Australian Government

Australian Transport Safety Bureau

ATSB TRANSPORT SAFETY REPORT
Aviation Occurrence Investigation AO-2009-018
Final

Midair collision
15 km SE Springvale Station, WA
5 May 2009
VH-PHT, Robinson Helicopter Company R22 Beta II
VH-HCB, Robinson Helicopter Company R22 Beta II

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Abstract

On 5 May 2009, two Robinson Helicopter Company R22 Beta II helicopters, registered VH-PHT and VH-HCB collided midair about 15 km south-east of Springvale Station, WA. Both helicopters had departed the station just prior to sunrise that morning to conduct mustering operations.

The first helicopter was observed departing to the east in order to make radio contact with an adjoining station prior to heading for the mustering area. The other helicopter departed about 10 minutes later and was observed heading to the south-east, the general direction to the area that was to be mustered.

The helicopters were due to refuel at about 0830 at a place to be arranged, depending on the progress of the mustering operation. When the pilots failed to respond to radio calls from ground personnel, a pilot from a nearby station was tasked to conduct a search by helicopter. The helicopters were subsequently located about 15km to the south-east of Springvale Station and about 2km north of the planned mustering area.

The circumstances of the accident were consistent with a midair collision while the pilots were positioning to commence the muster. The converging flight paths of the helicopters, pilot fatigue and sun glare from the rising sun are identified as contributing safety factors.

THE AUSTRALIAN TRANSPORT SAFETY BUREAU

The Australian Transport Safety Bureau (ATSB) is an independent Commonwealth Government statutory agency. The Bureau is governed by a Commission and is entirely separate from transport regulators, policy makers and service providers. The ATSB's function is to improve safety and public confidence in the aviation, marine and rail modes of transport through excellence in: independent investigation of transport accidents and other safety occurrences; safety data recording, analysis and research; fostering safety awareness, knowledge and action.

The ATSB is responsible for investigating accidents and other transport safety matters involving civil aviation, marine and rail operations in Australia that fall within Commonwealth jurisdiction, as well as participating in overseas investigations involving Australian registered aircraft and ships. A primary concern is the safety of commercial transport, with particular regard to fare-paying passenger operations.

The ATSB performs its functions in accordance with the provisions of the *Transport Safety Investigation Act 2003* and Regulations and, where applicable, relevant international agreements.

Purpose of safety investigations

The object of a safety investigation is to identify and reduce safety-related risk. ATSB investigations determine and communicate the safety factors related to the transport safety matter being investigated. The terms the ATSB uses to refer to key safety and risk concepts are set out in the next section: Terminology Used in this Report.

It is not a function of the ATSB to apportion blame or determine liability. At the same time, an investigation report must include factual material of sufficient weight to support the analysis and findings. At all times the ATSB endeavours to balance the use of material that could imply adverse comment with the need to properly explain what happened, and why, in a fair and unbiased manner.

Developing safety action

Central to the ATSB's investigation of transport safety matters is the early identification of safety issues in the transport environment. The ATSB prefers to encourage the relevant organisation(s) to initiate proactive safety action that addresses safety issues. Nevertheless, the ATSB may use its power to make a formal safety recommendation either during or at the end of an investigation, depending on the level of risk associated with a safety issue and the extent of corrective action undertaken by the relevant organisation.

When safety recommendations are issued, they focus on clearly describing the safety issue of concern, rather than providing instructions or opinions on a preferred method of corrective action. As with equivalent overseas organisations, the ATSB has no power to enforce the implementation of its recommendations. It is a matter for the body to which an ATSB recommendation is directed to assess the costs and benefits of any particular means of addressing a safety issue.

When the ATSB issues a safety recommendation to a person, organisation or agency, they must provide a written response within 90 days. That response must indicate whether they accept the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

The ATSB can also issue safety advisory notices suggesting that an organisation or an industry sector consider a safety issue and take action where it believes it appropriate. There is no requirement for a formal response to an advisory notice, although the ATSB will publish any response it receives.

TERMINOLOGY USED IN THIS REPORT

Occurrence: accident or incident.

Safety factor: an event or condition that increases safety risk. In other words, it is something that, if it occurred in the future, would increase the likelihood of an occurrence, and/or the severity of the adverse consequences associated with an occurrence. Safety factors include the occurrence events (e.g. engine failure, signal passed at danger, grounding), individual actions (e.g. errors and violations), local conditions, current risk controls and organisational influences.

Contributing safety factor: a safety factor that, had it not occurred or existed at the time of an occurrence, then either: (a) the occurrence would probably not have occurred; or (b) the adverse consequences associated with the occurrence would probably not have occurred or have been as serious, or (c) another contributing safety factor would probably not have occurred or existed.

Other safety factor: a safety factor identified during an occurrence investigation which did not meet the definition of contributing safety factor but was still considered to be important to communicate in an investigation report in the interests of improved transport safety.

