AIRPROX REPORT No 2010104

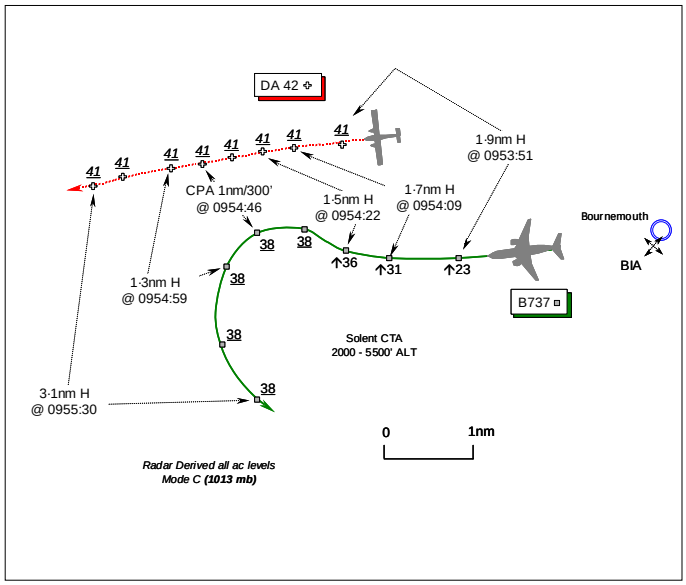
Date/Time: 10 Aug 0954Z

Position: 5047N 00158W (5nm W of Bournemouth Airport elev: 38ft)

Airspace: Solent CTA (*Class:* D)

Reporter: Bournemouth ATC

	1st Ac	*2nd Ac*
Type:	B737-800	DA42
Operator:	CAT	Civ Trg
Alt/FL:	3700ft↑ QNH (1011mb)	4000ft QNH (1011mb)
Weather:	IMC In Cloud	IMC In Cloud
Visibility:	Nil	500m
Reported Separation:	300ft V/1nm H	200ft V/1nm H
Recorded Separation:	300ft V/1nm H	



CONTROLLER REPORTED

PART A: SUMMARY OF INFORMATION REPORTED TO UKAB

THE BOURNEMOUTH APPROACH RADAR CONTROLLER (RADAR) reports that the B737 was departing IFR under a RCS and released to stop climb at 3000ft Bournemouth QNH. The restriction was because of a DA42, operating IFR, holding on the BIA at 4000ft QNH to the WNW of the Airport. The DA42 had been 'locked' onto a heading of 260° and the B737 crew was instructed to fly a heading of 080°, which was queried by the B737 crew but the transmissions crossed. The B737 was then observed climbing through 3000ft, so the crew was instructed to 'stop climb now' by which time their ac was at an altitude of 3700ft. TI was passed to the B737 crew about the DA42 and the airliner was turned L onto a heading of 080°. Minimum separation was estimated to be 200-300ft/1nm; once horizontal separation was achieved the B737 was climbed to FL70.

THE B737-800 PILOT reports he was departing from RW26 at Bournemouth under IFR bound for Ibiza. They were cleared for an easterly departure climbing to an altitude of 4000ft QNH. Passing about 2000ft, IMC in cloud, they were switched to RADAR and checked in with their passing altitude and cleared altitude. RADAR then instructed them to fly a heading of 080° and they began a R turn at 165kt in line with the direction of their departure. A few seconds after commencing the R turn they spotted traffic on their TCAS display 3nm away in the direction they were turning and immediately reversed the turn and pressed ALT HOLD. They questioned the direction of the turn with RADAR who confirmed it should be a R turn and they were then told to level at 3000ft QNH. At this point they were at 3700ft and, as the ac was still levelling slowly with the other ac appearing to be close, they activated control wheel steering. They estimated from their TCAS that minimum horizontal separation was 2nm, with vertical separation of 300ft; subsequently ATC informed them that they had come within 1nm of the other ac. RADAR then instructed them to continue their L turn to a heading on 080°. He assessed the Risk as 'moderate'; neither a TA nor RA was enunciated.

THE DA42 PILOT, a flying instructor, reports he was conducting an instrument training flight, under IFR and in receipt of a RCS from Bournemouth RADAR. A squawk of A7357 was selected with Mode C; elementary Mode S is fitted.

