

AS332L Super Puma, G-PUMD and Boeing 737-400, G-DOCH

AAIB Bulletin No: 5/2001 Ref: EW/C2000/7/5 (i) Category: 2.1

(ii) Category: 1.1

INCIDENT

Aircraft Type and Registration: (i) AS332L Super Puma, G-PUMD
(ii) Boeing 737-400, G-DOCH

No & Type of Engines: (i) 2 Turbomeca Makila 1 A turbine engines
(ii) 2 CFM56-3C1 Turbojet engines

Year of Manufacture: (i) 1983
(ii) 1991

Date & Time (UTC): 27 July at 1655 hrs

Location: Aberdeen Airport, Dyce, Scotland

Type of Flight: (i) Air Test
(ii) Public Transport

Persons on Board: (i) Crew - 2 - Passengers - 1 (engineer)
(ii) Crew - 7 - Passengers - 102

Injuries: (i) Crew - None - Passengers - N/A
(ii) Crew - None - Passengers - None

Nature of Damage: None

Commander's Licence: (i) Airline Transport Pilots Licence (Helicopters)
(ii) Airline Transport Pilot's Licence

Commander's Age: (i) Not known
(ii) Not known

Commander's Flying Experience: (i) 9,800 hours (of which 8,200 were on type)

Last 90 days - 174 hours

Last 28 days - 44 hours

(ii) NK

Last 90 Days - NK

Last 28 Days - NK

Information Source: AAIB Field Investigation

Synopsis

This serious incident occurred when a Boeing 737 (B737), operating a scheduled service from Aberdeen to London Gatwick, at a speed of 100 kt was obliged to abort its take off run to avoid a possible collision with a Super Puma (AS332L) helicopter. The helicopter had been hovering at a holding point close to the upwind end of the runway when, because of the crew's misinterpretation of their clearance, it manoeuvred to hover above the runway into the path of the departing B737.

The Super Puma (callsign 'MD')

The crew of 'MD', consisting of the commander, first officer and a ground engineer, were requested by their company's technical department to carry out a test flight following an engine compressor stall problem and a bleed valve replacement. The bleed valve check was to be carried out in the hover prior to departure.

The weather at the time was fine with a surface wind of 180°/ 10 kt, visibility of 14 km, few clouds at 2,800 feet and a temperature of 19°C.

At 1650 hrs the first officer, who was handling the radio, asked the Ground Movement Control (GMC) controller for '... SOMEWHERE JUST TO DO A HOVER FOR A FEW MINUTES BEFORE WE GO OFF ROUND THE CIRCUIT'. The ground controller confirmed that the helicopter could hover at holding point E2, and cleared the crew to 'TAXI TO E2 AND REPORT READY' (see Figure 1). Moments later the ground controller transmitted the departure clearance to the B737 as it taxied from its stand towards the runway threshold. After a correct 'read back' of the clearance the crew of the B737 was instructed to change to the tower frequency.

At 1654:30 hrs the first officer of 'MD' transmitted 'G-PUMD, HOVER IS COMPLETE NOW, WE'D JUST LIKE TO DO AN EXTENDED CIRCUIT FOR OUR AIR TEST'. The ground controller replied 'G-MD ROGER YOU'RE CLEARED INTO THE CIRCUIT VFR ADVISE IF YOU NEED HIGHER THAN HEIGHT SEVENTEEN HUNDRED FEET QFE ONE ZERO ZERO TWO MILLIBARS'. The first officer read back 'CLEARED INTO THE CIRCUIT ONE ZERO ZERO TWO AND WE'LL ADVISE YOU IF WE NEED MORE THAN SEVENTEEN HUNDRED FEET - MD'. The ground controller then added 'MD CONTACT TOWER ONE ONE EIGHT DECIMAL ONE'.