Other key finding: any finding, other than that associated with safety factors, considered important to include in an investigation report. Such findings may resolve ambiguity or controversy, describe possible scenarios or safety factors when firm safety factor findings were not able to be made, or note events or conditions which 'saved the day' or played an important role in reducing the risk associated with an occurrence.

Safety issue: a safety factor that (a) can reasonably be regarded as having the potential to adversely affect the safety of future operations, and (b) is a characteristic of an organisation or a system, rather than a characteristic of a specific individual, or characteristic of an operational environment at a specific point in time.

Risk level: The ATSB's assessment of the risk level associated with a safety issue is noted in the Findings section of the investigation report. It reflects the risk level as it existed at the time of the occurrence. That risk level may subsequently have been reduced as a result of safety actions taken by individuals or organisations during the course of an investigation.

Safety issues are broadly classified in terms of their level of risk as follows:

- **Critical** safety issue: associated with an intolerable level of risk and generally leading to the immediate issue of a safety recommendation unless corrective safety action has already been taken.
- **Significant** safety issue: associated with a risk level regarded as acceptable only if it is kept as low as reasonably practicable. The ATSB may issue a safety recommendation or a safety advisory notice if it assesses that further safety action may be practicable.
- **Minor** safety issue: associated with a broadly acceptable level of risk, although the ATSB may sometimes issue a safety advisory notice.

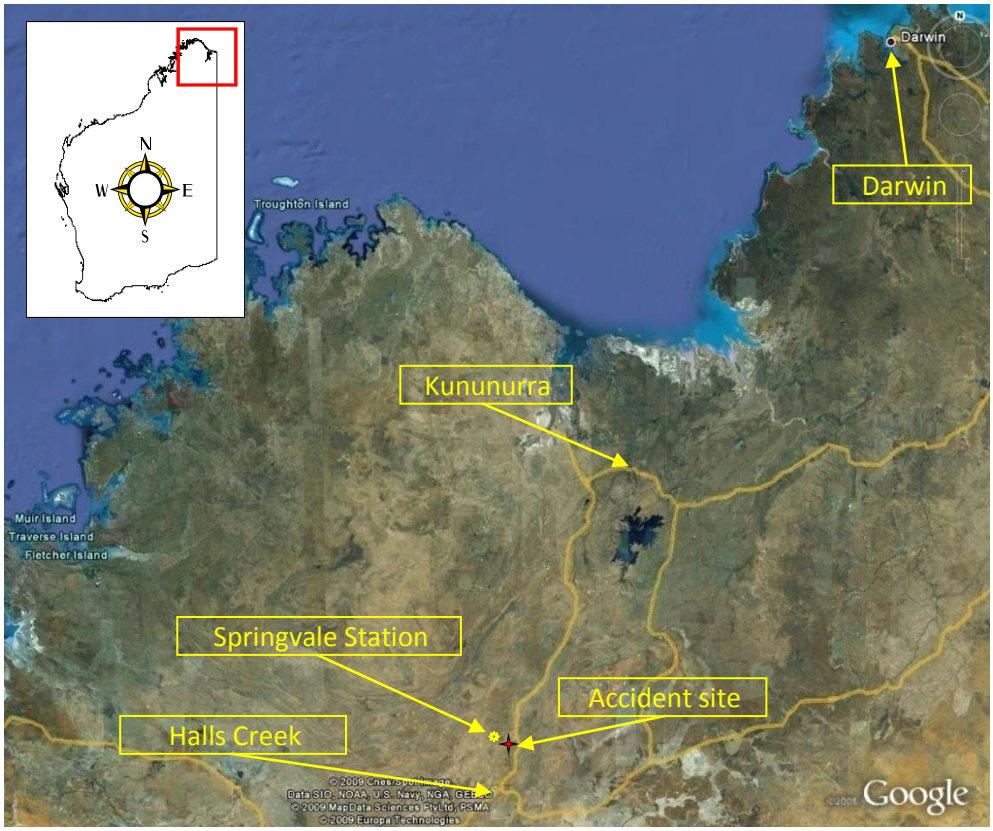
Safety action: the steps taken or proposed to be taken by a person, organisation or agency in response to a safety issue.

FACTUAL INFORMATION

History of the flight

On 5 May 2009, two Robinson Helicopter Company R22 Beta II helicopters, registered VH-PHT (PHT) and VH-HCB (HCB), collided midair about 15 km south-east of Springvale Station, which was about 50 km north-north-west of Halls Creek, WA (Figure 1). The two helicopters were engaged in, or en route to, mustering operations to the south-east of the station. HCB was owned and operated by the owner/occupier of the station, and PHT was contracted from another helicopter operator for the muster.

