

Department of Trade

ACCIDENTS INVESTIGATION BRANCH

**AGUSTA BELL 206B G-AVSN
DH 82A (TIGER MOTH) G-ANDE
Report on the collision at Biggin Hill
Aerodrome, Kent on 15 May 1977**

LONDON
HER MAJESTY'S STATIONERY OFFICE

List of Aircraft Accident Reports issued by AIB in 1978

| <i>No.</i> | <i>Short Title</i> | <i>Date of publication</i> |
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| 1/78 | Bell 206 (Jet Ranger) G-BAYA at Loch Avon, Inverness-shire January 1977 | (forthcoming) |

ACCIDENT INVESTIGATION REPORT

REPORT ON THE COLLISION OF BELL 206 G-BAYA
AT LOCH AVON, INVERNESS-SHIRE, ON 15 JANUARY 1977

Department of Trade
Accidents Investigation Branch
Kingsgate House
66-74 Victoria Street
London SW1E 6SJ

114 APR 1978

The Rt Honourable Edmund Dell MP
Secretary of State for Trade

Sir,

I have the honour to submit the report by Mr P J Bardon an Inspector of Accidents, on the circumstances of the accident to Agusta Bell 206B G-AVSN and DH 82A (Tiger Moth) G-ANDE which occurred at Biggin Hill Aerodrome, Kent on 15 May 1977.

I have the honour to be
Sir
Your obedient Servant

W H Tench
Chief Inspector of Accidents

Accidents Investigation Branch
Aircraft Accident Report No. 2/78
(EW C595)

Operator: Aircraft 1 Ferranti Helicopters Ltd
Aircraft 2 Stapleford Tiger Group

Aircraft *Type*
Aircraft 1 Agusta Bell 206B
Aircraft 2 DH 82A (Tiger Moth)

Nationality
Aircraft 1 British
Aircraft 2 British

Registration
Aircraft 1 G-AVSN
Aircraft 2 G-ANDE

Place of Accident: Biggin Hill Aerodrome, Kent
Latitude 51° 19' North
Longitude 00° 02' East

Date and Time: 15 May 1977 at 0957 hrs

All times in this report are GMT

Synopsis

The accident was notified by the London Air Traffic Control Centre (LATCC) on 15 May 1977. The investigation was carried out by operations and engineering personnel of the Accidents Investigation Branch.

Shortly after lifting-off, the helicopter climbed into the path of the Tiger Moth approaching to land on a grass strip parallel to the runway in use. The helicopter main rotor struck the undercarriage of the Tiger Moth which forced landed successfully, but the helicopter crashed, causing the death of the pilot and all four passengers.

It is concluded that the accident was caused by the helicopter pilot failing to ensure that his proposed flight path was clear of potentially conflicting traffic over which he had no right of way. Inadequate pre-flight notification by the Tiger Moth pilot and the area allocated for the operation of the helicopter were contributory factors.

1. Factual Information

1.1 History of flight

The pilot of a radio equipped Piel Emeraude aircraft, G-AXGY, had agreed to escort two non-radio equipped aircraft, Tiger Moth G-ANDE and Piper Cub G-AXHP, flying in formation with his aircraft from Stapleford Tawney to Biggin Hill. It was arranged that in the event of permission to land at Biggin Hill being refused for any or all three aircraft, he would escort the aircraft back to Stapleford Tawney. The escort pilot has stated he had seen the latest notice to airmen (NOTAM) giving details of operating restrictions at Biggin Hill on 15 May 1977. Also he had spoken to the pilot of a radio equipped aircraft who escorted the same Tiger Moth when it flew to Biggin Hill the day before the accident though with a different pilot. On that occasion the Tiger Moth had landed on the paved Runway 03, and no problems had been encountered.

