Despite the recent economic recession and its adverse impact on air travel, the Federal Aviation 
Administration (FAA) continues to forecast an increase in air traffic demand that may see traffic double or 
triple by the year 2025. Increases in air traffic will burden the air traffic management system, and higher 
levels of safety and efficiency will be required. The air traffic controllers’ primary task is to ensure 
separation between aircraft in their airspace and keep the skies safe. As air traffic is forecasted to increase 
in volume and complexity [1], there is an increased likelihood of conflicts between aircraft, which adds risk 
and inefficiency to air traffic management and increases controller workload. To attenuate these factors, 
recent ATM research has shown that air and ground-based automation tools could reduce controller 
workload, especially if the automation is focused on conflict detection and resolution.

Conflict Alert is a short time horizon conflict detection tool deployed in the Terminal Radar Approach 
Control (TRACON), which has limited utility due to the high number of false alerts generated and its use of 
dead reckoning to predict loss of separation between aircraft. Terminal Tactical Separation Assurance 
Flight Environment (T-TSAFE) is a short time horizon conflict detection tool that uses both flight intent 
and dead reckoning to detect conflicts. Results of a fast time simulation experiment indicated that T-
TSAFE provided a more effective alert lead-time and generated less false alerts than Conflict Alert [2]. 
TSAFE was previously tested in a Human-In-The-Loop (HITL) simulation study that focused on the en 
route phase of flight [3].

The current study tested the T-TSAFE tool in an HITL simulation study, focusing on the terminal 
environment with current day operations. The study identified procedures, roles, responsibilities, 
information requirements and usability, with the help of TRACON controllers who participated in the 
experiment. Metrics such as lead alert time, alert response time, workload, situation awareness and other 
measures were statistically analyzed. These metrics were examined from an overall perspective and 
comparisons between conditions (altitude resolutions via keyboard entry vs. ADS-B entry) and controller 
positions (two final approach sectors and two feeder sectors) were also examined. Results of these analyses 
and controller feedback provided evidence of T-TSAFE’s potential promise as a useful air traffic controller 
tool. Heuristic analysis also provided information on ways in which the T-TSAFE tool can be improved. 
Details of analyses results will be presented in the full paper.


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