The helicopter crew checked in on the tower frequency (after the B737 crew had been given their take off clearance) with the words 'AND ABERDEEN TOWER G-PUMD WITH YOU IN THE ????' (uncertain words) The tower controller replied 'MD I'LL CALL YOU STANDBY'. There was then a brief

transmission from the B737 followed by the tower controller transmitting '...ROGER THAT WAS UNAPPROVED THAT JUST HOLD POSITION THERE PLEASE'. The helicopter commander, having manoeuvred over the runway and sensing there was something wrong, moved the helicopter to his left back over the grass. A few moments later he apologised to the tower controller stating that he thought he had been cleared into the circuit and that manoeuvring over the runway was a misunderstanding on the part of the crew.

The Boeing 737 (callsign 33F)

The crew of the B737 (callsign 33F) checked in on the Aberdeen Ground Movement Control (GMC) frequency of 121.7 MHz at 1645 hrs to request 'push and start' clearance for their scheduled service to London Gatwick. This was approved and later, at 1649 hrs, the crew asked for taxi clearance. The ground controller cleared the aircraft to 'TAXI TO WHISKEY FIVE RUNWAY ONE SIX QNH ONE ZERO ZERO NINE'. At 1651 hrs, whilst the aircraft was taxiing to the hold, the ground controller issued the B737 with its departure clearance. After a correct readback the B737 crew were instructed to contact the tower.

At 1653 hrs the B737 crew transmitted to the tower controller that they were at 'WHISKEY FIVE READY FOR DEPARTURE'. The controller replied '...LINE UP RUNWAY ONE SIX BE READY IMMEDIATE'. Upon lining up the tower controller transmitted '...AFTER DEPARTURE IT'LL BE A RIGHT TURN DIRECT GLESK BUT MAINTAIN ALTITUDE FOUR THOUSAND FEET UNTIL INSTRUCTED BY RADAR'. Having received the read back the instructions the controller continued '...THAT'S CORRECT CLEAR TAKE OFF ONE SIX THE WINDS ONE NINE ZERO TEN KNOTS'.

As the B737 accelerated along the runway the commander saw the helicopter, which had previously been hovering at Holding Point E2, adopt a position directly over Runway 16 hovering at a height of approximately 30 feet. The commander called 'stop' at 100 kt. The crew carried out the rejected take off (RTO) actions and managed to stop the aircraft at an estimated distance of 100 metres behind the helicopter.

When the helicopter moved clear, the B737 taxied to the southern end of the runway and back to the terminal. It subsequently departed approximately an hour later having allowed 50 minutes for brake cooling.

The tower controller (air controller)

The tower controller, whose work load at the time was assessed as moderate, at 1653 hrs instructed the B737 to line up on Runway 16, to be ready for an immediate departure. After local departure instructions, those supplementary to its airways clearance were passed and acknowledged by the B737 crew and they were cleared for take off. The controller stated that when he cleared the aircraft for take off, in accordance with his usual method of operation, he checked that the runway was clear. He confirmed that he could see the helicopter at E2 and did not consider that it presented a problem to the departing aircraft. He then turned his attention to other traffic in the circuit. He first became aware of a problem when he noticed the B737, which had commenced its take off roll, start to decelerate as it passed abeam the tower. He looked along the runway and saw the helicopter hovering over it at what he estimated to be a height of 20 to 25 feet. He added that he did not know the callsign of the helicopter, as the GMC controller had not yet passed its flight progress strip to him. In fact it was still in the GMC controller's hand as he (the tower controller) warned the GMC controller of the situation. Before he could transmit anything the crew of the helicopter made contact on his frequency. Some part simultaneous transmissions were then made during which time

the helicopter was told to standby. After the helicopter vacated the runway the tower controller resolved the immediate traffic problems by instructing an aircraft on finals to go-around and the B737 to continue to taxi to the end of the runway before clearing.

The GMC controller

The GMC controller, whose work load at the time was assessed as light, stated that there are only three suitable positions on the east side of the airport, where the helicopter was based, to carry out hovering; the hold at E2, Runway 23 and the compass base. Although not an ideal location, not only for noise but also for visibility reasons, he considered E2 acceptable for a short period, especially as it was close to the helicopter's base, thus reducing its taxiing time.

