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Diary of M. H. Shamos on trip to Wright Field and N.A.C.A., Cleveland, August 7 to August 11, 1945

The primary purpose of the trip was to observe the progress of the instrumentation programs at Wright Field and at N.A.C.A., and to discuss plans for further experimental work on the measurement of instataneous thrust, pressure, and temperature. In general, the trip could be regarded as having been successful--if only in a negative sense in some respects; i.e. it served to confirm our own observations concerning these measurements.

Wright Field

Apparently, as far as instrumentation is concerned, very little has been accomplished at Wright Field. Although the personnel concerned are genuinely interested in obtaining the above-mentioned data, it is my impression that much original work of a conclusive nature can not be expected of them, for they lack the necessary scientific approach. Favorable comment was obtained regarding the G. M. condenser-type gauge when employing carriers of the order of 100 Kc. Present plans call for the use of this gauge for pressure measurements and of a reluctance-type gauge for thrust measurements, with the expectation that the functions can be interchanged. In order to minimize the effects of the high temperatures upon the diaphragm, it is planned to separate the gauge from the inner wall of the motor by several inches of tubing; the claim was made that such operation apparently does not influence the results--regardless of the length of the connecting tube.

Present also was a representative of an M.I.T. project who held out high hopes for the sodium reversal method for flame temperatures. Data taken by this means for steady state temperatures at M.I.T. indicate that a fairly high degree of precision may be expected.

N.A.C.A., Cleveland

The situation at N.A.C.A. is completely different, the personnel giving one the impression of competence and confidence--perhaps over-confidence in some respects. Attention

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has not been focused upon instantaneous measurements in the past, but plans call for such measurements in the future. Steady thrusts have been measured by means of wire strain gauges, employing D.C. excitation. It is planned to use the G.M . gauge for instantaneous thrust and pressure measurements, thus substantiating the claims made for this instrument at Wright Field. Here also, the gauge diaphragm is recessed from the wall of the motor by means of a tube which is water-cooled by means of a spray projected into the tube. The length of the tube, considered as a closed organ pipe, is calculated so as to keep its natural frequency well above that of the motor.

A major part of the discussion centered about the problem of temperature measurement--with the following results: An extensive survey of all possible methods yielded only two which show promise, the reversal method and the two-color method. Of these, the reversal method is the more direct in interpretation, although it is anticipated that six months will elapse before any definite results can be expected. Concerning the two-color method, an examination of the nature of the radiation from the hot gases is necessary before a true evaluation of the method can be made. Such an investigation is now being carried out, with some results expected within one month. It is planned to check the two-color method against the reversal method.

Comments

As noted above, my impression of the work done at N.A.C.A. was very favorable. I believe that convincing results can be expected of them, but that independent confirmation is essential The equipment at both labs is good, and the personnel adequate--at least in quantity. It would be desirable to set up a separate section at BuAer to be concerned with instrumentation only, patterned after similar groups at Wright Field and N.A.C.A.

Opinion was unanimous concerning the difficulties encountered with the commercial Tri-Mount gauges.

No Schlieren work has been done at either of the two labs.

I have not included any of the experimental details which were discussed, but simply outlined the general trend of the discussions.