Although the three pilots in the formation had booked out from Stapleford Tawney for the flight, neither the escort nor the Tiger Moth pilot had telephoned Biggin Hill for landing information prior to the commencement of the 20 mile flight. At 0930 hrs the three aircraft departed from Stapleford Tawney. After establishing radio contact with Biggin Hill Approach on 129.9 MHz, and advising ATC that the formation included two non-radio aircraft, the escort pilot was requested to pass the registration of both of the non-radio aircraft and to report field in sight. This was done. The escort pilot was then asked to call joining downwind for landing on Runway 03. At no time during the exchange of radio messages between Biggin Hill and the escort pilot was the use of the grass strip mentioned.

After ensuring that the other two aircraft were following as arranged, the escort pilot approached the aerodrome on the west side joining downwind for Runway 03 and reported the formation position. He also heard the Approach Controller warn traffic of a non-radio formation in the circuit. After calling downwind the escort pilot was advised to change frequency when turning on to final approach. On changing frequency to 129.4 MHz, the pilot of GY called 'finals' and ATC cleared the formation to land on Runway 03. Whilst on final approach at about 600 feet he saw a helicopter at a lower altitude converging towards his intended flight path from the right. He advised the tower of this conflicting traffic and was told that the helicopter would be landing on the grass in the public area. The escort pilot continued to observe the helicopter until he drew ahead and lost sight of it, and was then informed by his passenger that it had landed prior to his touch-down. After clearing Runway 03 he turned and saw that the Piper Cub had landed on the paved runway and the Tiger Moth was on its final approach. At no time could the escort pilot recall any radio warning of helicopter operations close to the threshold of the runway nor any radio transmissions relating to or directed at the helicopter. During this period the helicopter had offloaded one group of passengers and embarked the next group. The engine and main rotor were kept running and the pilot prepared for lift-off still facing into wind to the north-east. It is stated that a general warning had also been given on the tower frequency of the presence of the formation in the circuit.

The Tiger Moth was number three in the landing stream and was approximately a mile astern of the Piper Cub. The pilot, who was flying the aircraft from the rear seat, had seen the escort aircraft turn on to the final approach, and he had also seen the helicopter converging towards the approach to Runway 03. However, he lost sight of the helicopter just as the Piper Cub turned on to its final approach. After the second aircraft had landed, the Tiger Moth pilot checked the tower for visual signals because he had the 'feeling something was wrong' but saw none. He also observed from the windsock that there was a cross-wind from the right. As he was flying a tailskid equipped aircraft, the pilot elected to land on the newly cut grass strip, parallel to but 59 metres east and 550 metres beyond the beginning of Runway 03, (see Appendix A). This involved making the final approach over some parked aircraft positioned to the east of Runway 03. The Tiger Moth therefore crossed the aerodrome boundary above the helicopter but at an altitude higher

than normal, estimated to have been between 100 to 200 feet. It was at about this time that the helicopter lifted-off still facing north-east and close to the extended centre line of the 03 grass strip. There is no evidence that the pilot called 'lifting-off'. The tower operator on 129.4 MHz had seen the Emeraude and Piper Cub land on the main paved runway and has assumed the third aircraft would do the same. At this point his attention was diverted by other traffic in the circuit. Another tower operator handling traffic on 129.9 MHz also saw the Tiger Moth making its approach and the helicopter lift-off. However because of the viewing angle and the distance of over one kilometre away, he was unable to judge whether the Tiger Moth was landing on the main runway or the grass strip.

By now the speeds of the two aircraft were becoming synchronised, the Tiger Moth being above the helicopter. The helicopter then commenced a rapid climb and at a height estimated to be about 70-100 feet, its rotor collided with the Tiger Moth's undercarriage and became completely detached. The pilot of the Tiger Moth who was seated in the rear seat, heard a loud bang at the same time as a hole appeared in the aircraft floor. The aircraft lurched upwards and to the left and the pilot had a brief glimpse of the helicopter to his right rolling on to its back and falling. He pushed the control column forward and to the left and realising that his undercarriage was damaged, completed a successful forced landing on the main runway. The aircraft then slid off on to the grass. Both occupants of the Tiger Moth were uninjured, but the helicopter wreckage fell on to a parked Cessna F150M and the helicopter pilot and all four passengers were killed. The sole occupant of the Cessna was uninjured.

