Bombardier DHC-8-311 Dash 8, LN-WFA

AAIB Bulletin No: 5/2004	Ref: EW/C2002/04/03	Category: 1.1
INCIDENT		
Aircraft Type and Registration:	Bombardier DHC-8-311 Dash 8, LN-WFA	
No & Type of Engines:	2 Pratt & Whitney Canada PW123 turboprop engines	
Year of Manufacture:	1991	
Date & Time (UTC):	22 April 2002 at 1210 hrs	
Location:	30 nm north-east of Newcastle Airport, Tyne and Wear	
Type of Flight:	Public Transport	
Persons on Board:	Crew - 3	Passengers - 16
Injuries:	Crew - None	Passengers - None
Nature of Damage:	Nil	
Commander's Licence:	Airline Transport Pilot's Licence	
Commander's Age:	48 years	
Commander's Flying Experience:	11,423 hours (of which 2,586 hours were on type)	
	Last 90 days - 124 hours	
	Last 28 days - 16 hours	
Information Source:	AAIB Field Investigation	

Synopsis

While in Class G (unregulated) airspace, LN-WFA was operating under a Radar Information Service (RIS) from Scottish Control. Following information from the controller of closing traffic, the pilot acquired the reported traffic on his Traffic Collision and Avoidance System (TCAS). He then received a Resolution Advisory (RA) alert/warning commanding a climb, with which he complied, and subsequently reported this manoeuvre event to Scottish Control.

The pilot reported the incident as an Airprox on 25 April 2002 to the UK authorities. Subsequent enquiries established that the Airprox had occurred with two Sea Harriers operating from a Royal Navy vessel in the North Sea, whilst on a practice interception. Interpretation of radar information indicated that the closest separation distance was between 3,450 and 3,700 feet.

Previous AAIB Bulletins have reported upon, and made recommendations concerning, Airprox incidents which have occurred in the airspace over and around the north-east of the UK, between fast military aircraft and Civil Air Transport (CAT) aircraft operating in unregulated airspace. This report makes three further recommendations to the civil and military authorities.

History of the flight

LN-WFA was flying in UK Class G (unregulated) airspace, under the callsign WIF 385, from Newcastle to Stavanger, having filed an IFR flight plan. The aircraft was climbing and, at 1205 hrs, the pilot contacted Scottish Control (Tay Sector) on frequency 124.500 MHz; he reported passing FL136 and was squawking 'Ident', as requested. The controller confirmed that the aircraft had been identified and informed the pilot that he was in receipt of a RIS; the pilot acknowledged with "THANK YOU". Then, at 1208 hrs, the controller asked the pilot to confirm his flight conditions and this was confirmed as: "IMC SHORTLY WERE COMING UP INTO THE CLOUDS NOW". The controller then transmitted: "OKAY THERE IS TRAFFIC JUST IN YOUR HALF PAST TEN RANGE OF TWELVE MILES HEADING SOUTH AT LEAST TWO INDICATING FLIGHT LEVEL ONE FOUR FIVE AND ONE THREE EIGHT UNVERIFIED". The pilot replied with: "CHECKED WIF 385 WE HAVE HIM ON THE TCAS". About one minute later, the controller transmitted: "WIF 385 THAT TRAFFIC IS NOW IN YOUR NINE O'CLOCK RANGE OF FIVE MILES". The pilot replied that: "TRACK SEEMS TO BE BELOW" and the controller responded: "YES INDICATING ONE THREE FIVE UNVERIFIED". Approximately one minute later, the controller transmitted: "WIF 385 TRAFFIC NOW PASSED UNDERNEATH YOU HEADING SOUTH AT THE MOMENT". The pilot replied: "CHECKED WE GOT INFORMATION FROM TCAS TO START CLIMB WIF 385" but the crew did not visually acquire the other aircraft and noted that the height separation indicated on the TCAS was 100 feet, the minimum resolution of the system. After acknowledging this last message, no further transmissions were made between the controller and LN-WFA until, some 6 minutes later at 1216 hrs, the aircraft was transferred to another Scottish Control sector on frequency 134.77 MHz.

Two Sea Harriers were operating on an Air Defence Exercise in the area. They were instructed by their shipborne fighter controller to visually identify an unidentified radar target heading north. With the aircraft south of their promulgated exercise area, the Sea Harriers descended to remain VMC and established radar contact with the unidentified target. An intercept was made on this target, which was visually acquired flying north and just under a layer of cloud. Once the Sea Harrier pilots identified this as a Dash 8 aircraft, they broke off the intercept to the south-west. The minimum separation recollected by the crews on the intercepting aircraft radar was 1.8 nm.

