

## RESPONSE OF A TURBOFAN ENGINE TO A SIMULATED NUCLEAR AIRBLAST

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The response of aircraft gas turbine engines to a simulated nuclear blast continues to be evaluated by the DNA. All the tests are motivated by requirements to understand the inherent hardness of engines and their response when compared to the in-flight overpressure hardness of other air-frame components. The results of measurements on a TF33 low by-pass ratio turbofan engine have been added to those previously completed on J85 turbojet and F107 turbofan engines. This paper is primarily concerned with the description of the TF33 test set-up and a discussion of those results. However, for completeness, the similarities between the previous J85 and F107 results and the current TF33 results are discussed. The influence of the engine thrust setting and overpressure levels on the engine operating characteristics have been determined. For this program, the thrust setting was varied from engine-off to take off rated thrust and the overpressure was varied from 6.9 to 15.9 kPa. The results suggest has no influence on HP compressor speed, exhaust gas temperature, or bleed-valve operation. However, both thrust setting and overpressure have a significant influence on turbine exhaust total pressure and on the inlet casing and the diffuser casing displacements. Even though these displacements exceeded the redline limit by a substantial amount, the engine sustained no permanent damage.