1.2 Injuries to persons

| <i>Injuries</i> | <i>Crew</i> | <i>Passengers</i> | <i>Others</i> |
|-----------------|-------------|-------------------|---------------|
| Fatal | 1 | 4 | — |
| Non-fatal | — | — | — |
| Minor | — | — | — |

1.3 Damage to aircraft

The Bell 206B was destroyed and the DH 82A Tiger Moth was substantially damaged.

1.4 Other damage

A Cessna F150M parked on the airfield was substantially damaged.

1.5 Personnel information

| | |
|------------------------|---|
| 1.5.1 BELL 206B pilot: | Male |
| Age: | 33 years |
| Licence: | Airline Transport Pilot's Licence valid until 9 February 1986 with RTF licence. |
| Aircraft rating: (A) | Gazelle; Bell 206A/B, MBB 105 |
| (B) | Gazelle; Bell 206/AB |

Medical certificate: Valid until 22 August 1977 with no restrictions.

Flying experience

Total flying time as pilot: 1,899 hours

Flying experience in type: 723 hours

Flying time in previous 28 days: 31 hours

The pilot had been employed by Ferranti Helicopters Ltd since September 1975 and had 2 days rest prior to flying on 14 and 15 May. The pilot completed 20 pleasure flights on the 14th, and 18 on the 15th, each of about 3 to 4 minutes duration. The pilot had carried out similar flights at the 1976 Biggin Hill Air Fair.

1.5.2 DH 82A (Tiger Moth) pilot: Male

Age: 25 years

Licence: Private Pilot's Licence valid for life

Medical certificate: Valid until 30 September 1977 with restrictions for holder to wear spectacles which correct for distant vision

Flying experience

Total time as pilot: 110 hours

Flying experience on type: 23.40 hours

Time in previous 28 days: 1 hour

1.6 Aircraft information

There were valid certificates of airworthiness in respect of both aircraft and they had been maintained in accordance with the appropriate approved maintenance schedules.

1.7 Meteorological information

There is no official meteorological observer at Biggin Hill but the following weather conditions were estimated by ATC to be as follows:

Wind: 060/10-12 kts

Visibility: more than 10 km

Cloud: 5/8 at 3,000 feet

Weather conditions were not considered to be a factor in the accident which occurred in daylight.

1.8 Aids to navigation

Not applicable.

1.9 Communications

The two radio frequencies in use by Biggin Hill at the time of the accident were 129.4 MHz - call sign Biggin Hill Tower and 129.9 MHz, call sign Biggin Hill Approach. As Biggin Hill has no VHF direction finding nor radar facilities for holding, let-down or approach aids, Article 70 of the Air Navigation Order (ANO) requiring that radio transmissions to be recorded did not apply and no recording apparatus was installed. Communications were reported as being normal.

Prior to commencing flying on Saturday 14 May, the helicopter pilot had spoken to Biggin Hill ATC and had arranged that he would call on the radio when he was setting-down and lifting-off, but that if the RTF channel was occupied at those times, he would lift-off on his own initiative and call airborne when a gap in the transmissions occurred. On Sunday 15 May, prior to the commencing of flying, the helicopter pilot confirmed with ATC on the radio that these arrangements still stood.

There is no evidence of any radio communications between the helicopter pilot and the Tower just prior to or after lifting-off on the accident flight.

1.10 Aerodrome and ground facilities

1.10.1 The Aerodrome

Biggin Hill Aerodrome, elevation 600 feet, is situated below the London TMA airspace and licensed for public use. Surrey Aviation Ltd operate and administer the aerodrome. They had notified the Civil Aviation Authority (CAA) of an International Air Fair to be held on 13, 14 and 15 May 1977 and had requested a NOTAM to be issued informing pilots of aerodrome restrictions and instructions applying on those days. The wording of this NOTAM is given in full in paragraph 1.17.4 of this report.

The CAA Air Pilot on 15 May 1977 listed information about Biggin Hill grass area's under section AGA 2.4.1 item 26(c) which included the following:

'2 marked strips, one to the north of and adjoining RW 11/29 and the other to the east of the adjoining disused RW 05/23'.