Figure 1: Area map



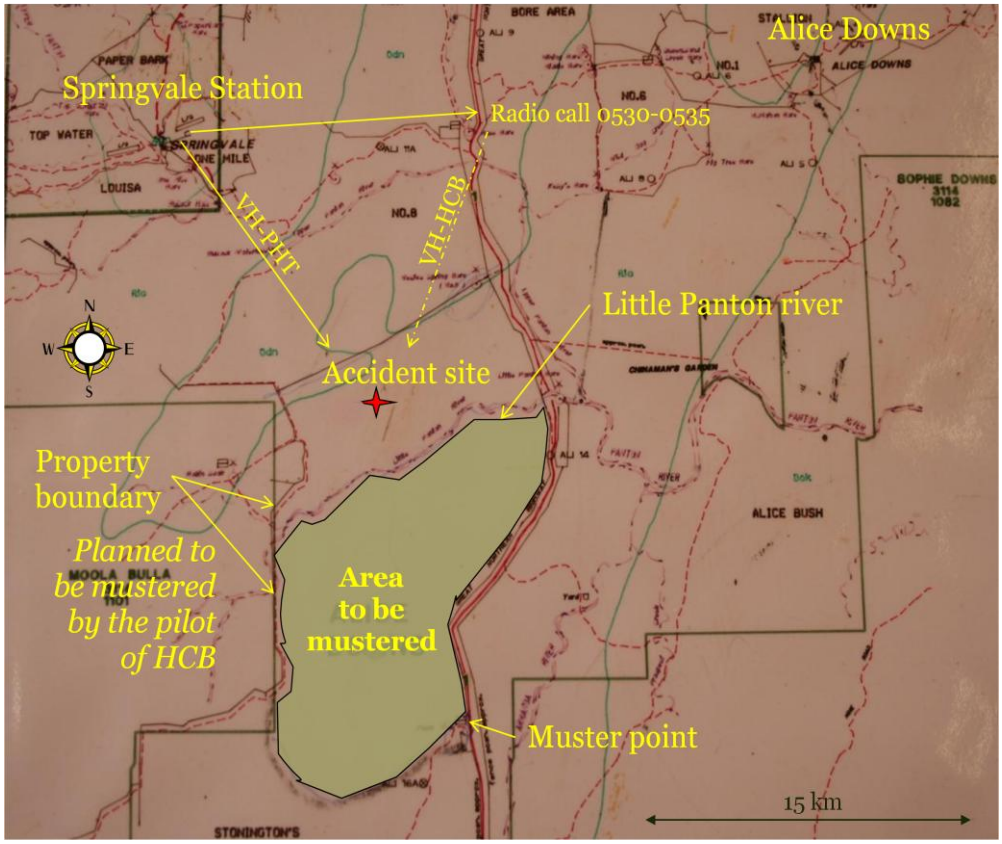
It was reported that both pilots discussed the planned mustering operation the evening prior to the accident. Neither pilot had previously conducted mustering in that particular area, however, the pilot of HCB had mustered on the station the previous season and was reported to be familiar with the intended mustering area. The station manager reported that, due to the sensitivity of flying near adjoining property boundaries, the pilot of HCB was planned to muster that particular area.

On the morning of the accident, the pilot of HCB was tasked by the station manager to initially fly east towards the neighbouring Alice Downs (Figure 2) in order to make contact with that station via ultra high frequency (UHF) radio and to organise equipment for the muster. The station manager reported that both pilots discussed that task prior to their departures from Springvale Station.

At about 0520 Western Standard Time[1], HCB departed Springvale Station and was observed by the station manager heading in an easterly direction. The station manager recalled hearing the pilot of HCB talking to the Alice Downs ground crew via UHF between 0530 and 0535.

After collecting his personal water supply, the pilot of PHT departed Springvale Station at about 0530 and was observed by the station manager, heading in a south-easterly direction towards the planned mustering area (Figure 2).

Figure 2: Mustering area



The station manager later drove from Springvale Station to Halls Creek where he collected drum fuel for the helicopters at about 0730. That was in preparation for a planned 0830 refuel at a place to be arranged with the pilots once the progress of the mustering operation was known.

At about 0810, in preparation for the planned refuel, the station manager began calling the pilots of the two helicopters using a UHF radio that was installed in the motor vehicle. Suspecting that the helicopters were out of UHF range[2], the station manager drove north along the Great Northern Highway to the Little Panton River, and then south back to the muster point[3] at Palm Well (Figure 2).

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1 The 24-hour clock is used in this report to describe the local time of day, Western Standard Time, as particular events occurred. Western Standard Time was Coordinated Universal Time (UTC) + 8 hours.

2 UHF range is dependent on transmitter power and relies on a line of sight signal path. The typical range in this instance was between 5 and 20 km.

3 Position to which the cattle were planned to be mustered (or driven) by the pilots.

The station manager and a station worker associated with the muster, then drove in separate vehicles from the muster point to the Little Panton River. During that time, they both attempted to make contact with the pilots.

At about 0910, the station manager and worker arrived at the Little Panton River and, soon after, noticed a fire located to the west. Given that it was now 40 minutes past the agreed refuel time, they considered the possibility that the fire may have been associated with the missing helicopters. The station worker subsequently drove to the station homestead to check if the helicopters had returned there, while the station manager made a final run to Palm Well before also returning to the station homestead.

