# Aviation human factors

Traffic Collision Avoidance System Traffic Collision Avoidance System I. Summary Mid-air collisions are a normal occurrence in the aviation industry pitting aircrafts against each other and often leading to catastrophic events. Over the years, the phenomenon of these occurrences has led scientists to research on systems of collision avoidance from as early as 1950 (Wickens, 1998). The system for avoiding aircraft collisions was innovated to lower the probability of mid-air collisions among aircrafts. It functions by tracking the airspace encircling one aircraft for other aircrafts that are free of air traffic control to avoid it (Dumitrache, 2013) and cautions pilots of other aircrafts that may pose a substantial danger of mid-air collision. It is designed to be fixed on all aircrafts with a maximum take-off weight of over 5, 700 kg or those authorized to carry above nineteen passengers. The implementation of Traffic Collision Avoidance System added a safety barrier in preventing mid-air collisions (Dumitrache, 2013). The innovation was made after the Grand Canyon mid-air collision that occurred in 1956 and led spurred aviation authorities into action. In the accident, a United Airlines Douglas DC-7 hit a Trans World Airlines Lockheed L-1049 Super Constellation and killing all the 128 passengers on board both flights.

II. Problem

The innovation still required further study, training, refinements and regulatory measures because of the limitations of the Traffic Collision Avoidance System. Furthermore, misuse of the same innovation resulted in other fatal incidents and accidents.

III. Significance of the Problem

Inadequate training and poor coordination among pilots has led to low effectiveness of the Traffic Collision Avoidance System. For instance, the

Uberlingen mid-air collision has been blamed on The Tupelov pilot’s failure to follow their TCAS RA and the Boeing pilot’s failure to follow the ATC instruction (Wickens, 1998). The problem presents an important gap that can only be bridged by more training and more refinements coupled with improved research.

IV. Development of Alternative Actions

Alternative Action 1. Using the Air Traffic Control can help improve the effectiveness of the Traffic Collision Avoidance System

Advantages. Using Air Traffic Control is particularly resourceful in aiding the decision of the pilot and the direction of the aircraft’s maneuver. According to Wickens (1998) it allows the pilot to make the most logical decision using the two guidelines.

Disadvantages. Pilots are expected to respond to the RA immediately unless that action would jeopardize the safety of the flight. This rule means that pilots can maneuver against ATC instructions or disregard the instructions altogether (Dumitrache, 2013). Furthermore, the ATC instructions could be contradictory to the resolution Advisory (RA) leading to accidents that it was meant to prevent.

Alternative Action 2. Implementing RA downlink to help in better decision making.

Advantages. The RA downlink provides information about Resolution Advisories posted in the cockpit. The RA downlink helps to remove the confusion occasioned by the presence of many sources of control and command to an aircraft by establishing one single command center.

Disadvantages. Currently, the ICAO has no clear guidelines on the use and operation of the RA downlink although some countries still use it. This poses

the danger of having no regulation and is therefore prone to abuse and misuse by pilots and especially the not so competent ones.

V. Recommendation

The Traffic Collision Avoidance System provides a better alternative in curbing mid-air collisions between aircrafts. It is clearly the best option that the world has at the moment. However, its shortcomings are a concern that must be addressed if the system has to be effective. Important is the fact that these shortcomings can be averted by training and doing more research to improve the system. More alternatives should be looked into to ensure the success of the Traffic Collision avoidance System is guaranteed (Dumitrache, 2013). Nevertheless, the system is still a great innovation because of its ability to reduce the chances of mid-air collisions.

References

Wickens, C. (1998). The future of air traffic control human operators and automation. Washington, D. C.: National Academy Press.

Dumitrache, I. (2013). Advances in intelligent control systems and computer science. Berlin: Springer.