This page was dated 30 November 1976.

However there was in existence awaiting issue, an Air Pilot page amendment dated 24 March 1977 giving details of a grass RW parallel and close to the main paved RW 03/21. Advice of this change of information and page amendment had not been promulgated with a Class 2 NOTAM.

In the AERAD flight guide on 15 May 1977 the landing chart for Biggin Hill gave the following information on use of the grass strips:

'Light aircraft may use marked grass strips north of RW 29 and east of RW 03/21 when permitted'.

This page was also dated 30 November 1976.

The Biggin Hill airport rules issued by Surrey Aviation Ltd dated August 1976 under section 1.4:

'Non-radio aircraft are restricted to grass runways'.

1.10.2 *Air traffic control unit (ATCU)*

The two persons on duty appointed by Surrey Aviation to operate the RTF communications were both experienced tower operators, one of whom possessed an ATCO licence, though not validated for Biggin Hill.

However as there was no statutory requirement for a licensed ATC officer with a valid rating to be on duty during the Air Fair, the ATCU was operating an unlicensed air traffic control service at the time of the accident.

The ATCU was sited in a building west of RW 03/21 approximately 1,000 metres north of the helicopter site in use on 15 May. The ATCU operated in conjunction with a flight clearance officer situated in the old civil control tower on the south-east apron and also with a pilots' briefing tent close to the beginning of Runway 03. Left hand circuits were in operation for the fixed wing and right hand circuits for the helicopter pleasure flights. On the previous day, Runway 21 had also been in use during the Air Fair.

1.11 **Flight recorder**

Neither aircraft was required to be fitted with flight recorder equipment and none was fitted.

1.12 **Wreckage**

1.12.1 *Bell 206B*

After striking the Tiger Moth the rotor head and blades of the Bell 206B detached and the helicopter fell to the ground nose first. At ground impact the landing gear was torn off and the cabin suffered gross deformation. Major fuel release resulted, but there was no fire. The tailboom struck a parked Cessna 150M and broke off, and the helicopter came to rest on its starboard side. The main rotor gearbox detached and came to rest approximately 75 m further along the line of the flight path. The majority of the aircraft wreckage fell within 50 m of the crowd enclosure barrier, with the exception of the main rotor blades and head which landed approximately 50 m to the north-west of the main wreckage, ie on the side away from the barrier.

1.12.2 *DH 82A Tiger Moth*

The collision resulted in the break up of the Tiger Moth's fixed main undercarriage, all major portions of which were found among a trail of small pieces of wreckage extending back along the flight path for approximately 120 m from the helicopter ground impact point. Damage also resulted to the Tiger Moth propeller blade tips, fuselage undersurface, particularly in the region of the rear cockpit, and to the undersurface of the port lower mainplane at its root. The Tiger Moth did not suffer any major damage as a result of the belly landing.

1.13 **Medical and pathological information**

Bell 206B pilot

A post-mortem examination did not reveal any evidence of a medical condition which could have contributed to the accident. Death was due to multiple injuries.

Tiger Moth pilot

The pilot was required to wear spectacles which correct for distant vision and he was wearing them.

1.14 Fire

There was no fire.

1.15 Survival aspects

This was a non-survivable accident for the Bell 206B occupants, all of whom received fatal multiple injuries. Both Tiger Moth pilots were wearing full safety harness.

1.16 Tests and research

Nil

1.17 Additional information

1.17.1 Air Displays Ltd

The Air Fair was administered by Air Displays Ltd but all aspects of flying including the control of air traffic and matters relating to air safety were under the control of Surrey Aviation Ltd. Although the closure of the grass strip 03/21 was not promulgated by NOTAM during the Air Fair, it was the intention of the organisers that it would be primarily used as a taxiway, except by prior arrangement and then at the discretion of ATC. Prior arrangements for the use of the strip had been made with Popular Flying Association (PFA) participants and certain display aircraft.