Once it had been established the helicopters had not returned to the homestead, the station manager phoned a nearby station and requested they send a helicopter to Springvale Station in order to commence a search for the overdue helicopters.

The search helicopter departed the nearby station at about 0945 and noticed the fire while en route to Springvale Station. On arrival overhead the fire, the pilot was able to identify the remains of the two helicopters and observed that the respective pilots appeared to have sustained fatal injuries. The search helicopter subsequently arrived at Springvale Station at about 1000 to collect the station manager before returning to the accident site.

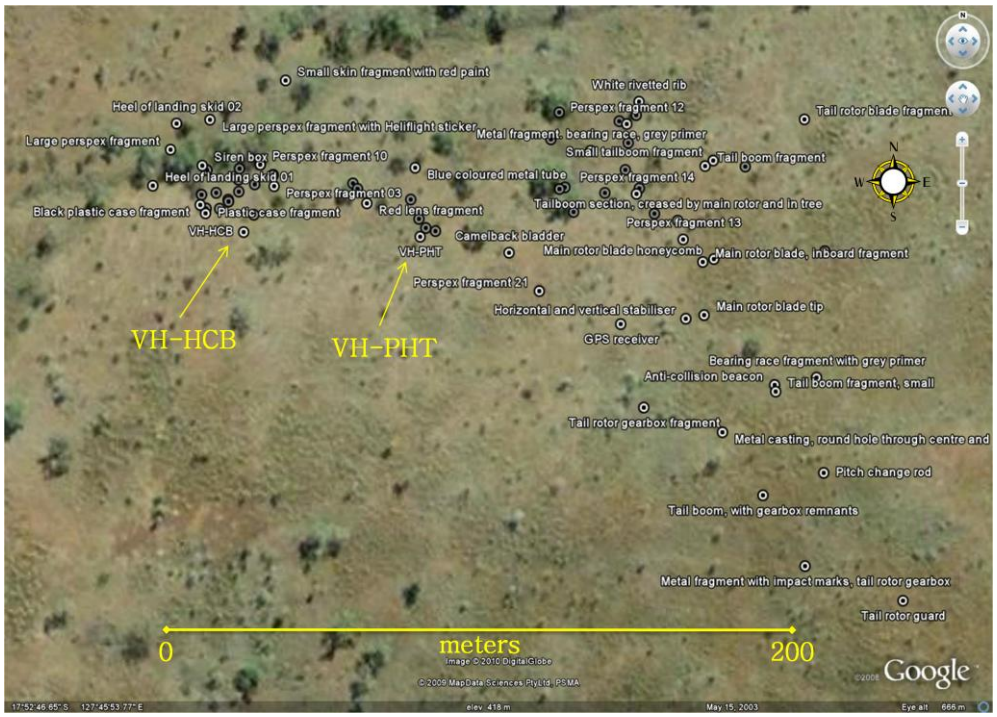
At about 1015, the search helicopter landed at the accident site. The station manager and pilot were then able to confirm that both pilots, the sole occupants of their respective helicopters, were fatally injured.

Damage to the helicopters

Both helicopters were seriously damaged[4] as a result of impact forces associated with the midair collision, the impact with terrain and post-impact fires. The wreckage was scattered over an area of about 260 m by 100 m (Figure 3).

[4] The Australian Transport Safety Regulations 2003 definition of 'serious damage' includes the destruction of the transport vehicle.

Figure 3: Wreckage scatter



Personnel information

The pilot of HCB held a valid Commercial Pilot (Helicopter) Licence that was issued in September 1998 and was endorsed to fly the R22 helicopter. The pilot was also approved to conduct mustering, and held a valid Class 1 Civil Aviation Medical Certificate with nil restrictions.

At the time of the accident, the pilot had accrued about 2,127 hours flight time, of which the majority were in R22 helicopters. That included mustering operations at the same station the previous season.

The pilot of PHT held a valid Commercial Pilot (Helicopter) Licence that was issued in January 1995, was endorsed to fly the R22 helicopter, and was approved to conduct mustering. The pilot's partner reported that he renewed his medical in New Zealand in March 2009.

At the time of the accident, the pilot of PHT had accrued about 4,944 hours of flight time. The pilot's flying hours in the R22 could not be accurately determined; however, it was reported that he had accumulated considerable experience in that type of helicopter, including in aerial mustering.

Both pilots had a rest day on the day prior to the accident. However, it was reported that during the course of their rest day, both pilots conducted minor servicing that included an oil change on their respective helicopters. In addition, the pilot of HCB worked for several hours earlier that day yarding cattle on the station.

The pilots' flying hours for the 9 days preceding the accident are shown in Table 1.

Table 1: Pilots' flying hours for the 9 days preceding the accident

Date	Pilot of HCB	Pilot of PHT
26 April	11.6	11.6
27 April	11.6	11.6
28 April	Nil entry	2.6
29 April	6.5	6.8
30 April	10.5	12.5
1 May	10.5	10.5
2 May	10.8	10.8
3 May	10.1	10.1
4 May	Reported day off	Reported day off
5 May	Day of the accident	

Aircraft information

Both helicopters were Robinson Helicopter Company R22 Beta IIs and were manufactured in the US.