Reporting procedure

The commander of LN-WFA initiated an Airprox after landing and the report was sent to the UK Airprox Board on 25 April, with a copy to the AAIB. By this time, the Sea Harrier pilots had embarked on board their ship and were unavailable. No radar or R/T records were available and, because of the delay in reporting the incident, no information was available from the DFDR or CVR from LN-WFA. However, once advised by the AAIB, the Royal Navy authorities initiated their own investigation and provided full assistance to the AAIB. Additionally, radar information was available from Great Dun Fell, Lowther Hill and Claxby NATS radar sites and a R/T recording was available from the Scottish Control frequency 124.500 MHz.

Radar data

At 1208 hrs, LN-WFA was on a north easterly heading some 30 nm from Newcastle and climbing through FL156 and the two Sea Harriers were 20 nm north of the aircraft and heading south. One Sea Harrier was at FL154 and the other at FL197. To the south of LN-WFA, by some 14 nm, was the intended practice military target heading north at FL79. Throughout the intercept, the military target maintained this position relative to LN-WFA and, at the completion of the intercept on LN-WFA at 1210 hrs, the Sea Harriers initiated and completed an intercept on the military target.

The AAIB evaluated the radar information from Great Dun Fell and Claxby radars to determine the minimum separation distance during the intercept. With radar sweep periods of 7.9 seconds, it was necessary for the tracks of the aircraft from the radar returns to be interpolated between data points. On this basis, at 1210.10 hrs, the Great Dun Fell radar indicated a horizontal separation of 0.6 nm and

a vertical separation of 640 feet and this equated to a minimum separation distance of 3,700 feet. At the same time, the Claxby radar indicated a horizontal separation of 0.562 nm and a vertical separation of 500 feet and this equated to a minimum separation distance of 3,450 feet.

Meteorology

After the incident, the crew of LN-WFA reported the significant weather as layers of cloud between FL140 and FL180. The pilots of the Sea Harriers reported the visibility as greater than 15 nm and that the cloud was at FL180.

Radar Services Outside Controlled Airspace

The UK AIP defines two radar services available to pilots outside controlled airspace; a Radar Advisory Service (RAS) and a Radar Information Service (RIS). These services are unique to the UK. A controller providing a RAS gives information on the relative range and bearing of any conflicting traffic, and the action necessary to resolve the confliction. A controller providing a RIS provides information only and it is the responsibility of the pilot to take any action necessary to resolve the conflict. In accordance with the AIP, the pilot and controller must reach an 'accord' and this requires that: *'the controller will confirm the type of service he is about to provide, and the pilot must give a read-back of the service'*. This requirement was not complied with in the incident as the pilot of LN-WFA did not read-back the clearance and the controller did not respond to this omission.

Scottish & Oceanic Area Control Centre - MATS Part 2 includes the following instructions relating to the provision of a RAS: *'Except in specific circumstances detailed below, and subject to the ScOACC specific conditions above and the general limitations detailed in the UK AIP and MATS Part 1, RAS shall only be provided to aircraft operating within Advisory Airspace notified in the UK AIP, including published Advisory Routes (ADRs)'*. In practical terms, the controller was limited to offering the crew of LN-WFA a RIS in the circumstances pertaining on the incident flight.

Military Regulations

Joint Services Publication (JSP) 318, paragraph 12205, details the regulations under which RN fixed wing aircraft may intercept civilian aircraft. This states:

1. Fixed wing aircraft may require to fly intercepts against unknown targets of opportunity, for example, when conducting radar check test flights. Whenever possible the intercepting aircraft should be in receipt of a radar service to permit intentions to be ascertained by the target aircraft's controller throughout co-ordination. All such manoeuvres are to maintain a vertical separation of 5000 feet or 'break off' by a minimum of 10 nm to ensure 5 nm lateral separation is always maintained.

Exercise notification

On 10 April 2002, the RN submitted to the Airspace Utilisation Section (AUS) of the Directorate of Airspace Policy (DAP) a notification of Intense Air Activity between 15 and 27 April 2002, from the surface to FL240. This information was included in the Navigation Warning Information published for 22 April 2002 and would have been available to the crew of LN-WFA.