1.17.2 Popular Flying Association aircraft (PFA)

Visiting PFA participants to the Air Display had been briefed by letter and instructed to arrive at Biggin Hill on 14 and 15 May before 0930 hrs and PFA non-radio aircraft were requested to arrange a radio equipped escort aircraft to accompany them or else obtain Prior Permission (PPR) before departure. Some aircraft landed on the grass strip between 0930 and 0935 hrs on 15 May during the helicopter operating period. The Tiger Moth was not a PFA aircraft, and therefore not included in these arrangements.

1.17.3 Pilots' briefing

All pilots participating in the Air Display flying programme on 14 and 15 May were required to attend a formal briefing, but this did not apply to the helicopter or fixed wing pleasure flight pilots who received their instructions from ATC. The helicopter pilot was accordingly given instructions by ATC on 14 May as to the circuit direction and height to be flown.

On 14 May after operating east of the main runway when landings were to the south on Runway 21, the helicopter pilot was requested by the Air Fair organisers to move his operating point to a position just south of Runway 11 threshold, approximately 80 metres east of the 03 centre line (see Appendix A). It was from this area on 15 May, that 18 flights prior to the accident were operated, all with the full agreement of Surrey Aviation, ATC and also the PFA, whose aircraft were parked close by.

During 14 May the helicopter pilot had briefed one of the ground despatchers to keep a lookout for any other aircraft (and also ground movements) whilst he lifted-off and completed a 360 degree turn and to indicate by pre-arranged signal when it was clear for the helicopter to climb away. These arrangements were not repeated with another despatcher on 15 May.

1.17.4 *Prior Permission Required (PPR)*

The CAA Air Pilot publication states there are three categories of aerodrome where prior permission is required.

These are Military, Ordinary and Unlicensed aerodromes. A Note under Unlicensed aerodromes states:

‘The persons in charge of most aerodromes which are licensed for private use or unlicensed require application for permission to land to be made by telephone prior to take off: in cases where permission by radio telephone (RTF) is acceptable or where application in writing is required this is stated in the Air Pilot’.

Biggin Hill, although not in any of the three categories mentioned, had promulgated a NOTAM requiring the PPR procedure from 25 April until the Air Fair and also restricting the use of the aerodrome to radio equipped aircraft. However ATC were accepting non-radio aircraft escorted by radio equipped aircraft on 15 May.

The NOTAM, A199, stated the following:

‘A199 Biggin Hill Airport International Air Fair. From 25 April 1977, and until further notice, work will be in progress in preparation for the Annual Air Fair. The airport will be PPR. Pilots are warned of the unusual and intensive air traffic and temporary unmarked obstructions on the aerodrome.

2. From 13 to 15 May inclusive, use of the aerodrome will be restricted to radio equipped aircraft able to communicate with Biggin Tower on 129.4 MHz and Biggin Approach on 129.9 MHz.

3. From 13 to 15 May inclusive, the following restrictions and instructions will apply:

(a) All aircraft will have to use Runways 03/21 only

(b) The airport will be closed to all traffic not connected with the flying display between the following hours on:

13 May 1300 - 1600

14 May 1130 - 1700

15 May 1130 - 1700

(c) In the event of radio failure:

(i) After receiving joining instructions: Aircraft may land subject to visual signals.

(ii) Before receiving joining instructions: Aircraft must divert.

(d) Permission to start up must be obtained from ATC and this will not be given during the parachute display’.

This NOTAM had not been seen by the pilot of the Tiger Moth.

1.17.5 *Rules of the Air and Air Traffic Control Regulations*

Under Section 1 'Interpretation' of The Rules of the Air and Air Traffic Control Regulation, 'Runway' means an area, whether paved or not, which is provided for the take-off or landing run of an aircraft.

Under Section IV 'General Flight Rules' it states:

Rule 17(1) General

- (a) Notwithstanding that the flight is being made with air traffic control clearance it shall remain the duty of the commander of an aircraft to take all possible measures to ensure that his aircraft does not collide with any other aircraft.

