

THE DRES BLAST-GAUGE STATION

RITZEL,D.V.

Despite several decades of progressively more sophisticated experiments in modern shock and blast wave studies, a requirement still exists for a general-purpose blast gauge station which provides time resolved measurements of all basic gas dynamic properties of the local blast flow. This is particularly true outside the laboratory in field trials or large shock tube tests. Standard instrumentation for blast field trials has often been limited to isolated measurements of some properties (e.g. stagnation and side on overpressure) which give an incomplete, and sometimes misleading, picture of the complete blast flow history at a location of interest.

This report describes the development of a blast gauge station which includes instrumentation for time resolved measurements of stagnation and static overpressure, density and shock speed, such that all principle blast wave properties can be determined at a site. While most of the pressure instrumentation is standard and has simply been configured in a relatively small and effective gauge head, the key new component of the system is a densitometer based on the principle of beta attenuation. This density gauge resolves the average total density of air and any other material passing between the beta source and detector. The value of such measurements has been proven in shock tube and blast trial tests by its ability to resolve contact surfaces, slipstreams and any dust or debris carried in the blast wave. Interesting measurements from various experiments are presented, and the experiment proposed for the Minor Scale test is described.

Future development of the station will be discussed including the probable replacement of the stagnation probe with a sonic velocity system for sound speed and flow velocity definition. With such a development, the station would be effective for measurements of all fundamental blast properties in 2 dimensional flow fields.