Previous Incidents

AAIB Bulletin 2/2001 contained a report (EW/G2000/03/07) into an incident in Class G airspace on 20 March 2000. It involved a Shorts SD-360, G-OLAH, bound for Newcastle on a direct track from Aberdeen, and a RAF Tornado F3. The crew of the Shorts SD-360 was operating under a RAS in VMC and were given avoiding actions by the Newcastle radar controller. The Tornado was manoeuvring and the closest point of approach was estimated to have been some 300 feet horizontally

and 100 feet vertically. None of the crew in either aircraft saw the other aircraft until after the point of closest approach.

That report made two Safety Recommendations:

Safety Recommendation 2000-57

The CAA, in conjunction with the Director of Airspace Policy, should, by means of risk assessment, quantify the risk of mid-air collisions occurring between scheduled public transport services, which operate wholly or partly outside controlled airspace, and other users of Class G and F airspace.

The CAA response to this recommendation was as follows:

The CAA partially accepts this recommendation.

It is not possible to gather the statistical data required to conduct the quantitative risk assessment called for in this Recommendation. Therefore, the Directorate of Airspace Policy conducted an immediate safety assessment of operations by scheduled public transport services in Class F and G airspace throughout the UK. The study confirmed that there had been a concentration of incidents in the vicinity of Newcastle Airport and that provided a Radar Advisory Service or Radar Information Service is used, the target levels of safety are met. However, this and a number of other incidents indicate that not all military traffic is availing itself of such air traffic services. Consequently, the CAA is continuing to work closely, as a matter of urgency, with the MoD and Newcastle Airport, on a wide range of initiatives aimed at reducing conflicts of this nature in the future. This work is expected to be complete by October 2001, after which the subject will continue to be reviewed as part of the ongoing safety assurance process.

CAA Action following this recommendation was as follows:

A variety of initiatives aimed at reducing conflicts between scheduled public transport services and military aircraft have been introduced between May 2001 and October 2001. Use of a serviceable transponder is now mandatory for military flights within the United Kingdom Low Flying System (UKLFS), and military pilots engaged in low-flying activities have been directed to make an information call to Newcastle Airport when operating close to the Newcastle CTR boundary and when transiting the Hexham gap. During large-scale military exercises in the area, an airspace buffer is put in place around the Newcastle CTR for UKLFS participants. A Military Liaison Officer is deployed to Newcastle Airport ATC during such exercise periods. The Liaison Officer has full details of exercise activities and acts as a point of contact for any unusual occurrences or incidents. The situation in the Newcastle area remains under constant review, with Newcastle Airport providing the CAA and MoD with monthly reports on any issues of concern. MoD subsequently investigates any suspected breaches of airspace, military regulations or UKLFS procedures arising from these reports and takes appropriate remedial action. The MoD and Newcastle Airport, in conjunction with the CAA, continue to meet at 6 monthly intervals to provide the safe and efficient use of airspace in the region.

Safety Recommendation 2000-58

The CAA, in conjunction with the Director of Airspace Policy (DAP), should assess whether there is adequate provision of regulated airspace for scheduled air transport operations to and from regional airports that are not directly linked by airways or advisory routes.

The CAA response to this recommendation was as follows:

The CAA partially accepts this recommendation

The safety assessment referred to in the response to Recommendation 2000-57 indicates that target levels of safety are met where Radar Advisory and Radar Information Services are utilised. However, a further consideration of the adequacy of the airspace in the Newcastle area will be conducted following discussions with MoD. It is expected that this further work will be concluded by April 2002.

CAA action following this recommendation was as follows:

Following discussions with the MoD, the CAA has recently reviewed the adequacy of the airspace in the Newcastle area. The CAA noted the steps that had been taken by MoD to address the issues surrounding airspace in the vicinity of Newcastle Airport and supported Joint Future Airspace Design Team proposals for additional Controlled Airspace in the area. The CAA concluded that, whilst there was clearly still a level of risk associated with the current airspace arrangements, all reasonable steps had been taken to mitigate the risk of encounters between civil air transport aircraft and military aircraft to an acceptable level in the short and medium term. Notwithstanding this, the situation needs to be carefully monitored. Additionally, commencing with data from 2001, the CAA will undertake an annual review of all AAIB/UKAB reports for incidents involving commercial aircraft operating in Class G airspace within the UK FIR. The 2001 review should be completed by 30 June 2002.

Other Incidents

A further incident occurred on 13 August 2001 and was reported in AAIB Bulletin 6/2002 (EW/C2001/8/02). This involved a Fokker 50, G-UKTH, and a USAF McDonnell-Douglas F15E south-east of Teeside Airport in Class G airspace. The crew of the Fokker 50 was operating under a RAS from Pennine Radar and reacted to a RA warning on TCAS. The rear seat crew member of the F15E saw the Fokker 50 at a late stage and estimated that it would pass behind his aircraft; the Fokker 50 crew only saw the conflicting military traffic after the event.