It also states:

Rule 17 (5) Landing

An aircraft while landing or on final approach to land shall have the right of way over aircraft in flight or on the ground or water.

Under Section X 'Signals in the aerodrome signals area'

The ground signal of a white dumbbell with a black strip across each disc, at right angles to the shaft, signifies that aeroplanes and gliders taking-off and landing shall do so on a runway, but that movement on the ground is not confined to paved, metalled or similar hard surfaces.

The ground signals area at Biggin Hill on 15 May was not positioned outside the control tower in use but was by the south-east civil control tower. The above signal was not displayed at the time of the accident.

1.17.6 *Safety arrangements at flying displays and air races*

The CAA had earlier issued a pamphlet, JH/59/07, titled 'Safety arrangements at Flying Displays and Air races', dated 1973. Under section 4, it recommends that the minimum distance between the display axis centre line or runway along which aircraft take-off and land and the public enclosure boundary shall be 150 metres (500 feet).

The latest edition dated July 1977 had reduced this to 107 metres (350 feet) for display aircraft with speeds up to 200 kts.

At Biggin Hill the initial take-off flight path of the helicopter was within 50 metres of the public enclosure and after the collision wreckage fell within this 50 metre area. There was no explosion or fire and the favourable wind direction resulted in some of the wreckage drifting away from rather than towards the public area.

1.17.7 *Helicopter and Tiger Moth pilots' restrictions to vision*

From the rear pilot's seating position in the Tiger Moth, the field of view through an arc of 45 degrees, forward and below, is obscured by the lower main plane.

The helicopter pilot was seated on the right side of the cockpit. The metal roof above his head had a direct vision panel which enabled the pilot to look vertically above and to the right. However an aircraft above and to the left of the helicopter centre line would not be seen.

2. Analysis

As the Rules of the Air state specifically that an aircraft approaching to land has right of way, the onus was therefore on the helicopter pilot to ensure, before he lifted-off, that his aircraft was not likely to conflict with traffic on the approach. It is quite apparent that he did not do so. It does not follow that as the helicopter was operating to one side of the runway, the pilot had no reason to expect an aircraft to approach from behind him. Even if it was his belief that there were no more movements expected on to the grass strip, he should still have had in mind the possibility that an aircraft could cross his operating area whilst overshooting, either from a misaligned approach or because the runway was temporarily blocked. It would seem that he may have had these considerations in mind when he was operating on the day before the accident, as not only had he arranged with a marshaller to signal when it was clear to climb away, he had also carried out a turn through 360 degrees after lifting-off. His reason for not persisting with these arrangements on the second day are not known, but clearly had he done so the accident would most probably not have occurred. This is not to say that a clearing turn through 360° should invariably have been made on each occasion, as such a turn is not always either practicable or safe. Nevertheless, it is considered that the pilot should have carried out a partial turn in the hover to check that all was clear behind him before making his transition into forward flight. On this occasion a 90° turn to the right through the wind would have been quite practicable and provided the pilot with a clear view of the approach both to the runway and the grass strip. It is probable in that case that he would have seen the Tiger Moth and it is inconceivable that a pilot of his experience would not have taken it into account before continuing his flight.

Notwithstanding the fact that the Tiger Moth had right of way, the actions of the pilot cannot wholly escape criticism as he also had a responsibility to ensure that his aircraft did not collide with any other aircraft. It would appear that he did not discharge that responsibility inasmuch as, having seen the helicopter converge towards his intended approach path, he seemed content to lose sight of it and rely wholly upon visual signals from ATC to tell him if he was coming too close to other aircraft, despite his 'feeling that something was wrong'.

