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Chapel Hill, N. Carolina 27514  
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Report to: Professor Frank W. Banghart

From: E.D. Palmatier

Subject: Mass Measurements during space flight

Period Covered: 10th September to 30th October

The determination of the mass of an object during space flight which is now an operational requirement will in general necessitate the use of some device capable of functioning independently of the local gravitational field and of the acceleration being experienced by the space craft. Such a device has been constructed for the accurate determination of the mass of small rigid objects (in the range from 50 to 500 grams) and this portion of the study has been concerned with theoretical studies encountered in the development of the device as well as with the preparation of the final report which actually covers work which has been in progress for at least a year.

The device is essentially a spring which couples the unknown mass to the space ship and allows one to determine the unknown mass from the period of the resultant oscillation. Amongst problems which have received theoretical study should be mentioned those pertaining to the corrected equation of motion of the system, the error analysis of the system, the loss terms in the equation of motion, trapping of air in the vicinity of the moving pan containing the unknown mass and so forth.

The preparation of the final report is continuing but is not expected to be ready for at least another month.

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