Fig. 2. Streak photographs in argon.

Streak photographs of the movement of the gas were recorded with an STL model 1D image converter camera and were used to measure shock speeds.

A series of photographs was obtained with argon test gas (Fig. 2). As with all the results reported here, these were obtained with an initial helium pressure of 24 kN m⁻² in the intermediate shock tube. A previous series of trial runs had suggested that this pressure yielded the highest shock velocity at a given initial shock tube pressure. It can be seen that the shock speed decreased somewhat over the length of the viewing section at the highest initial shock tube pressure but increased at the lowest pressure. In such cases, the average value of the shock speed through the viewing section was taken.

Shock speeds obtained in air and in argon are plotted in Fig. 3 as a function of the ratio of the primary diaphragm bursting pressure, P_R, to the initial test shock tube pressure, P_1. It can be seen that shock Mach numbers of 50 have been achieved. Some scatter is observed in results obtained at similar pressure ratios. This was found to be associated with the condition of the sealing rings on the piston in the compression tube, the higher shock speeds being obtained whenever the piston rings were renewed.

A curve displaying the predicted variation in shock speed (Fig. 3) was obtained by using ideal shock tube theory to predict the speed of the shock wave driven through the helium in the intermediate shock tube, and assuming that at the initial intermediate shock tube pressure used, no further expansion or compression of the helium took place after shock reflexion. These assumptions were validated by previous tests with a configuration essentially identical with the compression tube plus intermediate shock tube configuration used here. The speed of the shock wave in the test gas was then obtained by
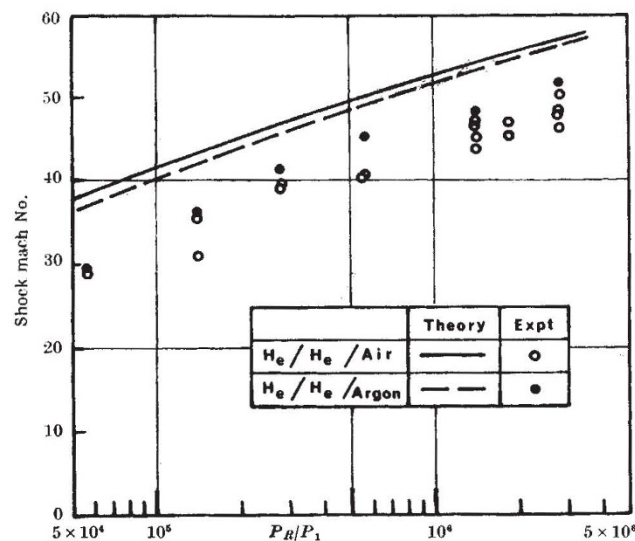

Fig. 3. Performance of double diaphragm free piston shock tube.

assuming perfect gas behaviour in the helium after shock reflexion, with an infinitely large area reduction in passing from the intermediate shock tube to the entrance to the test shock tube.

While the calculated shock speeds are in excess of those measured, the trend of the experimental results is correctly predicted. Allowing that some reduction in the temperature of the shock heated helium may be expected to arise from mixing processes and radiation effects, and that this will give rise to a reduction in shock speed, it may be concluded that the results obtained are consistent with accepted ideas of shock tube operation. Thus the experiments established the effectiveness of this type of configuration in producing high shock speeds.

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GENERAL

Recognition of Syntactic Structure by Computer

BROSS[1] claims that our article on the recognition of syntactic structure by computer[2] is refuted by its first sentence. Had he read the rest of the article with equal care he would have seen that this is not the case.

When the analyser is presented with a sentence such as "An essential part of the capacity to understand utterances lies in the ability to recognize syntactic structure", it will produce simultaneously all possible analyses for the sentence which can be obtained by changing the open-class words (subject to the constraint that the sentence must still be grammatical). For example, that sentence and the ambiguous sentence "An essential part of the excursion to paint factories lies in the opportunity to handle modern enamel" would both be analysed in exactly the same two (or more) ways. In other words, the program in effect plays Bross's game with the Xs, and (being mechanical) is much better at it than he can hope to be.

In fact, Bross's substitution in our opening sentence ("actor knew" for "essential part") gives an ungrammatical answer unless he also juggles very carefully with the remaining words. A more important point is that past tense forms of strong verbs are included in the closed class dictionary[3] as exceptions to the inflexional rules.

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