Flying level at 4000ft QNH in the Bournemouth NDB hold for RW26 at 125kt, as they turned westbound in the hold they were instructed to maintain present heading, which they reported as 265°. A few moments later they heard the B737 crew call RADAR on frequency departing from Bournemouth stating they were climbing 4000ft. The controller then said to the B737 crew that their cleared altitude was 3000ft, which the B737 queried saying they had been cleared to 4000ft. ATC instructed the B737 crew to stop climb due to traffic above in the hold – his DA42 – whereupon they heard the B737 pilot state he was at 3700ft before ATC turned them S. These transmissions took only a few moments and in the meantime they maintained their heading of 265° and looked for the B737. No TCAS equipment is fitted to his DA42, therefore he waited for instructions from ATC as they did not know if the B737 was to their L or R, or beneath his ac as they were in solid IMC in cloud. No avoiding action was taken by him or issued by ATC.

In a later telephone conversation with Bournemouth ATC he was told that the B737 reached 3800ft, 1nm from his ac. He assessed the risk as 'medium'.

THE BOURNEMOUTH TOWER CONTROLLER reports that the B737 was lined up on RW26 when he received the release from RADAR, which was to stop climb at 3000ft QNH. As he wrote this down on the fps he was distracted by a call from the Airfield Ops vehicle about a fox that was approaching the RW. Instructing the Airfield Ops vehicle driver to enter the RW to remove the fox, he informed the B737 crew about this and a possible delay. Once the fox had been removed and the Airfield Ops vehicle had vacated the RW he looked at the B737's fps, saw the '3A' restriction that he thought he had passed and cleared the flight for take-off. As the B737 climbed through 1000ft he informed the crew that they might detect an ac holding at 4000ft on their TCAS and transferred the flight to RADAR. The B737 pilot read back the frequency and acknowledged the TI on the ac in the hold. It was not until a minute or so later that he became aware of what had actually occurred.

ATSI reports that the Airprox occurred within Class D CAS, 5nm W of Bournemouth Airport. Both flights were in receipt of a RCS from Bournemouth RADAR. Staffing levels were considered normal with AIR and GROUND combined as Bournemouth TOWER. The TOWER controller reported traffic levels as being 'medium' and had been in position for 50min before the Airprox occurred. Although not feeling 100%, the RADAR controller considered that she was nevertheless fit for duty and commenced work just before the incident occurred. RADAR reported traffic levels as medium, with a number of ac on frequency.

The Bournemouth 0950UTC weather was: surface wind 250/06kt; Visibility >10km; Cloud, FEW010 SCT034; QNH 1011mb.

The Bournemouth MATS Part 2, Section 1, Chapter 5, page 1, paragraph 1.5.3, Noise Abatement Procedure for Runway 26, states:

> 'Climb on runway QDM to 0.6 DME then track 270 deg Mag to 3.5 DME, to be no lower than altitude 2000ft before any further turn.'

Bournemouth MATS Part 2, Section 3, Chapter 2, page 4, paragraph 3.2.10, Turns after Departure, states:

> 'The direction of turn must be specified with the take-off clearance to all aircraft. In the case of aircraft subject to the Noise Abatement Procedure, the phrase "after noise abatement" must be included with the direction of turn instruction if any doubt exists that the preferential noise route would not be followed.'

Bournemouth MATS Part 2, Section 4, Chapter 2, page 2, paragraph 4.2.3, Departure Routes, states:

> 'All departures will comply with the published Preferential Noise Routes (PNR) and may only vary to suit ATC safety requirements. Airway Clearances will be referred to as "Standard" between APS & GMC/Air.' Standard Clearance Eastbound is stated as 'SAM-GWC'.

The BIA NDB (L) is located on the airport, with a holding pattern to the NW that comprises a 1 minute racetrack pattern, with an inbound track of 078°, turning L at the BIA NDB (L) and flying an outbound track of 258°. The unit had recently made a recommendation that controllers consider the need to vector holding traffic away from the BIA hold in order to facilitate continuous climb for commercial jet departures.

The DA42 had departed from RW26, 20min before the Airprox and been cleared by RADAR to take up the hold at the BIA NDB (L) at an altitude of 4000ft. The DA42 crew requested two holds followed by an NDB procedure.

At 0935:24, the B737 crew called TOWER, *"..*[B737 C/S] *stand 5 QNH 1-0-1-2 request clearance to Ibiza."* TOWER replied, *"*[B737 C/S] *Bournemouth Tower standard departure clear Ibiza routeing SAM Goodwood 4 thousand feet squawk 7-7-1-7",* which was acknowledged correctly. The B737 crew was given taxi clearance for RW26 at 0947:51.

