

BRITISH ACOUSTICAL SOCIETY: Meeting on Tuesday, 6th June
1972 at the Gloucester Hotel, Weymouth.

UNDERWATER ACOUSTIC TEST FACILITIES AND MEASUREMENTS.

UNDERWATER TRANSDUCER MEASUREMENTS - J S PYETT

Basic acoustic measurements on underwater transducers are usually made (a) to elucidate the principles of operation when developing a new design, (b) to determine how well a completed new design meets the design requirements, or (c) to provide calibration data for a transducer which is to be used in other acoustic experiments. One needs first of all a primary electro-acoustic calibration to establish acoustic field quantities in terms of electrical quantities at the terminals of a reference or standard transducer; this standard transducer can then be used in secondary or substitution measurements to determine the sensitivities and beam patterns of other transducers.

The transmitting and receiving sensitivities of a transducer are related by a reciprocity equation, which provides the basis for a primary calibration method. Electro-acoustic reciprocity in a two-transducer configuration can be regarded as an extension of electrical reciprocity in a four-terminal network, and the electrical measurements required to calibrate a transducer are in effect measurements of transfer impedance.

Transducer sensitivities and directional patterns, as normally defined, should be measured in an unbounded medium. The practical situation is commonly restricted by the available water volume and apparatus for mounting the transducers, so the measurements may be degraded by proximity and boundary reflection effects. The magnitudes of these errors and the principles used to establish the geometry for acceptable measurements are discussed.