

# Shorts SD3-60 100 series, G-OLAH and Tornado F3

**AAIB Bulletin No: 2/2001**

**Ref: EW/G2000/03/07 - Category: 1.1 & 1.3**

## INCIDENT

**Aircraft Type and Registration:** (i) Shorts SD3-60 100 series, G-OLAH  
(ii) Tornado F3

**No & Type of Engines:** (i) 2 Pratt & Whitney PT6A-65R turboprop engines  
(ii) 2 RB 199 turbofan engines

**Year of Manufacture:** (i) 1982  
(ii) Not known

**Date & Time (UTC):** 20 March 2000 at 1847 hrs

**Location:** 26.5 nm North of Newcastle Airport

**Type of Flight:** (i) Public Transport  
(ii) Royal Air Force

**Persons on Board:** (i) Crew - 3 - Passengers - 11  
(ii) Crew - 2 - Passengers - N/A

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

**Nature of Damage:** (i) None  
(ii) None

**Commander's Licence:** (i) Airline Transport Pilot's Licence  
(ii) Military

**Commander's Age:** (i) 60 years  
(ii) Not known

**Commander's Flying Experience:** (i) 17,130 hours (of which 1,450 were on type)

Last 90 days - 80 hours

Last 28 days - 39 hours

(ii) Not known

Last 90 days - Not known

Last 28 days - Not known

**Information Source:**

AAIB Field Investigation

**Synopsis**

A Shorts SD3-60 aircraft, G-OLAH, was operating a scheduled service from Aberdeen to Newcastle. The direct track between the two aerodrome control zones followed by the aircraft lay within Class G airspace. At the same time a formation of three RAF Tornado F3 aircraft were engaged in a Tactical Leadership Training medium scale night exercise planned by the Air Warfare Centre and notified to civilian operators by NOTAM. As the SD3-60 descended to FL50 into Newcastle, under a Radar Advisory Service (RAS), one of the Tornados was manoeuvring at high speed and passed closely in front of the SD3-60 at the same level. The Newcastle radar controller, who observed the military traffic on his radar, provided the SD3-60 pilot with avoiding headings, which were followed. Despite this, and because the Tornado was manoeuvring, both aircraft conflicted, with the closest point of approach estimated to be some 300 feet horizontally and 100 feet vertically. The Tornado navigator detected the confliction on his radar moments before and warned his pilot of the danger. Neither he nor the pilot saw the aircraft until it had passed behind them and too late to take any avoiding action. The pilot of the SD3-60 did not see the Tornado until it passed in front of his aircraft.

**The Shorts SD3-60**

The crew of the SD3-60, who were on a flight from Aberdeen, contacted the Newcastle approach controller on 124.375 MHz at 1840:30 hrs having copied ATIS information 'X-ray', stating that they were 'level at FL075 and ready for descent'. The controller transmitted that the aircraft was identified on radar 44 nm to the north, that he was providing a RAS and that the aircraft was cleared to descend to FL050. The crew acknowledged the clearance and the type of service being provided. The controller then stated that he would provide radar vectors for the ILS to Runway 25, ATIS 'X' was current and the QNH was 1026 mb.

As the SD3-60 crew approached FL050 the controller transmitted 'MAINTAIN FOR THE MOMENT THERE'S MILITARY CONTACTS. YOU MAY SEE OUT IN YOUR HALF PAST TWO AND HALF PAST THREE A RANGE OF TEN TO FIFTEEN MILES MILITARY CONTACTS MANOEUVRING VARIOUS LEVELS. FIRST ONE IS INDICATING FLIGHT LEVEL FOUR SIX ON A NORTHERLY TRACK I'LL KEEP YOU ADVISED'. The crew replied that they were maintaining FL050 and were in Instrument Meteorological Conditions (IMC). At 1846 hrs the controller transmitted 'IF YOU TURN LEFT LEFT ONTO A HEADING OF 100° FOR A SHORT TIME JUST TO KEEP YOU CLEAR OF THAT TRAFFIC'. The crew confirmed that they were turning left whereupon the controller transmitted that the previously mentioned traffic was in their half past two position at FL047 turning onto an easterly heading. The Newcastle controller then transmitted 'FURTHER LEFT HEADING 090 AVOIDING ACTION THAT

TRAFFIC JUST PASSING NOW IN YOUR HALF PAST TWO RANGE OF A MILE AND A HALF'. The SD3-60 pilot acknowledged the instruction and almost immediately transmitted an expletive followed by the words 'AIRMISST'. The controller confirmed that the Tornado had passed and instructed the SD3-60 pilot to continue on his present heading, as there was further traffic five miles in trail. As the conflicting traffic passed clear the SD3-60 was given a heading for the airfield and cleared for further descent. The aircraft landed without further incident.

