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# RESEARCH MEMORANDUM



MEASUREMENTS OF STATIC AND TOTAL PRESSURE THROUGHOUT THE  
TRANSONIC SPEED RANGE AS OBTAINED FROM AN AIRSPEED  
HEAD MOUNTED ON A FREELY FALLING BODY

By

C. W. Mathews and J. R. Thompson

Langley Memorial Aeronautical Laboratory  
Langley Field, Va.

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## NATIONAL ADVISORY COMMITTEE FOR AERONAUTICS

WASHINGTON

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## RESEARCH MEMORANDUM

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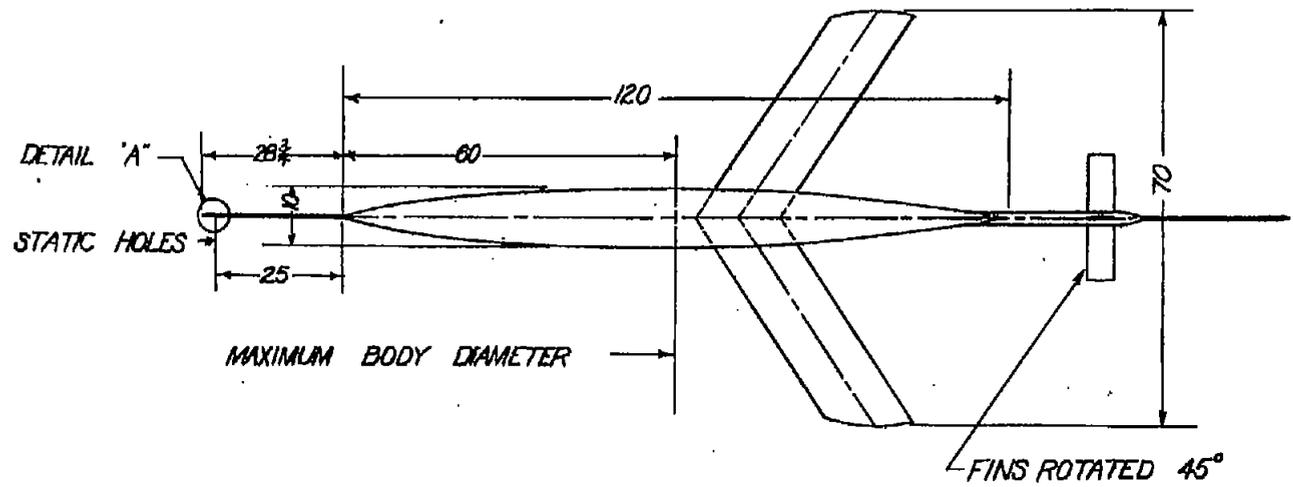
By C. W. Mathews and J. R. Thompson

1. Results of tests of an airspeed head mounted on a freely falling body are presented in preliminary form. Measurements were made throughout the transonic speed range. Details and dimensions of the airspeed head and the body are given in figure 1.

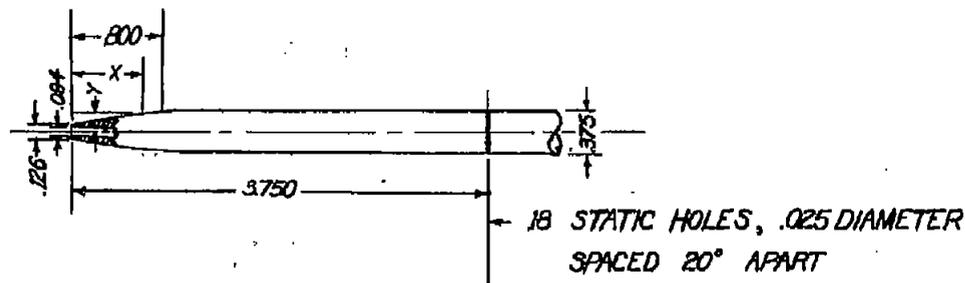
2. The variations of static pressure, total pressure, and Mach number with time from release of the test body are presented in figure 2. The dashed curves show these variations as measured by the airspeed head. The solid curves were computed from true airspeed as determined by ground radar tracking records corrected for wind and from correlation of the altitude-time variation of the test body during its fall with the variations of atmospheric temperature and pressure with altitude at the time of the test. The discrepancies between the curves in figure 2, interpreted in terms of the corresponding discrepancy in true airspeed, are shown in figure 3 for the typical case of flight at 30,000 feet. The indicated error in static-pressure coefficient as measured by the airspeed head is presented in figure 4. Since the possible error in the measurement of the static-pressure coefficient due to transmitting and recording may be as much as 0.015, the presented curve should not be interpreted as a final calibration of the airspeed head. It does show, however, that with this type of head the measured error in static pressure was small throughout the transonic speed range.