Another more recent incident occurred on 2 July 2002, which involved an Avro RJ85 civil transport aircraft and a RAF Jaguar. This incident was investigated by the UKAB (Report No 102/02). The RJ85 was inbound to Newcastle, in IMC, at FL70 and at 250 kt, when the TCAS alerted them to a potential conflict within 2.5 nm. The conflict symbol quickly changed from blue to yellow and then to red, and there was an associated 'climb' warning. At about this time, but before any significant avoiding action could be taken, both crew members heard a jet engine noise from another aircraft and the FO in the right seat "saw him in a flash passing underneath while in a steep climb".

The minimum separation distance was assessed as 100 feet and the Degree of Risk in this Airprox was categorised by the UKAB as 'high'. In their report the UKAB stated *'The Board agreed that this incident was one of the most serious Airproxs they had seen'*

The Jaguar had been operating low level and, due to a low fuel state, had been initiating a high level recovery to base. The Jaguar's operating authority, RAF Strike Command (STC), was reported by the UKAB as stating *'how seriously this incident had been treated within STC and that a robust directive had been sent to all fast jet pilots in the Command to ensure that a similar occurrence could not happen again. Additionally, a draft amendment to military flying regulations had been raised'.*

Recent incidents

On 16 June 2003 an Airprox occurred between a F100 aircraft, in the climb-out from Teeside on a flight to Amsterdam, and three unknown fast jet aircraft. UK Airprox 82/2003.

On 19 June 2003, avoiding action was issued to a Learjet within ADR (Class F) airspace at RANOK due to the unknown intentions of military aircraft in the vicinity. The Learjet was in receipt of a RAS against two military aircraft.

On 24 June 2003 an Airprox between a Jetstream 32, flying from Teeside to Aberdeen, and two military jets occurred 25 nm south of Aberdeen at FL165. The Jetstream was under a RIS from Scottish Radar who advised that traffic was on their left and co-ordinated 1,000 feet below. A few minutes later, after transferring to the Aberdeen frequency, ATC issued avoiding action to turn right by 30°, as the traffic had climbed above its cleared level and was converging. As this action was started it became evident to the crew that the converging aircraft (a Tornado F3 from RAF Leuchars) had levelled and would pass safely ahead and below.

On 1 October 2003, an alleged infringement of the Newcastle CTR (Class D airspace) involved a military aircraft, some 8 nm west of Newcastle. Avoiding action and traffic information was issued by ATC to an Airbus A319 on approach to Runway 07.

On 5 February 2004, a serious AIRPROX occurred between an AS332L helicopter and a RAF Tornado, both operating within Class G airspace. The helicopter had departed the AUK oil platform and was in the process of joining the 117 Helicopter Main Route (HMR) for the flight back to Aberdeen Airport. The usual transit height of 2,000 feet was reduced to 1,000 feet in order to minimise the effect of a strong headwind, which placed the helicopter some 500 feet below the recognised base level of the HMR. (It should be noted that offshore helicopter operations often result in helicopters flying at such heights for other reasons, eg, to keep below freezing levels and when conducting inter-rig shuttles.) Whilst on autopilot and just prior to joining the HMR some 120 miles offshore, the crew suddenly became aware of a roaring noise coupled by, a very short time later, the sudden onset of harsh and severe turbulence. The commander grabbed the controls and looked across the cockpit to the left in time to see the co-pilot's windscreen and quarter light filled with, what he believed to be, the rear section of a Tornado aircraft in a steeply banked turn away from the helicopter at a range of some 50 feet. On return to Aberdeen, a download of the QAR showed the airflow disturbance from the event as a maximum normal g variation of, approximately, +0.1g to +1.6g over one second, although the overall disturbance lasted for some 20 seconds. After arrival, the helicopter was inspected and not found to have suffered damage, and was returned to service. The crew of the Tornado aircraft, an F3 variant based at RAF Leuchars, reported that their controller stated (wrongly) that the other aircraft was an emergency aircraft en-route to Norwich and that he apologised for the late point out. Following the flight, it was reported that the Tornado was grounded pending an inspection for any signs of overstress.

This event is the subject of a separate investigation by the UKAB.