### **The Tornado formation**

Four Tornados were tasked to participate in 'AIREX TLT 1/00', a medium scale Tactical Leadership Training night exercise planned by the Air Warfare Centre. This exercise involved up to 32 fast jets including the flight of four Tornado F3s (callsign FOZZY) based at RAF Leuchars. Also taking part were an 'Airborne Early Warning' (AEW) E3D aircraft (callsign MAGIC 95), Air-to air refuelling Tankers and Falcon Electronic Warfare aircraft. The scale of the exercise was such that it was notified as an unusual aerial activity via an Airspace Co-ordination Notice (ACN), whose distribution included the ATC managers of Aberdeen and Newcastle, and a Notice to Airmen (NOTAM). The NOTAM provided information to other airspace users that, within the notified area, high-energy manoeuvres would be carried out by fast jet aircraft, some in large formation packages, and that some aircraft would be unable to comply with the Rules of the Air. The ACN explained that some participating crews would operate with night vision goggles, some aircraft might not show standard lighting and that some communications and radar jamming should be expected. The NOTAM stated that all exercise aircraft would remain clear of regulated airspace unless under the control of the appropriate controlling authority.

The Tornado formation, now consisting of three aircraft because of technical problems with one aircraft on start-up, flew south towards the Spadeadam Weapon Range Danger Area (WRDA) 30 nm to the west of Newcastle, before turning east and passing 20 to 30 nm to the north of Newcastle en-route to an air-to-air refuelling area over the North Sea.

During the transit to their assigned station for Airborne Early Warning (AEW) the crew of MAGIC 95 initialised their equipment in preparation for an 'on station' declaration. As the aircraft mission systems came 'on-line' and became available for assessment, the Tactical Director (TD) gave permission to the mission crew members to communicate with external agencies to check their radios and co-ordinate as necessary. In authorising the crew for this procedure the TD reminded the crew that although communications had been opened any external agency or aircraft was to be told that the AEW aircraft was not 'on station'.

At 1824:04 hrs 'FOZZY' formation (three aircraft; FOZZY 2, 3 and 4) made radio contact with the Weapons Controller (WC) of MAGIC 95 on the exercise check-in frequency. Their call was acknowledged by the WC who informed them that MAGIC 95 was not on station and that the E3D's radar was not available. At 1825:32 hrs FOZZY formation re-established contact with the WC on the primary exercise frequency. The controller had no radar display and the E3D was not yet 'on station' thus no form of radar service was offered by the WC or requested by the F3 formation. Radar data first became available to the E3D crew at 1843:30 hrs, some 7 minutes before the required 'on station' time.

As the formation turned onto a northeasterly heading to pass between Danger Area D512 and Newcastle, FOZZY 4 turned away briefly to simulate an attack on another aircraft. After disengagement this manoeuvre put him approximately 10 nm behind the rest of the formation. After disengaging from a further target the crew of 'FOZZY 3' returned to track 070° at 450 kt

towards the Air-to air refuelling area. At this time it was twilight with an in-flight visibility of 8 nm with some thin small patches of layered cloud 1 nm distant. The navigator of 'FOZZY 3' then noticed on his radar a contact which was 50° to 55° left of the nose at the same level at very short range. He warned the pilot to look out to the left. A very short time later the navigator saw a red light and looked to the left '8 o'clock' position to see a small civilian aircraft very close and slightly below. The pilot did not see the aircraft until it was in his right '4 o'clock' position. 'FOZZY 3' transmitted that a civilian aircraft had passed his 6 o'clock position with an estimated clearance of 100 feet vertically and 300 feet horizontally. He asked the WC if he had seen anything. The WC checked his radar display and could see the aforementioned traffic in close proximity to the F3. He reminded 'FOZZY' formation however that the E3D was not yet 'on station'. At 1850:14 hrs the controller announced that 'MAGIC 95' was now on station and provided the 'FOZZY' formation with a Flight Information Service (FIS).

