# 6.8 DESCRIPTION OF THE MECHANICAL AND ELECTRICAL COMPONENTS, GENERAL OVER-ALL, OPERATION AND EXPANSION STUDIES OF THE MURA MODEL HEAVY LIQUID BUBBLE CHAMBER

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This report describes the mechanical and electrical components of the MURA model experimental heavy liquid bubble chamber and includes a discussion of the expansion studies performed on it. Another report which will be presented by Professor Wilson Powell describes the expansion dynamics and optical inhomogeneity studies performed on this model.

The intriguing question, "Can a tank car filled with propane be expanded and photographed through small ports?", leads to the basic concept of the 9 $m^3$ bubble chamber. After a few minutes of serious thought it became clear that many questions needed to be answered before a working chamber could be designed.

Some of these questions were: (1) What are the problems of keeping a large volume of liquid free from impurities so that good photographs could be taken through a long optical path; (2) how serious are the problems of optical inhomogeneity arising from temperature gradients in the liquid; (3) can such a large volume of liquid be expanded uniformly and what are the problems associated with that; (4) does wide angle photography offer serious problems; and, (5) can Scotchlite be successfully employed inside a liquid and used as a retrodirective device?

It was clear that optical inhomogeneities could be a serious problem in large heavy liquid chambers. The largest existing heavy liquid chamber at the time of the initiation of the program was the CERN heavy liquid chamber of Ramm. In this chamber, and even in smaller chambers such as the Berkeley and Paris chambers, optical inhomogeneities could easily be observed, suggesting that this could be a serious problem in a larger chamber.

Furthermore, experience with both the CERN and Paris chambers showed that boiling on the diaphragm occurred, suggesting that there could be serious problems associated with boiling on a diaphragm in expanding a still bigger chamber. Furthermore, it was not clear that the increased motion of the liquid near the walls, diaphragm, etc. might not cause specific problems.

With these questions in mind, it was decided to construct some sort of "model chamber" to study these problems before completing the ultimate design of the big chamber. Rather than build a scale model of the big chamber, it was decided to build a chamber which would permit a specific study of some of these problems. The shape of the model chamber was dictated by three factors: (1) the longest dimension should be at least as great as the path length to be photographed in the big chamber, (2) the column of liquid to be expanded should correspond to the same length as in the big chamber, and (3) the ratio of diaphragm area to liquid volume should be comparable to that of the big chamber.

Many other minor considerations enter into the detailed design of the model, but generally speaking the above criteria set the configuration of this model chamber. A photograph of the model during operation is shown in Fig. I.1