Langley Memorial Aeronautical Laboratory  
National Advisory Committee for Aeronautics  
Langley Field, Va.

M =  
112  
7.0  
7  
Am = .012  
.009  
0.006



NOSE COORDINATES	
X	Y
.000	.063
.100	.067
.200	.110
.300	.131
.400	.149
.500	.169
.600	.176
.700	.184
.800	.188
.900	.188



DETAIL 'A'  
AIRSPEED BOOM

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Figure 1.- Details of airspeed head installation on freely falling body.

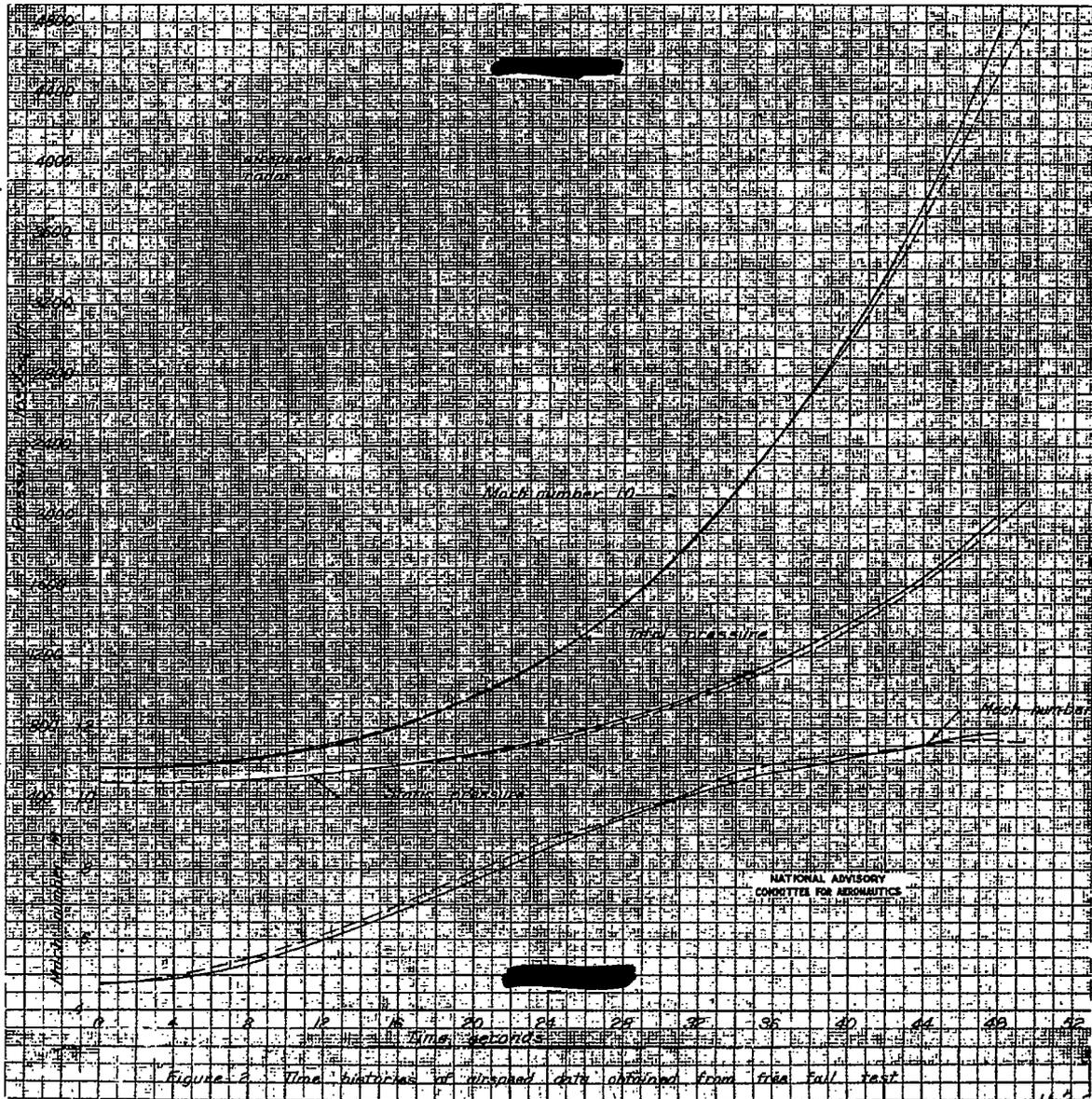


Figure 2. Time histories of airspeed data obtained from free fall test.

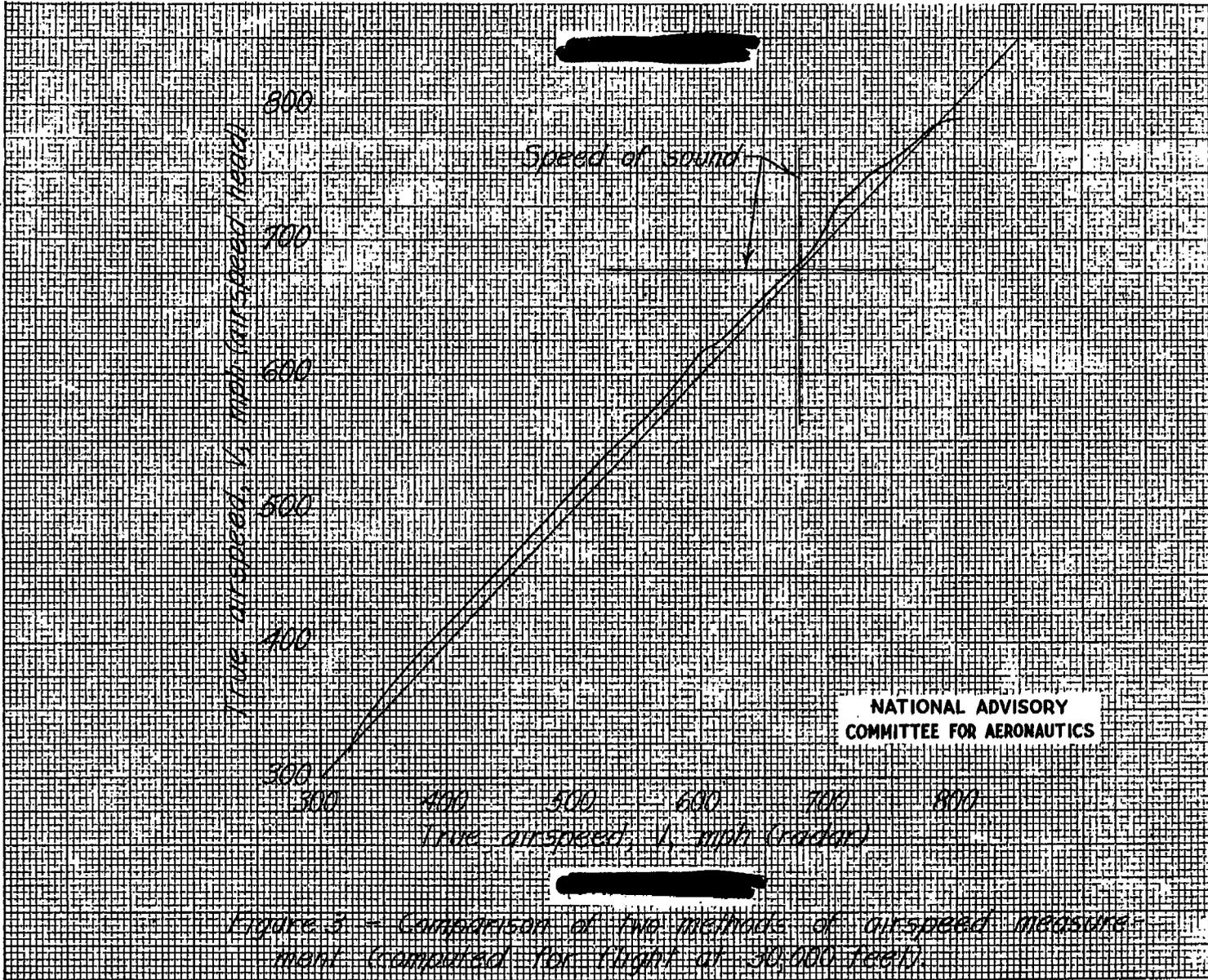


Figure 3 - Comparison of two methods of airspeed measurement (computed for flight at 50,000 feet)

