AAIU Report No. 1998/006
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Name of Operators:	USAF and UPS
Manufacturer:	Boeing
Model:	B747's
Nationality:	U.S.
Location:	53N 15W
Date & Time (UTC):	27 May 1997; 0420 hrs

Notification

The AAIU was notified of this Incident by the Irish Aviation Authority (IAA) on Monday, 2 June 1997.

Synopsis

The Boeing 747 USAF 1 was routing from the United States to Paris at flight level 290. The Boeing 747 UPS 6080 was routing from Europe to the United States at flight level 310. The position 53N 15W, is one of the entry/exit points from the Shannon Upper Information Region (UIR) to oceanic airspace.

History

The UPS 6080 had been assigned flight level 280 as its oceanic crossing level. On entering Irish airspace, the UPS aircraft gave its estimated time for position, 53N 15W, as 0421. It was instructed by Shannon to cross 53N 15W at flight level 280.

The control of the sector in which the UPS aircraft was flying was carried out by two Grade III Air Traffic Controllers. One operating as a Radar Controller, the other as a Procedural/Planner.

The USAF 1 Boeing 747 had given an estimated time of 0419 for position 53N 15W. At 0416, UPS 6080 commenced descent from flight level 310 to flight level 280 at position 53N 1404W.

At 0418.34 the Short Term Conflict Alert (STCA) activated.

UPS 6080 was turned left 20º at 0418.40, the conflict alert ceased at 0419.03. The USAF was turned left 20º and instructed to climb to flight level 31 at 0419.

Examination of the radar recording of this incident, shows that when both aircraft were at the same flight level, i.e. 290, they were 18 nm apart on diverging tracks in opposite directions. The closest the aircraft were to one another, UPS 6080 at flight level 282, against US Air Force One at flight level 290, was 6 nm.

The requirement to separate aircraft is detailed in ICAO Annex 11, Air Traffic Services which contains the Relevant Standards and Recommended Practices for Air Traffic Control.

Short Term Conflict Alert System (STCA) Note

The STCA is operational in Irish controlled airspace. The system software is designed to take radar track and altitude data and make linear extrapolations looking forward for a two minute period in order to predict possible conflicts between aircraft pairs when the appropriate separation standards could be lost.

The STCA system uses basic radar data for its calculations, with no 'aircraft intention' input as to altitude clearances issued or the expected initiation of turns (such as over holding fixes). Filters have therefore been built into the software in order to minimise the occurrence of 'nuisance' alerts when separation would be properly maintained, for example, by an aircraft levelling off at a new cleared flight level during a descent.

In this case the alert was generated for only one second before the controller issued appropriate clearance.

Traffic Alert and Collision Avoidance System (TCAS) Note

This system, also known as Airborne Collision Avoidance System (ACAS), is based upon the use of aircraft transponder equipment to provide warnings of possible collision with other transponding aircraft. The TCAS equipment scans once per second and may detect intruding traffic up to 40 nm distant and within 8,700 feet of the subject aircraft. Traffic movements are assessed and trends are predicted to search for potential conflicts. Advisory alerts will then be triggered when a particular target aircraft becomes a threat, i.e. within a defined volume of airspace around the aircraft. The lower priority alert is a Traffic Advisory (TA) which produces an aural alert ***"Traffic, Traffic"***, on the flight deck and a visual cue as to the location of the target.

For closer encounter predictions when evasive action is required, a Resolution Advisory (RA) is generated which gives both visual and aural cues to the flight crew on the vertical manoeuvre required to avoid a collision. Preventative commands, such as ***"do not descend",*** can also be generated and displayed to the crew where circumstances are such that level flight will maintain safe operation.

Conduct of Investigation

The conduct of this investigation was by way of review of the:-

(i) ATC Radar Tapes;
(ii) ATC Audio Tapes;
(iii) Interviews with ATC Management Shannon;
(iv) Interview with ATC Controllers involved.

Several aspects of this incident merit consideration.

The main observation must be that both the ground based STCA and the airborne TCAS fitted only to USAF 1 both functioned as required.

The second observation is that almost immediately the STCA activated the radar controller issued avoidance clearances to both aircraft which was the correct response.

In analysing any conflict between two aircraft it is important not to over react to a loss of separation as distinct from a loss of safety.

Airproximity

Aircraft proximity is defined by the International Civil Aviation Organisation Doc 4444 as:- ***"A situation in which, in the opinion of a pilot or air traffic services personnel, the distance between aircraft as well as their relative positions and speed have been such that the safety of the aircraft involved may have been compromised. An aircraft proximity is classified as follows:-***

Risk of collision:- *The risk classification of an aircraft proximity in which serious risk-of collision has existed.*

Safety not assured:- *The risk classification of an aircraft proximity in which the safety of an aircraft may have been impaired.*

No risk of collision:- *The risk classification of an aircraft proximity in which no risk of collision has existed.*

Risk not determined:- *The risk classification of an aircraft proximity in which insufficient information was available to determine the risk involved, or conflicting evidence precluded such determination."*

Handling of Airprox Reports

In Ireland, where a loss of separation occurs, ATS staff are required to report such events under the Mandatory Occurrence Reporting (MOR) Scheme in the Air Navigation Services. An investigation follows all such reports, pending the outcome of such an investigation, the controller involved is removed from operational duty without prejudice, and not permitted to exercise the privileges of his or her rating until the investigation is complete or refresher training is carried out.