Having been in the hover for approximately 2.5 minutes the helicopter crew requested clearance into the circuit. The GMC controller issued the requested clearance on his understanding that take-off clearance would then be given by the aerodrome controller. Having correctly read back the clearance, the pilot was transferred to the tower frequency, although he did not acknowledge the frequency change. The GMC controller went on to state that when the tower controller warned him about the situation, he saw the B737 on the runway slowing down but assumed at first that it was a landing aircraft. He had not noticed the helicopter enter the runway. This may have been because a pillar in the control room restricts the view of E2 from the GMC position. His attention may have been focused elsewhere and the red colour of the helicopter did not contrast well against the red-coloured doors of a building situated immediately behind the E2 holding point.

Believing that the helicopter was still on his frequency, as the crew had not acknowledged transfer to the tower frequency, he instructed them to vacate the runway to the left. He repeated this instruction and made three further unsuccessful attempts to establish communication before the helicopter crew contacted his frequency again after a transfer from the tower frequency.

The GMC controller agreed that, with hindsight, he should have instructed the helicopter to hold position when he passed the pilot his circuit clearance. He confirmed that he was aware of the procedural requirements laid down in an amendment to the Manual of Air Traffic Services (MATS) Part 1 and a local Safety Notice, but he considered that they did not apply to the circumstances of this incident as the helicopter was not lined up on the runway at the time.

The helicopter crew

The commander and the first officer stated that they both felt tired at the time of the incident. The commander had flown on the previous six days to clear an offshore transportation backlog brought about by fog. The first officer had just finished his second flight of the day. Both flights had been in foggy weather conditions requiring the use of radar / NDBs for the rig approaches. He had only been notified that he was rostered for the air test as he entered the flight planning room upon his return. He had agreed however to join the commander immediately for the short flight as he had no desire to extend an already long working day.

That part of the air test performed in the hover required a high degree of attention from both pilots, recording the different instrument readings whilst handling the helicopter. Listening out on the ground frequency excluded them from being updated on the traffic situation on the runway or in the circuit. The crew, therefore, were not aware of the traffic on finals or at the take off position. Furthermore, during the hovering phase of the air test, the nose of the helicopter had pointing south into wind away from the view of the runway threshold.

Pre-incident safety action by ATC

The Manager Air Traffic Control, had issued a Safety Notice to his controllers in February 2000, after an incident in which an aircraft had started its takeoff roll without clearance. He highlighted the need for strict adherence to the correct RT phraseology when issuing 'after departure' clearances'. The Safety Notice is reproduced below:

'Safety Notice 3/2000 (issued 9 February 2000)

"AFTER DEPARTURE" CLEARANCE

In a recent incident the pilot of a Dash 8 was instructed to line up on Runway 34 and was advised of a helicopter landing and crossing on Runway 32 ahead. The next transmission to the pilot was "After departure, route direct Glesk"; this was read back correctly.

The tower controller then turned momentarily to check circuit traffic but then became aware that the Dash 8 had commenced its take off roll. Fortunately, this was spotted in time and the pilot reacted when told to stop.

Although correct phraseology was used throughout, both the pilot and the first officer mistook the "after departure" clearance as a take off clearance. This was further exacerbated by the fact that the crew had actually misinterpreted the traffic information about the helicopter crossing ahead as part of a "conditional" take off clearance, despite the fact that conditional take off procedures, to the best of my knowledge do not exist anywhere in the UK.

The purpose of the Safety Notice is therefore to highlight the potential for confusion when an "after departure" clearance is used. Controllers should exercise extreme caution in such circumstances and either withhold the after departure clearance until immediately prior to the take off clearance being issued, or if this is not practicable, consider using the phrase "hold position" as part of the after departure clearance.'

Additionally, the AAIB had investigated a serious incident that occurred at Birmingham airport in June 1999 (reported in AAIB Bulletin 9/99) when a Piper PA38, operating on a cross runway, was in near collision with a BAe 146 aircraft, departing on the main runway. As a result of that investigation the Manual of Air Traffic Services (MATS) Part 1 was amended to include the following:

' When, after an aircraft has been instructed to hold clear of the runway, a clearance message is passed which might be misinterpreted as permission to take-off, the instruction to hold should be repeated as part of the message...