The serial number of PHT was 3,302. It was manufactured in 2002, and its last recorded total time in service was 3,045.7 hours, 2 days prior to the accident. PHT had a current maintenance release and certificate of registration. The engine was overhauled at the 2,200 hour inspection[5] and had accumulated about 880 hours since overhaul.

The serial number of HCB was 3,440. It was manufactured in 2003, and its last recorded total time in service was 2,399.8 hours on 19 December 2008. HCB had a current maintenance release as well as a current certificate of registration. The engine was overhauled at the 2,200 hour inspection and had accumulated about 200 hours since overhaul.

Maintenance records supplied by the organisation that maintained both helicopters were incomplete. A review of the available maintenance data covering the last 6 months found nothing that would have contributed to the accident.

Meteorological information

The weather conditions on the morning of the accident were reported to be fine with light to moderate easterly winds. Those observations were supported by information obtained from the Bureau of Meteorology.

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[5] The engine overhaul coincides with the airframe manufacturer's requirement to 'remanufacture' the airframe at each 2,200 hours of flight operations. This process involves the replacement of certain lifed components, and permits the re-certification of the aircraft for a further 2,200 hours of operation.

On the day of the accident, civil twilight commenced at 0521 and sunrise occurred at 0544.

Although the time of the collision could not be accurately determined, the sun's azimuth[6] from sunrise to 0810 was calculated to be north-easterly at a bearing of between 73° and 58° respectively and its elevation[7] between 0° and 30° above the horizon.

Aids to navigation

A Garmin Global Positioning System (GPS) Pilot 3, which was owned by the pilot of PHT, was identified at the accident site and sent to the Australian Transport Safety Bureau (ATSB) laboratory in Canberra for further analysis. That analysis confirmed that the GPS was not in operation on the day of the accident but previous track history was available on the unit.

Communication

Both helicopters were fitted with very high frequency (VHF) and UHF radios.

Two-way UHF radios are commonly used for communications between ground personnel and were installed in most motor vehicles and homesteads in the area. They are of relatively low power and rely on line-of-sight signal paths. Dependant on the local terrain and conditions; their serviceable range is typically limited to between 5 and 20 km.

The station manager recalled hearing the pilot of HCB talking to ground crew at Alice Downs on the manager's UHF radio. That radio call occurred about 10 to 15 minutes after the helicopter departed Springvale Station, and was consistent with the helicopter having travelled about 15 km to the east[8]. At that point, it was likely that the helicopter was within UHF range of Springvale and Alice Downs stations.

The VHF radios in each helicopter were used to communicate with other aircraft and, where required, air traffic services (ATS). Given the nature and location of the mustering operation, there was no requirement for either helicopter to contact ATS.

Both helicopters were fitted with an Emergency Locator Transmitter (ELT) that was designed to operate on frequencies 121.5/243 (MHz). The ELT battery packs had an expiry date of December 2008 (PHT) and July 2008 (HCB). Signals from that type of ELT were no longer monitored by the search and rescue agency, and did not comply with regulations in place at the time of the accident. Those regulations required that an ELT capable of transmitting on frequency 406 MHz be carried in, or fitted to, the helicopters.

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6 The clockwise horizontal angle from the sun to true north, measured in degrees.

7 The vertical angle to the sun from an ideal horizon, measured in degrees.

8 The station manager reported that the radio call would have been made near the Great Northern Highway, which is about 15 km east of Springvale Station. That distance and timing is consistent with an effective ground speed of about 60 kts.

Flight recorders

Neither helicopter was fitted with a flight data or cockpit voice recorder, nor were they required by regulation.

Wreckage and impact information

General

The wreckage of the two helicopters was located on undulating terrain. The accident site consisted of a combination of dirt, rock, termite mounds, spinifex, and scattered small trees (Figure 4). All major sections and components of the helicopters were identified within the accident site except for the tail rotor hub and one tail rotor blade from HCB, which were not located.

Figure 4: Accident site

Airframes

PHT

Inspection of the airframe revealed that the helicopter contacted the ground in a mostly upright attitude. A post-impact fire destroyed the majority of the cabin area of the helicopter.

Detailed inspection of the main rotor system identified signs of blade deformation including bending, which was consistent with the main rotor blades turning at low

RPM. About 700 mm of the outer portion of one blade had separated, and a notch, consistent with contacting a piece of HCB's tail rotor gearbox, was located about 70 mm inboard of the point of blade tip separation (Figure 5).

Figure 5: Missing blade tip and notched leading edge

Impact marks on the tail rotor showed that it was turning with little to no rotational energy at ground contact. One blade exhibited trailing edge damage, while the other blade had been crushed from the tip inboard.

The main and tail rotor drive trains were complete, attached and able to be rotated by hand. The two engine-to-main-rotor system drive belts had moved forward off the upper sheave, but were complete and intact.