Recorded RT information showed that in the 1 minute 44 second period before the call about the near miss from FOZZY 3, the WC made 2 transmissions to FOZZY formation containing radar derived tactical information. These calls related to a low-level fast moving contact being reported by FOZZY 3 and not to the conflicting civilian aircraft. The transmissions by the WC, before the 'on station' declaration and prior to the formal imposition of any form of service, were made with reference to secondary radar information that had just become available but were contrary to normal procedure and the standard instructions issued to the mission crew by the TD.

### **Radar Advisory Service (RAS)**

A Radar Advisory Service (RAS), which is only available in Class F Airspace (Advisory Routes) and Class G Airspace, is defined in the UK AIP section ENR 1.6.1 as follows:

'RAS is an air traffic radar service in which the controller will provide advice necessary to maintain separation between aircraft participating in the advisory service, and in which he will pass to the pilot the bearing, distance and, if known, level of conflicting non-participating traffic, together with advice on action necessary to resolve the confliction. Where time does not permit this procedure to be adopted the controller will pass advice on avoiding action followed by information on the conflicting traffic. Under a RAS, the following conditions apply:

- the service will only be provided to flights under IFR irrespective of meteorological conditions.
- controllers will expect the pilot to accept vectors or level allocations which may require flight in IMC. Pilots not qualified to fly IMC should accept a RAS only where compliance with ATC advice permits the flight to be continued in VMC.
- there is no legal requirement for a pilot flying outside Controlled Airspace to comply with instructions because of the advisory nature of the service. However, a pilot who chooses not to comply with advisory avoiding action must inform the controller. The pilot will then become responsible for initiating any avoiding action that may subsequently prove necessary;
- the pilot must advise the controller before changing heading or level;
- the avoiding action instructions which a controller may pass to resolve a confliction with non-participating traffic will, where possible, be aimed at achieving separation which is not

less than 5 nm or 5,000 feet, except when specified otherwise by the regulating authority. However, it is recognised that in the event of the sudden appearance of unknown traffic, and when unknown aircraft make unpredictable changes in flight path, it is not always possible to achieve these minima;

- information on conflicting traffic will be passed until the confliction is resolved;
- the pilot remains responsible for terrain clearance, although ATSU's providing a RAS will set a level or levels below which a RAS will be refused or terminated.'

### **AIRPROX statistics**

The UK AIRPROX Board (UKAB) provided statistics for January 1990 to March 2000 showing the number of reported AIRPROXs involving military aircraft and commercial air transport aircraft that had occurred outside controlled airspace in the Eastern and North-eastern UK Flight Information Region (FIR). The area of concern covered Class F & G airspace from the eastern boundary of the UK FIR to the edge of the main airway's structure running approximately east/west from Ipswich to Bedford and north/south from Bedford to the west of Aberdeen. The statistics were further segregated into AIRPROXs occurring between FL100 and FL245, and those below FL100 are shown Figure 1 below.

Height Band	Category 'A (Risk of collision)	Category 'B' (Safety not assured)	Category 'C' (No risk of collision)	Total
between FL100 and FL245	1	1	31	33
below FL100	4	14	69	87

Figure 1. AIRPROXs involving military aircraft and commercial air transport outside controlled airspace in the Eastern and North-eastern UK Flight Information Region (FIR).

### **Discussion**

An RAF investigation of this AIRPROX concluded that the transmissions by the WC concerning tactical information made prior to the 'on station' declaration may have misled the crew of FOZZY 3 into believing that they were actually receiving a radar service. However, the form of radar service under which FOZZY 3 operated once MAGIC 95 was 'on station' was a Flight Information Service (FIS). This is a non-radar service under which the aircraft captain is responsible for maintaining safe separation from other aircraft. This is standard practice under circumstances where radar and communications jamming is forecast, as for this exercise, and is reflected in documentation relating to the 'Procedures for Early Warning Aircraft within UK FIRs in peacetime' and 'Group Air Staff Orders'. Furthermore, Joint Service Publication (JSP 318A) states that:

'The act of identifying an aircraft does not imply that a radar service is being provided. From time to time the pilot may be required to select SSR codes or make turns for identification, but he must

not assume that a radar service is being provided until the controller makes a positive statement to that effect'.

