and is provided with an aid for holding, let down, or approach purposes.

Article 63 of the ANO 1972 requires that any ATCS provided under Rule 57 shall be provided by licensed personnel.

Nottingham Airport is not covered by any of the conditions mentioned and is therefore not legally required to provide an ATCS. However Article 89 of the ANO 1972 recognises an ATCS provided by any duly appointed person and such a service need not be provided by licensed personnel.

On the date of the accident the UK Air Pilot indicated that aerodrome Flight Information Service (FIS) only was available at Nottingham Airport and the control tower was manned by personnel who held no formal ATC qualifications but who had been authorised by CAA Telecommunications to operate the ground-air VHF R/T equipment.

In the case of the subject accident the ATC at Nottingham was clearly operated in an efficient and intelligent manner despite being manned by unqualified personnel. The extent to which the provision of Article 89 of the ANO apply to Nottingham Airport are not clear. The recognition of the aerodrome management as being 'duly appointed persons' apparently only applies to their ability to operate a private ground to air R/T facility. The approval and qualifications of the operators concerned is the province of the CAA Telecommunications Branch whereas the only meaningful information the radio operators can pass to pilots is obviously of an ATC nature. It would seem that some form of benign supervision of the ATC organisation of an aerodrome such as Nottingham by the National Air Traffic Services is preferable to the present arrangement. This is particularly valid when considering private aerodromes in and around the London Control Zone and Terminal Control Area.

## 2.2 Conclusions

### (a) Findings

- (i) Both aircraft had been properly maintained and possessed valid Certificates of Airworthiness.
- (ii) There was no pre-crash failure of either aircraft.
- (iii) Both pilots were qualified to make the respective flights.
- (iv) The pilot of the Tiger Moth did not possess an R/T Licence.
- (v) The Beta collided with the Tiger Moth whilst both aircraft were joining the circuit and the Beta was the overtaking aircraft.
- (vi) It was the duty of the pilot of the Beta to give way and avoid the other aircraft.

### (b) Cause

The Beta collided with the Tiger Moth probably because the pilot of the Beta did not see the Tiger Moth in sufficient time to take evasive action. Lack of R/T equipment prevented his being warned of the proximity of the other aircraft.

G C Wilkinson  
*Inspector of Accidents*

Accidents Investigation Branch  
Department of Trade

May 1974