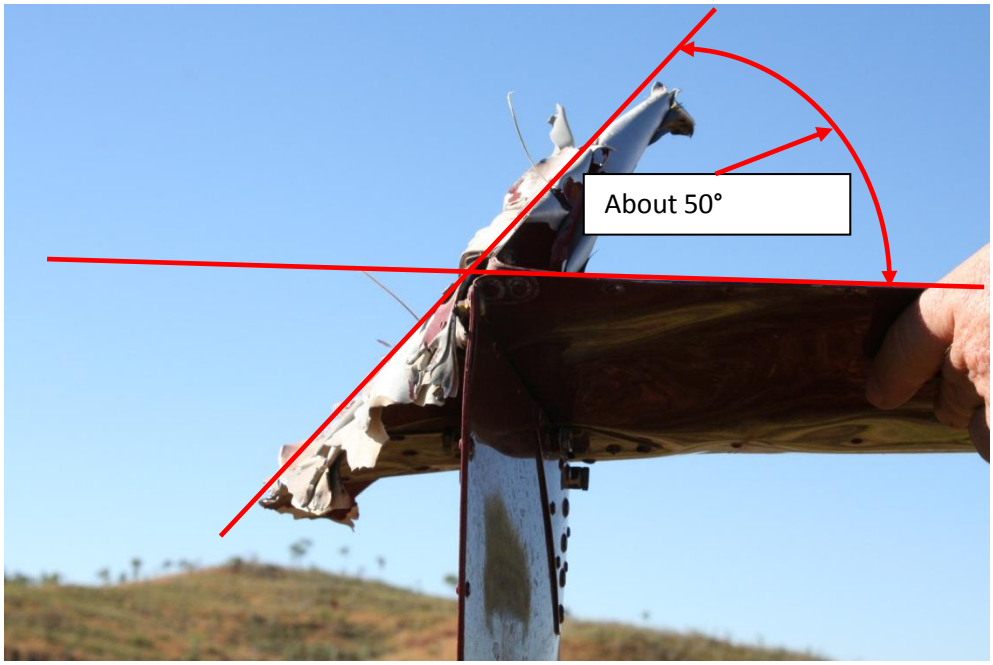
The flight control system in the cabin area was significantly damaged during the post-impact fire. The steel fasteners and flight control tube ends for the flight controls between the pilot's controls and the main gearbox area were identified and confirmed as being attached. However, the integrity of the alloy components could not be verified as they were mostly consumed during the post-impact fire. The flight control tubes from the main gearbox to the rotor head and from the main gearbox tail boom attach area to the tail rotor were in place and secured correctly.

HCB

Inspection of the airframe revealed that the helicopter contacted the ground in a mostly upright attitude. A post-impact fire destroyed the majority of the helicopter. The tail boom was severely disrupted by the main rotor blades from PHT, which passed through the tail boom structure several times. The vertical and horizontal fins had been separated as an assembly by a main rotor blade strike (Figure 6). A yellow paint transfer was evident on sections of the tail boom, consistent with the colour used on an R22 main rotor blade tip. Rotational scuffing on the inner surfaces of a number of tail boom skin fragments that were found at the site, confirmed that the tail rotor driveshaft was rotating during the impacts with the tail

boom. Only the outer half of one of the tail rotor blades was located. The fracture surface on this blade displayed signs of gross overload.

Figure 6: Horizontal and vertical fins



A detailed inspection of the main rotor system showed that it was complete, but the mast had separated below the main rotor head. This failure displayed a degree of torsional twist, typical of an overstress fracture (Figure 7). The rotor system was further damaged by the post-impact fire.

Figure 7: Failed rotor mast

The flight control system in the cabin area was significantly damaged during the post-impact fire. The steel fasteners and flight control tube ends for the flight controls between the pilot's controls and the main gearbox area were identified and

confirmed as being attached. However, the integrity of the alloy components could not be verified as they were consumed during the post-impact fire. The flight control tubes from the main gearbox to the rotor head and from the main gearbox tail boom attach area to the tail rotor, were in place and secured correctly, up to where the tail rotor pitch change shaft in the tail boom was severed (around the mid-boom area).

Engines

PHT

There was evidence of engine drive belt scuffing through about 60° on the ring gear.[9] This indicated that the engine was rotating prior to impact, although the engine's RPM/power output at that time could not be determined. There was also drive belt scuffing on the top surface of the upper sheave to the main rotor gearbox driveshaft, which was also consistent with engine rotation.

HCB

The nature of the separation of the main rotor head and blades and upper mast above the swashplate drive link indicated that there was power being delivered to the rotor system when it struck the ground.

Fire

Post-impact fires started a spinifex scrub fire that spread in a mostly westerly direction for a number of kilometres. The pilot of the search helicopter reported that on arrival overhead the accident site, the fire had already travelled about 2 km.

Burn patterns on the trunks of a number of trees in the affected area, suggested that the scrub fire was of low intensity and fanned by a light to moderate wind from the east.