It is now necessary to consider the actions of ATC in relation to the circumstances leading to the accident and to determine whether or not the personnel on duty ought to have foreseen that the risk of a collision existed. Insofar as the acceptance by ATC of the formation into the circuit provided the ingredients for the collision it can be argued that it was within ATC's power to have averted the risk of collision by refusing permission for the formation to continue towards the airfield. However this is to suggest that the relationship between the acceptance of the formation and the risk of collision should have been immediately apparent to ATC but this argument cannot be sustained. The only grounds that ATC had for refusing permission for the formation to continue were if, in the opinion of the controller, adequate separation between it and other aircraft could not be provided. This would doubtless have been his opinion if at the time display flying was in progress, but as it was not, he quite reasonably concluded that the formation could be accommodated into the circuit. It can also be argued that ATC acted contrary to the terms of the NOTAM inasmuch as it accepted non-radio aircraft into the circuit when it was specifically stated that only aircraft equipped with radio would be acceptable. In fact it was within the controller's discretion to vary the application of the terms of the NOTAM as he saw fit and it was not unreasonable that he should have accepted the formation on the grounds that it was a radio equipped movement over which he had control. However some criticism can be made of the manner in which this control was subsequently exercised. It might have been better had the escort pilot been instructed to report 'downwind' on the tower frequency. As it was, much of that which passed on the approach frequency whilst the formation was downwind was unheard by the helicopter pilot, though presumably he could have heard the general warning that it is stated was given on the tower frequency of the presence of the formation in the circuit. However this warning would not necessarily have indicated to him that the formation was about to land, and it would seem that he was not specifically warned of this.

Though of course such a warning could only have been beneficial, it does not necessarily follow that had it been given the outcome would have been any different, as it was not at all apparent to ATC that the Tiger Moth was approaching the grass strip. There is no reason why this should have been anticipated as on the previous day the same aircraft had landed on the runway though on that occasion it was being flown by another pilot. It is concluded that the accident would most probably have been prevented had ATC been advised in advance that it was the Tiger Moth pilot's intention to land on the grass strip but they received no intimation of this at any time. It is considered that before take-off the leader of the formation and the Tiger Moth pilot should have discussed more fully than appears to have been the case their respective intentions on arrival at Biggin Hill particularly as they must have been well aware from the NOTAM that there was the possibility of 'unusual and intensive air traffic'. The accident would most probably not have happened had they taken the simple precaution of telephoning Biggin Hill before departure and ascertaining if it was possible to use the grass strip, particularly as the NOTAM stated that all aircraft 'will have to use Runways 03/21 only'. Though this appeared not to preclude the use of the grass strip, such an inference might reasonably have been drawn bearing in mind the nature of the occasion and notwithstanding the existence of the airport rule which stated that 'non-radio aircraft are restricted to grass runways'. The possibility that the rule might have been varied in order to accommodate public enclosures and parking areas could have been anticipated sufficiently to raise a doubt as to whether or not the grass strip would still be available. Nevertheless it is conceded that the NOTAM was capable of more than one interpretation and it was expecting a great deal that the intentions of the organisers as regards the use of the grass strip would be inferred correctly by all who read the NOTAM. It would have been obviously preferable if the NOTAM had been positively worded not only in relation to the grass strip and the occasions when it might be (and was) used, but also with regard to the conditions under which non-radio aircraft could be (and were) accepted.

With the benefit of hindsight, it can be said that the operating area allocated to the helicopter by the Air Fair organisers was not well chosen as it was too close to the fixed wing aircraft manoeuvring area. In the light of what happened, it is doubtful if there is anyone who would now dispute this. But at the time, the choice of area for the helicopter did not appear to be unreasonable in the opinion of all those concerned, particularly as the same area had been used without incident on several occasions during previous Air Fairs and was considered to be the most convenient for the purpose. Nevertheless, it is considered that it ought to have been envisaged that the choice of this particular site might prove to be a distraction to any pilot approaching the runway. The pilot of the leading aircraft in the formation certainly appeared to find it so. It is also of some concern that the helicopter operating area was as close as it was to the public enclosure and it is considered that the possible consequences of an accident to public safety ought to have been foreseen. Though the advice given in the CAA pamphlet as to the recommended minimum distances of flight paths from public enclosures referred only to display aircraft, it is considered that the Air Fair organisers might have borne those distances in mind as a reasonable criterion when siting the helicopter area. As it was, it can only be regarded as fortuitous that no injury resulted to any persons on the ground as a result of the collision. A further point that ought to have been considered in connection with the helicopter operating area was the provision of ground markings in accordance with Section X of the Rules of the Air.