Bournemouth MATS Part 2, Section 1, Chapter 17, page 2, paragraph 1.17.3, states:

> 'All departing IFR/SVFR traffic is subject to a "Check Before Release (CBR)" from APS (Approach Procedural Surveillance)[RADAR]. This has the added advantage of alerting APS to the aircraft's imminent departure and an up-to-the-minute departure clearance can be issued.'

At 0948:23, the B737 crew was given line up clearance for RW26 that was correctly acknowledged. In response to a request from TOWER, the B737 was released by RADAR with a climb restriction of not above 3000ft ALT, due to traffic in the hold at 4000ft ALT. TOWER correctly annotated the departure restriction on the B737's fps, however, at 0950:45 the Airfield Ops vehicle driver called, *"Bournemouth Tower Safety 1 I have got a fox heading towards the runway."* TOWER instructed the vehicle to enter the runway and advised the B737 crew, *"…there's a fox just coming up to the runway gonna clear him before we..let you go".* During the period that the runway was obstructed, the controller reported that there was a certain amount of discussion regarding the fox. This break in the sequence of events caused a distraction. When the Airfield Ops driver called vacating the runway at 0951:54, the local departure climb restriction of 3000ft had not been passed to the B737 crew. At 0952:13, the B737 was given take off clearance, "[B737 C/S] *after noise right turn clear take off wind 2-5-0 degrees 5 knots".* For IFR traffic departing Eastbound from RW26, a R turn is standard but the B737 crew's clearance and climb to 4000ft had not been amended. The B737 departed at 0953 and when safely airborne, TOWER passed TI to the crew, "[B737 C/S] *there's traffic in the hold at 4 thousand feet which you may pick up on your TCAS contact radar 1-1-9 decimal 4-7-5...".* The B737 pilot replied, *"Yes have it on TCAS…1-1-9-4-7-5* [C/S]". TOWER subsequently stated that the B737 had been cleared for departure, in the belief that the local restriction of 3000ft had been passed. It was only after the Airprox, that the controller realised the fps and climb restriction had not been ticked to indicate the correct passing and read-back of the clearance.

Meanwhile at 0951:25, the DA42 crew established in the hold reported ready for an approach, so RADAR instructed them to maintain 4000ft QNH and to report beacon outbound. As the B737 took-off the radar recording shows the DA42 in the hold, 2nm NW of the airport, tracking W. Rather than allow the DA42 to turn back towards the overhead with a loss of radar contact, RADAR decided to change the plan by letting the DA42 continue W, which would keep it within good radar coverage and allow the B737 to make a R turn behind the DA42, facilitating an early climb from 3000ft. The DA42 crew was instructed, "..*change of plan continue present heading report your heading",* which was 265°; RADAR then advised, "[DA42 C/S] *roger continue on that heading until advised there's gonna be traffic departing and he'll climb through your level."*

MATS Part 2, Section 3, Chapter 1, Page 16, paragraph 20.7, states:

> 'Pilots of all aircraft flying instrument departures are required, on first contact, to inform the approach/approach radar controller of their callsign, SID designator (if appropriate), current or passing level and their cleared level. If the SID involves a stepped climb profile then the initial altitude/flight level to which the aircraft is climbing will be given. If the pilot does not provide the

cleared level then controllers shall, without delay, either confirm that the crew are climbing to the correct initial level or clear the aircraft to climb to a higher altitude or flight level.'

At 0953:50, the B737 crew called RADAR,*"…good morning* [B737 C/S] *passing altitude 2 thousand 4 hundred climbing altitude 4 thousand on an easterly departure".* The B737's fps did not indicate that verification of the Mode C had been completed and the controller reported she had not heard the pilot's report, "..*passing altitude 2 thousand 4 hundred climbing altitude 4 thousand.."*. The controller believed that this was due to the workload and distraction in dealing with another ac, but could not recall the precise details of any coordination or conversations at the point when she missed hearing the report. The RADAR frequency was quiet during the minute prior to the first call from the B737. Telephone transcription was not available at the time of the investigation and it was not therefore possible to establish a precise reason for the reported distraction. [UKAB Note (1): Despite the absence of a landline transcript, the TOWER and RADAR controllers concurred that the landline co-ordination conversation relating to the 3000ft climb-out restriction for the B737 had actually taken place.]