Survival aspects

As a result of impact forces associated with the midair collision, and the subsequent uncontrolled flight and impact with terrain, the accident was considered not survivable.

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[9] The ring gear was a geared 'disk' that was attached to the crank shaft and was engaged by the starter motor during engine start.

Organisational and management information

Flight and duty time

Pilot of HCB

The pilot of HCB was engaged in aerial stock mustering over land that was occupied by the helicopter owner. In that case, Civil Aviation Order (CAO) 29.10 allowed for the operation to be carried out by the pilot as a private operation. As such, there were no regulated flight and duty times affecting the pilot.

Pilot of PHT

Commercial operations were defined in the Civil Aviation Regulations 1988 (CAR) as meaning '...civil air operations other than private operations.' Flight and Duty time limitations applied to commercial operations, including when an aircraft operator provided services such as mustering. As such, the contracted pilot of PHT was required to comply with the relevant flight and duty time limitations, or a CASA-approved fatigue management program.

The flight crew and duty time limitations affecting the pilot of PHT were detailed in CAO Part 48, which limited the pilot's rostered flight time in this instance to 8 hours; conditionally extendable by the pilot to 9 hours. CAO Part 48 also limited the maximum number of consecutive duty days by the pilot to six.

The pilot's log book showed that 6 of the last 8 days of recorded flight times exceeded 10 hours per day. In addition, the pilot had worked continuously for 8 days since his previous day off.

Exemptions applicable to aerial mustering were contained within the Civil Aviation Safety Authority (CASA) document titled *Fatigue Management*, which was available at www.casa.gov.au Part X, section 10.2.1 of that document permitted a total flight time up to a maximum of 10 hours in any 24-hour period. Section 10.3.2 required that a flight crew member have two duty-free days in any 14-day period.

A web-based printout of the limitations associated with Part X was located within the pilot's log book. However, unless the operator held relevant exemptions that were authorised by CASA, the flight and duty limitations as specified in CAO Part 48 would have applied. An examination of documents that were supplied by the operator showed no evidence of such an exemption.

Fatigue assessment

Fatigue can arise from a number of different sources, including time on task, time since awake, acute and chronic sleep debt, and circadian disruption (that is, factors that affect the normal 24-hour cycle of body functioning).

A US Federal Aviation Administration review of fatigue research relevant to flight operations noted that fatigue can have a range of influences, such as increased anxiety, decreased short-term memory, slowed reaction times, decreased work efficiency, reduced motivational drive, increased variability in work performance,

and increased errors of omission.[10] The report also made the following observations:

- A common symptom of fatigue is a change in the level of acceptable risk that a person tolerates, or a tendency to accept lower levels of performance and to not correct errors.
- There is a discrepancy between self-reports of fatigue and actual fatigue levels, with people generally underestimating their level of fatigue.

The pilots' work hours were estimated based on entries in their log books and were then entered into a fatigue modelling program. The results from that program indicated that the duties and hours flown by both pilots were not conducive to optimal alertness levels. The limited information in relation to the duration and quality of any sleep and activities outside of those duties and flying hours, precluded a more detailed analysis of that data.

Operator's mustering procedures

An examination of documents supplied by the operator, showed no evidence of any procedures for application to the conduct of multiple helicopter mustering operations.

Additional information

Mustering operations at Springvale Station

The station owner and station manager reported that mustering operations requiring two or more helicopters would normally be split into pre-determined areas. The pilot of each helicopter involved would then muster their area individually. When it was necessary for them to operate close to their respective area boundaries, they would ensure separation using VHF radio. The only occasions where such helicopters may be required to operate together was when moving cattle from a particularly difficult area, or during the final stages of a muster.

[10] Federal Aviation Administration, System Safety Engineering and Analysis Division, *Risk Analysis for Flight, Duty and Rest Requirements – Part 121*, Safety Risk Assessment News, Report Number 01-06, November 2001.

ANALYSIS

Overview

On the basis of the available information, the investigation determined that the accident occurred as a result of inadequate separation being maintained between the two helicopters, probably while the pilots were positioning to commence the muster.

The on-site examination and assessment of other evidence indicated that the helicopters were capable of normal operation prior to the accident. This suggested that one or more operational factors had contributed to the development of the accident. This analysis will examine a number of operational scenarios that could have led to the midair collision.

Operational factors

In the 9 days preceding the accident, both pilots had logged six flight days that were in excess of 9 hours duration. Fatigue modelling indicated that the duties and hours flown in the days preceding the accident were not conducive to optimal alertness levels. The additional duties that were undertaken by the pilots the day prior to the accident, their designated day off, were not included in that modelling, and had the potential to further increase their fatigue levels. It was likely that both pilots were experiencing a degree of fatigue that may have negatively affected their performance at the time of the accident.

It was reported that the pilot of PHT was unfamiliar with the intended mustering area. Given the sensitivity associated with mustering operations in the vicinity of property boundaries, it was considered probable that he would have been tasked to muster the area closest to the more discernable highway to the east of the mustering area. This was consistent with the station manager's recollection that the pilot of HCB, who was reported to be familiar with the area, would muster the less defined area to the west.

