In this final report we summarize the research carried out under the indicated contract during the period 1 March 1982 to 30 September 1985. This effort involved collaboration with other workers: With Professor K.N.C. Bray, formerly of the University of Southampton and currently of Cambridge University, with Professor J.B. Moss, also formerly of the University of Southampton and currently of the Cranfield Institute of Technology and finally with Professor Forman A. Williams of Princeton University. In addition two doctoral students received their degrees at the University of California San Diego on the basis of research supported under this contract.

The research involving collaboration with Professors Bray and Moss has been concerned with two topics in premixed turbulent combustion. One relates to a continuation of the research conducted for the Office of Naval Research under the contract preceding the one under consideration, namely the discovery of new mechanisms for turbulent transport and turbulence generation arising from the interaction of mean force fields due to gradients of either pressure or shear stresses and density variations. These earlier studies consider infinite planar flames and since the mechanisms in question are confined to the flames themselves, the question arises as to their applied significance and importance in determining global features of turbulent flows consisting of two regions of uniform density on each side of a flame. To examine this question we have extended the analysis to
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becomes identical with that for the classical unstrained laminar flame. This theoretical work will in due course be integrated into a more complete theory for premixed turbulent flames, one in which the influence of a distribution of the rates of strain are taken into account. For example, related studies in non-premixed flames indicate that a turbulent flame involving such intense turbulence that a large fraction of its flamelets are subjected to such high rates of strain that they are extinguished is itself likely to be extinguished. Similar considerations have not as yet been applied to premixed turbulent flames but our studies provide one of the essential elements for such studies.

The following is a listing of the publications reporting the results of research under this contract:

Calender Year 1982:

Calender Year 1983:

Calender Year 1984:


Calendar Year 1985:


There are several manuscripts in various stages of completion describing work in progress.