

SHOCK TUBE ASSESSMENT OF THE ERROR INTRODUCED BY MISALIGNING PENCIL PROBES

Dr. R. Lorenzo¹, M. Clausen¹, B. Hulliger¹, A. Seitz², A. Zahnd²

¹*Federal Department of Defence, Civil Protection and Sport, armasuisse Science and Technology, Feuerwerkerstrasse 39, 3602 Thun, Switzerland;* ²*Federal Department of Defence, Civil Protection and Sport, Federal Office for Civil Protection, Spiez Laboratory, Austrasse, 3700 Spiez, Switzerland.*

Key words: Shock Tube – Pencil Probe – Misalignment – Shock Wave – Pressure Sensor

Even with the calibration issue sorted out (see MABS24), obtaining reliable side-on pressure values from shock waves in air requires copious amounts of preparation, particularly for mounting and aligning the sensors. However, scrupulous attention to detail cannot compensate for the inhomogeneous expansion of shock waves in the nearfield due to e.g. variations in density across the explosive charge.

To shed light onto the problem of misalignment, a series of shock tube tests at constant peak pressure with pencil probes from two major manufacturers were performed. For each shot a sensor of one of the manufacturers was placed in the rotational axis of the shock tube and deliberately misaligned either in the horizontal axis by 0 to +5° or in the vertical axis by ±5° in steps of 1°. With both sensor types three shots were measured at each alignment error. For reference two pressure gauges for interior ballistics were placed in the shock tube (in the mirror plane) and one in the driver tube. The signals obtained from the sensors were then used to determine the consistency of each product and the deviation of the individual signals from the reference.