A take off clearance shall be issued separately from any other clearance message. If an aircraft is lined up on the runway and a revised clearance or post departure instructions need to be passed, the revised clearance or post departure instructions shall be prefixed with the instruction to hold position...'

Post-incident safety action by ATC

The Manager ATC at Aberdeen issued the following Safety Notice on 31 July 2000:

'Safety Notice 5/2000

Safety Notice 3/2000 described an incident in which the pilot of a Dash 8 aircraft misinterpreted an after departure clearance as a clearance to commence take off. The Safety Notice advised controllers to exercise extreme caution when issuing after departure instructions, and recommended consideration of use of the phrase "hold position " as part of the after departure clearance.

In addition to the above, following similar incidents elsewhere the latest MATS 1 amendment (46, dated 30 June 2000), now includes revised procedures for aircraft awaiting take off (MATS 1, page 2-7 para 11) and also take off clearance (MATS 1, page 2-7 para 13) which reinforces the content of Safety Notice 3/2000.

A recent, potentially far more serious incident at Aberdeen has once again highlighted the problems of issuing an ATC clearance to an aircraft at the hold.

All aerodrome controllers are therefore reminded of the requirements detailed in MATS 1 page 2-7, particularly para 11 which states, inter alia, that whenever there is any possibility *'that a clearance message might be misinterpreted as permission to take off, the instruction to hold should be repeated as part of the message'*.

Local Competency Examiners are being asked to pay particular attention to the use of correct phraseology in these circumstances.'

The following Temporary Operating Instruction was included in MATS Part 2 on 11 August 2000:

TOI No.25 of 2000

HELICOPTER HOVER CHECKS

Following a recent incident, it has been agreed with AAL that until further notice **all** helicopter hover checks, irrespective of duration, are to be carried at either the compass base or over the threshold of Runway H23. All helicopter hover checks are subject to MASU approval.

Post-incident safety action by the helicopter operator

The operator's own investigation of the incident produced several recommendations. It was recommended that ATC should consider revising their present procedures allowing GMC controllers to issue clearance messages when aircraft are at holding positions.

Their report, amongst other issues, also highlighted changes that should be brought about by the operator. These were:

1. Helicopters should land after an extended period hovering at a hold and requests for departure clearances should be made whilst the helicopter is on the ground.
2. Management should re-examine the aspect of extended consecutive work periods for crews with a view to reducing their susceptibility to tiredness.
3. The operator should examine crew rest facilities.

4. An acceptable area, clear of the runway holding points, should be identified for the hover testing of helicopters.

Conclusion

The Safety Regulation Group (Aerodrome, Air Traffic and Licensing Division) of the CAA made the following comment on this incident:

'Previous amendments and additions to MATS Pt 1 should have ensured that this incident did not take place. Unfortunately, the controller concerned did not comply with either MATS Pt1 or Unit Instructions specifically designed to avoid runway incursions of this type. Because of this, SRG have undertaken a further review of this matter and have identified additions to relevant phraseology which, if followed, will prevent any misinterpretation of 'zone clearance' as clearance to take off. Additionally, the wider problem of runway incursion is recognised as a "Hot Topic" (Safety Risk) and is the subject of a major review by an SRG chaired working group which includes wide industry representation.'

Since the controller did not repeat the instruction to hold as part of the clearance message it was capable of being misinterpreted as permission to take off. Helicopters at the hold at E2 are not only difficult to see from the VCR but it is also difficult for the GMC controller to see whether they are in the hover or on the ground with rotors running.

The crew of the helicopter assumed they had been given take off clearance possibly because the helicopter was at the hold but 'in flight' (i.e. hovering) at the time the clearance was passed. Having misinterpreted the clearance the crew did not make contact with the tower controller or visually ascertain that the runway and approach were clear before they entered the active runway. Actions taken by the operator and airport ATS as well as the reviews mentioned by the SRG are designed to prevent a recurrence of this type of incident and no further recommendation by the AAIB is envisaged at this stage.