Discussion

The Airprox involving LN-WFA occurred in an area of Class G airspace with each of the conflicting aircrafts' pilots having responsibility for collision avoidance. With airborne radar, the pilots of the Sea Harriers were in control of the intercept. However, they had misidentified their correct target, which was on a similar heading but some 14 nm further away. The pilots reported that they both had visual contact with the target aircraft and broke off the intercept as soon as they had recognised it as a civilian aircraft. In this incident, the military regulations concerning the interception of civilian aircraft were not complied with in that the Sea Harriers did not break off the intercept at 10 nm or maintain 5,000 feet vertical separation. However, the Harrier pilots were not aware that their initial target was a civilian aircraft until they came within visual range. This difficulty was highlighted by the UKAB in the conclusions to their report on this Airprox, and it is reported that a current redrafting of the intercept regulations will list rules under 'known' and 'unknown' headings.

The crew of LN-WFA was understandably concerned at the closure rate of the unknown aircraft and the resultant activation of TCAS. The controller had kept the crew informed of the position of the unknown traffic but was under no requirement to pass avoiding instructions to LN-WFA. Indeed, it is difficult to know what instructions the controller could have passed without any communication with the unknown traffic, particularly as it was military fast jets. In this incident, the R/T transcript showed that the type of service had not been agreed between the controller and civilian pilot as required by the UK AIP. The controller should have picked up this omission. However, it was also

possible that the pilot of the foreign aircraft was not fully conversant with the level of service offered. All foreign crews operating in UK airspace should be aware of the level of ATC service available and foreign Operators should have completed the appropriate risk assessments. Nevertheless, the AAIB has written to suggest that the Norwegian Authorities remind their appropriate operators of the UK regulations regarding the current limited levels of ATC service.

Although the UKAB determined that there was no risk of actual collision (Category C), this incident is another example of the potential risks involved when CAT aircraft and military aircraft operate concurrently in the same unregulated airspace, especially when the controller has no communication or control over the manoeuvres of the military traffic and when providing a minimal radar service, ie, a RIS. In the general area where this incident occurred, there is a high level of military activity and limited lower altitude (below FL245) controlled airspace for CAT aircraft operating between the regional airports in the north-east of the UK and northern Europe. Whilst there are military regulations in place designed to avoid Airprox events, such as the one involving LN-WFA, this incident highlights the difficulty of always ensuring compliance with such regulations. The obvious possible solutions are to require military traffic to operate under a radar service, to deny CAT aircraft access to areas of known military activity or to increase the regulated airspace. Either of the first two options, while providing a high level of safety, would be restrictive to both types of operation. An increase in the provision of regulated airspace from regional airports in the north-east of England would seem to offer the optimum solution for the safety of CAT aircraft, but this would be at the expense of the available airspace in one of the few large scale training areas in which military aircraft operate in the UK. Safety Recommendation 2000-58 addressed this situation on a UK wide basis. The CAA partially accepted this recommendation and continues to monitor the situation.

Nevertheless, the situation in the area of the incident involving LN-WFA, and the unregulated airspace associated with the north-east of the UK generally, is potentially more acute, involving the disparate operational procedures and requirements of military and CAT aircraft. CAT/military Airproxes continue to occur in this area despite the procedures, monitoring and airspace changes that have been put in place in an attempt to prevent such incidents. The fact that collisions did not result from the circumstances of two extremely serious events of July 2002 and February 2004, with what would have been an inevitable loss of life, was extremely fortuitous. It is therefore recommended that:

Safety Recommendation 2002-55

The Civil Aviation Authority should re-examine the airspace categorisation, procedures and services currently available to Civil Air Transport aircraft which operate through unregulated airspace associated with regional airports in the north-east of the UK, with the aim of ensuring that a level of protection is afforded to such aircraft from military aircraft such that airprox events are avoided. The impact of any potential changes to the available unregulated airspace used by military aircraft should be minimised as far as possible.

Safety Recommendation 2003-53

The Ministry of Defence should review the operation of military aircraft in the unregulated airspace around the north-east of the UK, including the conduct of practice interceptions of targets, to ensure that procedures in use and the equipment fitted to military aircraft assure adequate separation of military aircraft from Civil Air Transport aircraft which operate concurrently through unregulated airspace in the region.

Safety Recommendation 2004-21

The concurrent use of unregulated airspace by both CAT and military aircraft in the north-east of the UK, should be reviewed jointly at the highest level by the CAA and MoD with the aim of eliminating Airproxes and potential collisions, with likely large scale loss of life, between Civil Air Transport and military aircraft.