Such an Investigation is private to the Irish Aviation Authority (IAA).

A further or parallel investigation may be carried out by the Air Accident Investigation Unit of the Department of Public Enterprise, under S.I. 205 of 1997.

In the UK, reports generated by pilots are classified as AIRPROX (P) reports are considered by the Joint AIRPROX Working Group (JAWG). Reports generated by Air Traffic Controllers are classified as AIRPROX (C) reports and are considered by the Joint AIRPROX Assessment Panel (JAAP).

The JAAP consists of an independent Chairman plus four pilots and four controllers. The panel reviews the reports and assesses the degree of risk inherent in each occurrence. The causal factors are determined and, where appropriate, safety recommendations are made in the interests of flight safety.

A number of Safety Recommendations have been made by JAAP, two of which were in areas relevant to the circumstances of this AIRPROX. These are detailed below:-

J95-6 "The Panel recommended that the CAA continue the development of ATC radar Short Term Conflict Alert (STCA) devices especially in TMA airspace, including holding Patterns."

J95-7 "The Panel recommended that the CAA mandate the fitting of TCAS to all commercial air transport operating in UK controlled airspace as soon as possible".

The UK CAA publishes Airprox C Reports on behalf of the independent joint Airprox C Assessment Panel (JAAP).

The procedures followed by the IAA in dealing with controllers involved in Airprox incidents merits examination. All the controllers interviewed were deeply shocked at the occurrence. In all cases there was a feeling of failure and low self esteem, *"How could this have happened on my watch"*.

It was also quite obvious that the controllers were traumatised, and had some difficulty in coping with the stress of the subsequent actions, i.e.

(i) loss of rating;
(ii) ANS Investigation;
(iii) AAIU Investigation;
(iv) re-training period.

Analysis

In ensuring separation of aircraft in controlled airspace differing levels of automated and human centred systems are used, and at the final level the visual acquisition of the pilot, of his conflicting traffic may have to be relied on. Analysis in the UK of Airprox incidents indicates that most are attributed to flight deck errors which lead to deviation from the altitude arranged by ATC.

This case differs in that an ATC clearance was given which did not provide the required separation. However, the safety tools, STCA and TCAS, as distinct from separation tools, activated to provide timely intervention by the controller.

This occurrence should have been reported by way of the MOR. This would have allowed a timely examination by the ANS management and possibly have prevented some of the subsequent media attention. Notwithstanding this, the identity of the aircraft *"USAF 1"* would more than likely have triggered media attention. This event may also have been used unfairly to illustrate the differing requirements for the carriage of TCAS, i.e. for passenger aircraft only, as distinct from cargo aircraft by some sections of the U.S. pilot community.

The event however has served as a useful purpose in prompting both an IAA investigation and an AAIU investigation and has helped to identify possible deficiencies in the handling of Airprox Reports, and the manner in which controller induced separation losses are dealt with.

It also re-affirms the effectiveness of the automated safety tools of STCA and TCAS and the wisdom of their provision.

Human factors played the major role in the cause of this incident and this further reinforces the requirements to examine the role of human factors in Air Traffic Control as well as in the Flight Crew Operations. The occurrence also highlighted the lack of a critical incident response programme for controllers who may have been traumatised by an incident or indeed the subsequent investigations into such events, and illustrates the requirement of a similar programme for ATC personnel as exits for most aircrew.

Conclusions

1. The controllers were properly rated for the respective roles.

2. No risk of collision existed even without controller intervention.

3. No action by either flight crew contributed to the incident.

4. Both controllers involved were considerably traumatised by the event.

5. No formal counselling system exists for controllers involved in an incident - similar to the Critical Incident Response Programme for aircrew.

6. The incident was not reported according to the MOR System.

7. No formal independent system exists for the assessment and categorisation of Airprox Reports.

Safety Recommendations (SR)

1. The IAA and Department of Public Enterprise should establish a Joint Airprox Working Group with an independent chairman, to assess Airprox Reports, with authority to make recommendations in the interests of safety. **(SR 1 of 1998)**

2. The IAA Should provide Human Factors training to all controllers in line with Eurocontrol recommendations. {*Recommendation made 17 June 1997*}. **(SR 2 of 1998)**

3. The IAA should establish a Critical Incident Response Programme for ATC personnel. **(SR 3 of 1998)**

4. Reporting of Incidents under the Air Accident and Incident Investigation Regulation, the IAA MOR System or any other reporting system should be re-enforced to all in the aviation system. {*Recommendation made 17 June 1997*}. **(SR 4 of 1998)**

5. Where possible Air Traffic Management should roster controllers to provide the best cross gradient of experience. {*Recommendation made 17 June 1997*}. **(SR 5 of 1998)**

6. The IAA should examine the principles of Crew Resource Management for aircrew as to their applicability to the air traffic control working environment. **(SR 6 of 1998)**

7. The IAA should review the range of corrective actions/sanctions applied to controllers involved in Airprox occurrences. **(SR 37 of 1998)**

Response to Safety Recommendations

The IAA stated as follows:-

Recommendation No. 1	The Air Proximity Working Group is in operation.
Recommendation No. 2	Accepted and will be implemented.
Recommendation No. 3	Accepted and will be implemented.
Recommendation No. 4	Accepted and has been implemented.
Recommendation No. 5	Accepted and has been implemented where practicable.
Recommendation No. 6	Accepted and will be implemented.
Recommendation No. 7	Accepted and has been implemented.