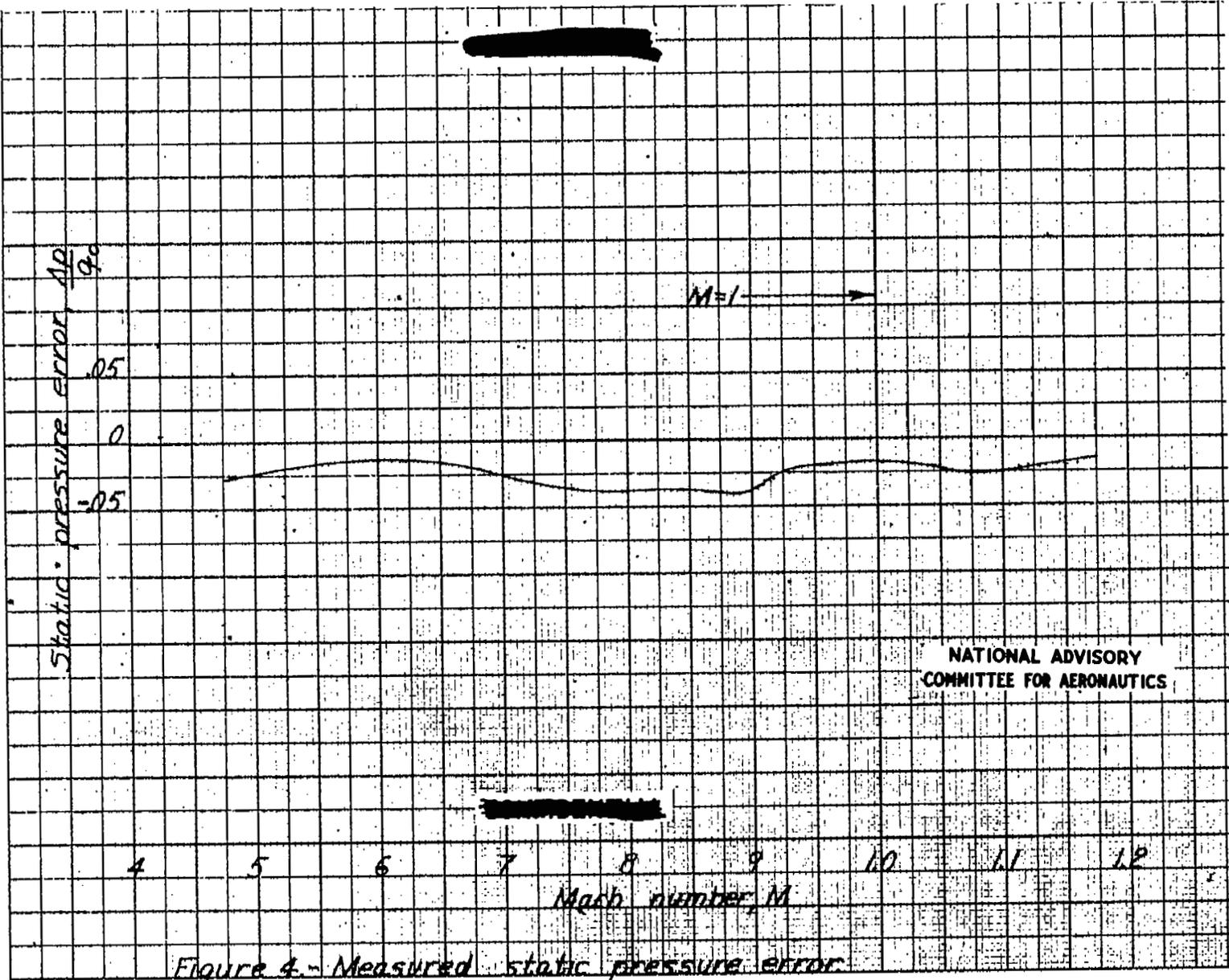


Figure 4. - Measured static pressure error.