

SFTE. 4th MINI SYMPOSIUM, PRATICA DI MARE (ROME) ITALY

GUN MUZZLE FLASH

M61A1 GUN IN THE AM-X AIRCRAFT:

SECONDARY FLASHES SUPPRESSION

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1. ABSTRACT

The AM-X light attack aircraft (slide 0) has an internal M61A1 gun installed in the forward section of the fuselage (slide 1).

The gun is hydraulically driven with nominal rate of fire of 4200 rounds/min.

To reduce gun gas ingestion by the engine intake during gun firing in air-to-ground missions (primary role of the aircraft) a down-ward deflector has been fitted to the airframe around the muzzle, just ahead of the muzzle sealing plate (slide 2).

During in flight firing for gun-engine compatibility trials, engine stalls have been experienced at medium ÷ low altitudes, medium high speed and α above $7^\circ \div 8^\circ$ (slide 3).

Analysis of the engine parameters cross-checked with high speed filmcamera frames of the gun muzzle area during stall events allowed to identify the cause of engine stalls: gun secondary flashes (slide 4); above $7^\circ \div 8^\circ \alpha$ the gun S.F. overheated the airflow to the engine left intake causing engine stall (slide 5 and 6).

To solve the problem two different corrective philosophies could have been pursued :

- 1a) make the engine to cope with the problem adopting compressor control devices (like fuel dip, BOV/IVG operation, etc.);
- 1b) remove the cause of the problem (i.e. remove the secondary flashes).

To chose the most cost/effective solution it has been decided to measure the engine left air intake flow