After the initial call was received from the B737 crew, RADAR replied, *"*[B737 C/S] *Bournemouth RADAR good afternoon fly heading 0-8-0 degrees"*. A direction of turn was not specified by RADAR but had been passed previously by TOWER. The B737 was now climbing to 4000ft and the crew was aware of the DA42 in the hold at 4000ft. This prompted the B737 pilot to question the R turn towards the DA42, *"right turn heading 0-8-0 degrees* [B737 C/S]..*is that a right turn can you confirm we have traffic on the TCAS around that area"*. At 0954:11, RADAR responded, "..*you're maintaining altitude 3 thousand feet and right turn on to a heading of 0-8-6",* and, *"just confirm you're maintaining 3 thousand feet".* (It was noted the controller specified 086° instead of 080°). At this point the NATS radar replay shows the B737 indicating 3100ft (1013mb) – equating to an altitude of 3040ft QNH (1011mb). This would have shown as 'A30' on RADAR's display. The B737 crew advised, *"Negative we're not we're climbing altitude 4 thousand feet and we're turning back round again".* At 0954:22, RADAR instructed the B737 crew, *"roger stop your climb now"*; the radar recording shows the two ac on parallel tracks with the B737 commencing a R turn indicating 3600ft (1013mb) – about 3540ft Bournemouth QNH – with the DA42 1·8nm NW of the B737, indicating 4100ft (1013mb) – about 4040ft QNH.

At 0954:23, the B737 crew reported that the climb had been stopped at 3800ft ALT and RADAR passed TI, "[B737 C/S] *roger traffic information in your 11 o'clock now range of 1 mile maintaining 4 thousand feet in the hold is..a D-A 42".* The B737 pilot responded, *"Okay we're taking up runway heading again is that..good for you."* RADAR advised *"That's fine if you continue on the left turn now on to a heading of 0-8-0 degrees that turn will take you away".* This was acknowledged by the B737 pilot at 0954:47. At this point the radar recording shows the minimum spacing between the 2 ac is 1nm and 300ft with the B737 turning L. RADAR then passed TI to the DA42 crew, *"..traffic information for you a mile south of you 3 thousand 7 hundred feet maintaining that altitude on to an easterly heading is a 7-3-7",* which was acknowledged. Once separation was re-established the B737 crew was climbed to FL70.

RADAR could not recall hearing the B737 pilot's level report of passing 2400ft for 4000ft and believed that this may have been due to the workload at the time. When questioned about the proximity of the 2 ac and the consideration of avoiding action, RADAR reported that the realisation of the situation came as a shock and having given a L turn to resolve the situation, considered this to be an avoiding action turn. The controller recognised that the correct phraseology was not used, but commented that this was probably due to the speed of events occurring and unexpected circumstances of the situation.

TOWER did not ensure that the 'standard clearance' was amended to include the climb-out restriction of 3000ft and did not check the fps to ensure that the amendment had been passed. The TOWER controller did pass TI about the DA42 in the hold, which aided the B737 crew's SA and alerted them to the position of the DA42 on TCAS. It was evident that the delay to the B737's departure caused by the fox, together with discussion amongst the VCR staff caused a distraction. This delay and distraction broke the natural sequence of events and interrupted TOWER's normal thought process.

When the Airfield Ops vehicle reported clear of the runway, the controller resumed operations, wrongly considering that the climb restriction had already been passed and without the appropriate check of the ac's fps. Consequently, TOWER allowed the B737 to climb unrestricted to 4000ft, the level occupied by the DA42, resulting in a loss of separation.

Once the B737 was airborne and transferred to RADAR, the pilot's first transmission, correctly included the 'level reporting', with passing level and cleared level should have alerted the RADAR controller to the TOWER controller's error; however, the 'level reporting' was not heard. It was not possible to establish what caused the controller to miss the level reports, but the controller considered that it was due to workload and this is supported by the fact that RADAR had not marked the fps to signify that verification of Mode C had been achieved. The opportunity to detect and correct the error was therefore missed and this was considered by ATSI to have been a contributory factor.

With the B737 now climbing to 4000ft and the crew having been made aware of the DA42 in the hold also at 4000ft, the B737 pilot questioned the R turn towards the DA42. The RADAR controller, in the expectation that the B737 was levelling at altitude 3000ft, initially confirmed the R turn was correct. This belief was reinforced when at the time the B737 pilot queried the heading, but the controller's radar display will have shown the B737 climbing through 3000ft ALT. However the pilot reported that the B737 was in fact climbing to 4000ft and the RADAR controller immediately instructed the pilot to 'stop the climb', followed by a L turn to resolve the conflict. The term 'avoiding action' was not used. The RADAR controller reported that the continued climb of the B737 had been unexpected and she was surprised and shocked when the realisation of the situation became clear.