In this incident the WC neither positively identified 'FOZZY' formation nor placed them under any form of service until some minutes after the AIRPROX had occurred. Despite the potentially misleading RT at the time of the AIRPROX, 'FOZZY 3' was not receiving any form of radar service from MAGIC 95.

For the most part civil air transport scheduled operations are conducted within the confines of controlled airspace where positive ATC, providing radar or procedural separation, affords a measure of protection from conflicting traffic. In the 'open FIR' (ie Class F and G airspace) only a RAS or Radar Information Service (RIS) is available. The service provides either traffic information followed by advice on avoiding action, or traffic information will be given but no avoiding action, making the pilot in receipt of the service responsible for his own separation. Furthermore, any radar service outside controlled airspace may be limited either by equipment performance or controller workload. When available and where possible a RAS will be aimed at achieving separation which is not less than 5 nm or 5,000 feet, except when specified otherwise by the regulating authority. However, in the event of the sudden appearance of unknown traffic, and when unknown aircraft make unpredictable changes in flight path, as in this case, it is not always possible to achieve these minima.

Within the UK there are number of regional airports between which it is not possible to conduct flights which remain continuously within controlled airspace. The flight which is the subject of this report illustrates the point, where the direct track lies almost entirely in Class G airspace. An indirect track, within controlled airspace for the most part, still necessitates a portion of the flight being flown in class G airspace.

The statistics provided by the UKAB for the last 10 years show 87 reports were made in which pilots, flying in class G airspace, considered that there had been a loss of safe separation; the fact that the majority were assessed as 'no risk of collision' does not necessarily diminish the potential risk that existed.

The area of the military exercise notified by NOTAM and ACN concerning unusual aerial activity covered such a large area of Northern England and Scotland that its avoidance by non participating aircraft was impractical. At the time of the AIRPROX the Shorts SD3-60, descending at 180 kt in IMC, was receiving a RAS. The Newcastle controller could see on his radar display the fast moving Tornado formation and issued information in the form of heading changes to the Shorts SD3-60 crew in order to de-conflict the traffic. The high speed (450 kt) and unpredictable manoeuvres flown by the Tornado however made this ineffective. The Tornado formation was not on the same frequency as the Shorts SD3-60 and not 'participating' traffic receiving a RAS from Newcastle. The Tornado crew, reportedly in VMC conditions with an in-flight visibility of 8 km, did not see the confliction until it had passed and were only momentarily aware of it prior to the event via their on board radar. Finally, without visual acquisition neither pilot was able to take avoiding action.

By definition the 'open FIR' is available to a wide range of airspace users, often with incompatible operating characteristics. This is highlighted by the performance of military fast jets, conducting high energy manoeuvres, which are, in general speed limited to 450 kt, and slower moving public transport passenger flights on direct tracks between regional airports. Operators of scheduled passenger services, who need to fly outside controlled airspace, and are limited by aircraft design

characteristics to fly at FL100 or below, can plan to minimise the risk of a collision by adopting some or all of the following measures:

- Operating as much of the flight as possible under positive radar control inside controlled airspace. When this is not practicable,
- follow Advisory Routes (if available) and,
- comply with the rules of the air and flying at the correct quadrantal level maintaining VFR when possible and,
- observe the civil speed limit of less than 250 kt below FL100 thus improving the ability to 'see and avoid' potential conflicts.
- Request a RAS or RIS (if available).
- Avoid areas of intense military activity and areas or times of unusual aerial activity specified in NOTAMS.
- Install airborne equipment capable of providing crews with adequate warning of potential collisions.

### **Safety recommendations**

It is recommended that:

#### **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 partially outside controlled airspace, and other users of Class F and G airspace.

#### **Safety recommendation 2000-58**

The CAA, in conjunction with the Director of Airspace Policy, 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.