It is for consideration that the control of air traffic is not best provided in instances of this kind from a relatively distant control tower. Bearing in mind the wide variety of aircraft operating at Air Fairs of this nature, a higher standard of flight safety might result if the control of aircraft in the manoeuvring area was provided from a Runway Control Vehicle, equipped with the appropriate radio and visual aids.

As was the case on the occasion of the previous accident at the 1975 Biggin Hill Air Fair (Aircraft Accident Report 10/76 refers) many of those concerned could not subsequently recollect the precise sequence of events prior to the accident. As was stated in the earlier report, this particular problem could have been overcome to a large extent had RTF recording apparatus been installed

at the aerodrome. Though the aerodrome is not within the scope of Article 70(2) of the Air Navigation Order 1976, it is considered nonetheless that RTF ought to be recorded because of the large volume of general aviation traffic handled by the Aerodrome. If it is not possible to apply ANO 70(2) to Biggin Hill, then it is considered that special provision ought to be made anyway for the installation of RTF recording apparatus at the aerodrome.

3. Conclusions

(a) Findings

- (i) Both the aircraft involved in the collision had been properly maintained and their documentation was in order.
- (ii) Both the pilots involved in the collision were properly licensed and adequately experienced to undertake their respective flights.
- (iii) The pilot of the Tiger Moth did not take adequate precautions before his flight to brief himself fully on the arrangements for aircraft visiting the Air Fair. Nor did he ensure prior to his departure from Stapleford Tawney that either his formation leader or Biggin Hill ATC were aware of his intentions to land on the grass strip, which he should not have used without express agreement.
- (iv) The area chosen for the operation of the helicopter conflicted with aircraft approaching the grass strip and constituted a distraction to the pilots of aircraft landing on Runway 03. It was also too close to the public enclosure.
- (v) The helicopter pilot did not ensure before taking-off that his proposed flight path was clear of potentially conflicting traffic over which he had no right of way. The Tiger Moth pilot did not take all possible measures to ensure that his aircraft did not collide with any other aircraft.
- (vi) In the circumstances leading to the accident, ATC could not reasonably have recognised that a collision risk existed. However the helicopter pilot should have been warned that the formation was about to land. Also the control of air traffic on the downwind leg of the circuit should have been exercised on the tower frequency to which the helicopter's radio was also tuned.
- (vii) The NOTAM relating to the Air Fair did not make it clear that non-radio aircraft would be accepted subject to certain conditions, nor did it make it clear that the grass strip was not to be used other than by prior arrangement. The lack of clarity with regard to the Air Fair organisers' intentions with respect to the use of the grass strip and the acceptance of non-radio aircraft was a factor in the accident.

(b) Cause

The accident was caused by the helicopter pilot failing to ensure that his proposed flight path was clear of potentially conflicting traffic over which he had no right of way. Inadequate pre-flight notification by the pilot of the Tiger Moth of his intentions and the area allocated for the operation of the helicopter were contributory factors.

4. Safety Recommendations

It is recommended that:

- 4.1 If positive control cannot be provided by an air traffic control service, then the helicopter operating area should be sited far enough from the main aircraft movement area to provide adequate geographical separation between the fixed wing and rotary wing aircraft during take-off and landing.
- 4.2 The operators of all pleasure flight helicopters at air displays provide the services of suitably qualified personnel to advise the pilots that their take-off flight path is clear.
- 4.3 Prior to future Air Fairs at Biggin Hill the conditions relating to the acceptance of non-radio aircraft and the use of the grass strip be more precisely defined and more widely promulgated than was the case in this instance.
- 4.4 RTF recording apparatus be installed at Biggin Hill on a permanent basis.
- 4.5 Consideration be given to the provision of an appropriately manned and equipped Runway Control Vehicle at future air displays at Biggin Hill.

P J Bardon
Inspector of Accidents

Accidents Investigation Branch
Department of Trade