

The Human Factors Related to the Development and Incorporation of Traffic Alert and Collision Avoidance Systems (TCAS) in Commercial Aircraft

STS Research Paper
Presented to the Faculty of the
School of Engineering and Applied Science
University of Virginia

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April 12th, 2020

On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Avoidance Systems in Commercial Aircraft

Aircraft safety is the most important aspect of commercial air travel. Aircraft communication, navigation, and situational awareness systems are under constant change to improve their current states in order to ensure their passengers can travel safely. Traffic Alert and Collision Avoidance Systems (TCAS) are put in place to operate when all other avenues of maintaining mid-air separation are exhausted and have failed, in order to ensure that aircraft will safely avoid each other. TCAS issues a Resolution Advisory (RA) when two aircraft are on collision paths, which consists of a sounded alarm and a voice recommendation to climb or descend and a corresponding image on the system's display. Pilots rely on a number of different resources to safely operate their aircraft, and some may consider TCAS to be the most important in gaining an understanding of the airspace around them. When it comes to the social and human dimensions of TCAS, it is important to consider its changes and development with careful examination. Pilots are trained to immediately obey the RA when received from TCAS without hesitation, which is essentially removing the human decision maker from the situation. Further implications will lead to ever increasing autonomous flight, and transportation in general.

This issue can be analyzed using the technological momentum theory, in which the relationship between human and technology is reciprocal and time-dependent so that one does not determine the changes in the other, but both influence each other. Interviews and technical research will be conducted in order to gain information on the manner in which TCAS is used, and how the system operates. Case studies will be analyzed to gain a perspective on how the

human and technical dimensions of TCAS coincide, and to generate ideas on possible improvements or resolutions. Changing the slightest aspect of a social or technical dimension of TCAS can have significant effect on the other, and change air travel along with all types of human travel.