The advice on the morning of the accident of the additional task for the pilot of HCB, precluded its full consideration as part of the pilots' mustering briefing on the night before the accident. In addition, had both helicopters departed Springvale Station at or about the same time as planned, PHT would have been established in the mustering area prior to the arrival of HCB. However, the requirement for the pilot of PHT to collect his water supply prior to takeoff meant that while travelling to his mustering area, he was on a converging track with HCB. Concurrently, the pilot of HCB would not have known of PHT's delayed departure, and would therefore have had no awareness of the traffic risk of his south-westerly track to his mustering area.

The requirement for HCB to initially fly east, coupled with the later departure of PHT to the south-east, meant that the two helicopters would ultimately be on crossing or converging flight paths while en route to their respective sections of the mustering area. It was likely that, given the time of the radio transmission by the pilot of HCB to the neighbouring station, and the departure time of PHT, HCB's relative position was to the north-east (left) of PHT as it transited to the south-east.

That contrasted with the possible expectation by the pilot of PHT that HCB would be approaching the mustering area from behind him. Even if the pilot of PHT had kept a lookout to his left, from his position in the right seat, the structure of the helicopter and position of the rising sun to the north-east had the potential to have restricted the pilot's ability to identify a helicopter that was converging from that direction.

The collision

The midair collision occurred about 3 km to the north of the planned mustering area, and was consistent with the predicted flight paths of both helicopters to their respective sections of that area. The accident site area was reported by the station manager to be unlikely to contain cattle and no evidence of cattle was observed at or near the site during the on-site phase of the investigation. It was therefore unlikely that mustering was being conducted at the time of the collision and that, more probably, the two helicopters were in transit above the accident site.

On the basis of the destruction to the tail boom of HCB and paint transfer markings, it was determined that the main rotor system of PHT came into contact with the tail boom of HCB in flight. Evidence available on site indicated that the engines of both helicopters were operating at the time of the accident. In each case, no mechanical defect was identified that would have precluded normal flight. The low rotational energy displayed on the tail rotor of PHT was consistent with a loss of main rotor RPM associated with the midair collision. The impact angle on the tail section of HCB was consistent with one or both pilots attempting to take avoiding action.

The intensity of the post-impact fires was consistent with each helicopter having a significant amount of fuel on board at the time of the accident. The extent of the scrub fire, as reported by the pilot of the search helicopter, was also consistent with the accident having occurred early in the day, probably while en route to the mustering area.

The Emergency Locator Transmitter (ELT) for PHT was identified at the accident site. That ELT was of a type no longer monitored by search and rescue agencies and its battery pack had expired. Similarly, the maintenance documentation for HCB showed that its ELT was also fitted with an out-of-date battery pack and was of the type no longer monitored. Due to the forces involved in this particular accident, the absence of a serviceable ELT did not affect the survivability of the accident.

FINDINGS

From the evidence available, the following findings are made with respect to the midair collision that occurred 15 km south-east of Springvale Station, WA on 5 May 2009, involving two Robinson Helicopter Company R22 Beta II's, registrations VH-PHT (PHT) and VH-HCB (HCB) and should not be read as apportioning blame or liability to any particular organisation or individual.

Contributing safety factors

- Adequate separation between the two helicopters was not maintained resulting in the main rotor system of PHT contacting the tail boom of HCB.
- The timing of the departures and subsequent converging flight paths of the two helicopters increased the risk of a midair collision.
- The duties and hours flown by the pilots in the preceding 9 days were not conducive to optimal alertness levels for either pilot.
- The position of the rising sun would have made it difficult for a pilot to identify an aircraft approaching from a north-easterly direction.

Other safety factors

- The emergency locator transmitters that were fitted to each helicopter were not capable of transmitting on the required frequency of 406 MHz.

Other key findings

- The on-site evidence indicated that both helicopters' engines were producing power at the time of the accident, and that the helicopters were capable of normal flight at that time.

APPENDIX A: SOURCES AND SUBMISSIONS

Sources of Information

The sources of information during this investigation included:

- the station owner
- the station manager
- the operator and maintenance organisation
- the Civil Aviation Safety Authority (CASA)
- the Bureau of Meteorology
- a number of other pilots.

Submissions

Under Part 4, Division 2 (Investigation Reports), Section 26 of the Transport Safety Investigation Act 2003, the ATSB may provide a draft report, on a confidential basis, to any person whom the ATSB considers appropriate. Section 26 (1) (a) of the Act allows a person receiving a draft report to make submissions to the ATSB about the draft report.

A draft of this report was provided to the owner/operators of the helicopters and CASA.

A 'no comment' submission was received from CASA.

Midair collision
15 km SE Springvale Station, WA, 5 May 2009,
VH-PHT, Robinson Helicopter Company R22 Beta II
VH-HCB, Robinson Helicopter Company R22 Beta II