Subsequent to this Airprox, ATSI made a number of recommendations that:

a. In addition to the Unit's review of the current procedures for amending a standard clearance before departure, that the unit ensure, whenever possible, these are passed before a departing ac is given clearance to line up.

b. The Unit include, as part of their Training in Unusual Circumstances and Emergencies (TRUCE) programme, unusual events or circumstances that cause a period of delay or break in operations, with a view to ensuring that controllers pause to complete a situational check, before resuming normal operations.

c. Unit controllers are reminded of the importance of ensuring that distractions in the operational room do not result in a lack of attention or lapse. (MATS Pt1, Section 8, Chapter 2, page, paragraph 5.3 refers.)

d. Unit controllers are reminded of the importance of ensuring that the 'level reporting' of departing ac is used to verify the aircraft Mode C, and the cleared level, as soon as possible after departure.

e. Unit controllers are reminded of the requirement to use the correct phraseology, when issuing 'avoiding action' in accordance with ATSIN 141.

PART B: SUMMARY OF THE BOARD'S DISCUSSIONS

Information available included reports from the pilots of both ac, transcripts of the relevant RT frequencies, radar video recordings, reports from the air traffic controllers involved and reports from the appropriate ATC authority.

It was plain that the 3000ft climb-out restriction was not passed by TOWER to the B737 crew before they took-off. Although it had been written on the strip, the appropriate check mark was absent from the ac's fps, which should have alerted the controller to his omission if checked before he issued the take-off clearance. Controller Members recognised that TOWER had been distracted at a critical

moment; the effectiveness of noting such restrictions on the fps with a check before clearing the flight to depart was not in doubt and if the controller had followed this simple procedure this Airprox could have been averted. This was a good example of what can go wrong when normal sequences are interrupted and the catalyst for the conflict with the DA42.

A controller Member suggested simply monitoring the TOWER frequency might have revealed the controller's error to RADAR, but not all Airports operate in this manner. At military aerodromes, a controller Member opined, the ATC SUPERVISOR might well have been monitoring what was happening and intervened. Nevertheless, it was apparent that RADAR had not assimilated what the B737 crew had said when they checked-in and reported, "..*passing altitude 2 thousand 4 hundred climbing altitude 4 thousand..*" and contrary to the restriction passed by RADAR to TOWER. In the absence of any Mode S derived selected level information being displayed to RADAR, the read-back from the B737 crew of their cleared altitude provided an opportunity for RADAR to forestall this Airprox, but it was missed. A CAT pilot Member believed that this was fundamentally part of the Cause; whilst there was general accord that it was certainly contributory to the outcome and a lost opportunity, the overwhelming view amongst the Members was that the fundamental Cause was TOWER's omission to pass the restriction in the first instance. The Board agreed, therefore, that the Cause of this Airprox was that TOWER did not pass the altitude restriction to the B737 crew resulting in a conflict with the DA42. Furthermore, it was agreed that a Contributory Factor was that RADAR did not assimilate the B737 crew's cleared level report on first contact.

Turning to the inherent Risk, when the B737 crew 'checked-in' with RADAR at 0953:50, the two ac were a little under 2nm apart but, forewarned by TOWER, the B737 pilots had subsequently spotted the DA42 on their TCAS and queried the situation with RADAR. A controller Member commended TOWER for wisely passing TI about the DA42 in the hold at 4000ft. This sound practice had ensured that the B737 crew were primed to look out for the other ac when they departed and, in his view, had ameliorated the Risk significantly. At this point it was the direction of turn not their cleared altitude that was at issue. Even when RADAR queried, just after 0954:11, *"just confirm you're maintaining 3 thousand feet",* the controller would not have realised what was happening as the B737's Mode C would not have shown any excursion above 3000ft QNH at that stage with 'A30' on RADAR's display. So it was a full 30sec after their first call before RADAR realised what was happening and instructed the B737 crew to stop their climb. The B737 crew demonstrated sound appreciation here as they turned back onto the RW heading and then to the L following RADAR's revised instructions. The B737 crew's prompt response to the stop climb enabled them to level their ac 300ft below the DA42 that was still over 1nm away. The Board recognised that although the DA42 crew were cognisant of what was happening they had no impact on the outcome as they maintained their heading while the B737 crew promptly reversed into a L turn and passed no less than 1nm away, thereby averting any need for the B737's TCAS to intercede. This led Members to agree, unanimously, that no Risk of a collision had existed in the circumstances conscientiously reported here.

PART C: ASSESSMENT OF CAUSE AND RISK

Cause: TOWER did not pass the altitude restriction to the B737 crew resulting in a conflict with the DA42.

Degree of Risk: C.

Contributory Factors: RADAR did not assimilate the B737 crew's cleared level report on first contact.