II. TERMS OF REFERENCE

General Objective: Provide an assessment of the effect of physical stress generated during aviation combat maneuvers and the consequences of such stresses on short and long term mission performance. The assessment should address present and future high performance aircraft and unique platforms that create novel types of physical stress.

Background:

a. During the past year, it has been learned that up to one-third of the F-16 squadrons in Europe are operating at reduced capacity. This is allegedly due to neck injuries sustained by aviators during high G-force maneuvers. While such injuries appear transient, they have a clear impact on mission performance. It is likely that such injuries have also been seen in pilots of any high performance aircraft capable of rapid G-onset and high G-forces (>6).

b. The availability of unique sensors and technologies has led to the attachment of several devices to the aviator helmet. Targeting and night vision devices are presently mounted, and laser dazzle protective gear are under development. The addition of such systems adds weight to the helmet and changes the center of gravity such that they may exacerbate forces during high G-maneuvers, especially during visual reconnaissance of the aft quadrants.

c. Other physical stresses include the transient loss of consciousness due to G-forces. This syndrome known as G-LOC is reduced by the use of pressure suits and employing straining maneuvers, both of which prevent blood from pooling in the body's lower extremities. More recently, forced breathing systems (Demand PPB) have been employed, but the long-term effects of such forms of therapy are unclear.

d. The introduction of aircraft capable of swift vertical and lateral movements will likely exacerbate the types of pilot SD and disability currently observed during certain maneuvers.

Specific Tasking:

a. Analyze the current information on G-induced injuries and loss of consciousness and formulate recommendations for detecting and minimizing such problems. Include an analysis of helmet weight as a factor in potential neck injuries and the potential for worsening of such problems as highly agile aircraft are deployed.