

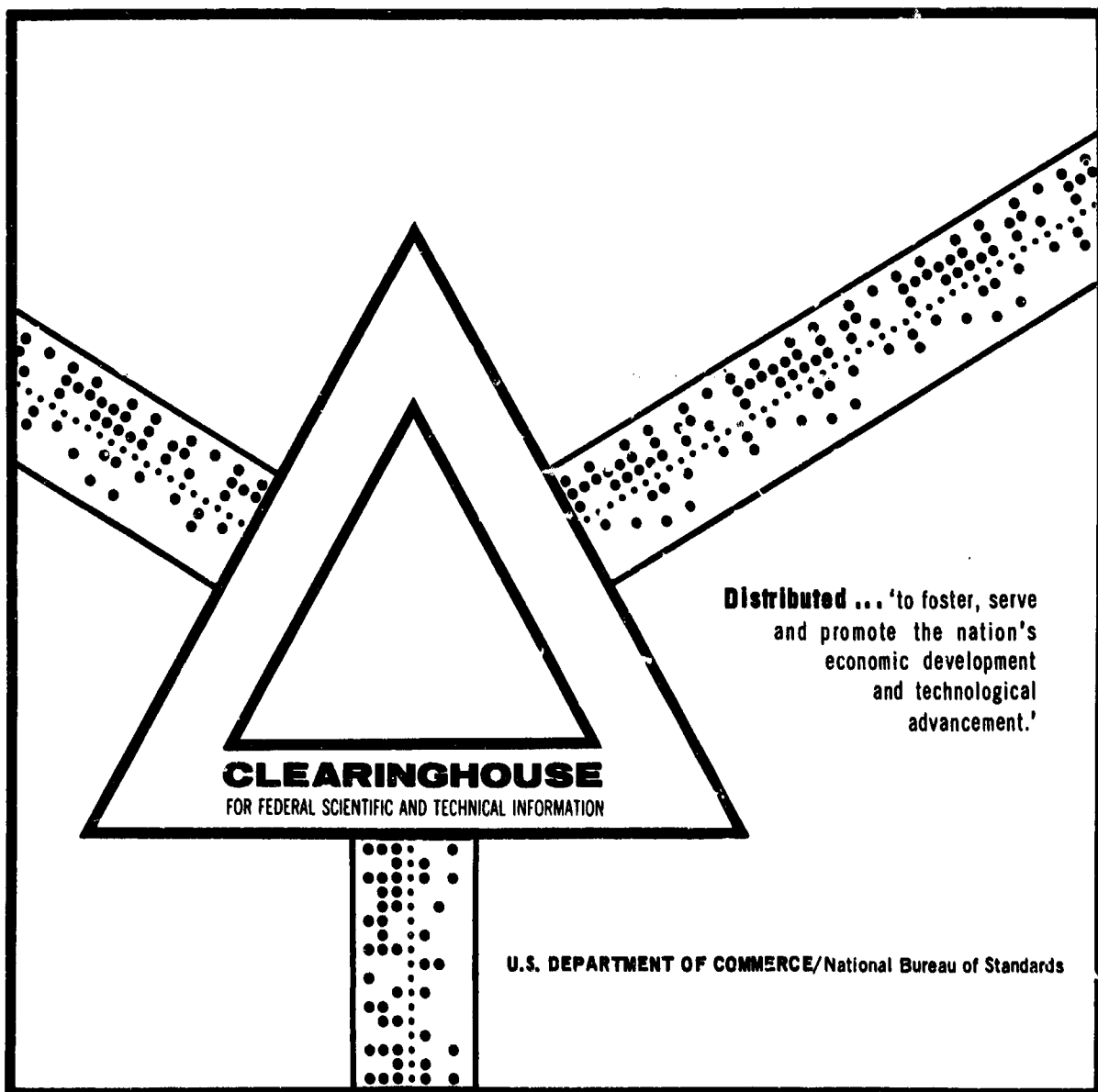
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A DEVICE FOR RECORDING THE VELOCITY OF ATMOSPHERIC TURBULENCE PULSATIONS FROM AIRCRAFT

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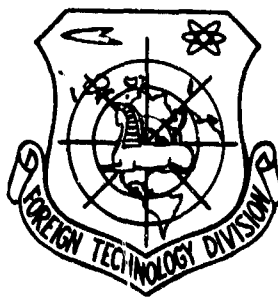
FOREIGN TECHNOLOGY DIVISION



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EDITED TRANSLATION

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TURBULENCE PULSATIONS FROM AIRCRAFT

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ABSTRACT

(U) An Author Certificate has been issued for a device for registering the velocity of atmospheric turbulence pulsations from aircraft, which consists of a dynamic pressure sensor in the form of a diaphragm case, a converter, an amplifier, a motor with reduction gear (which is coupled with the converter), and a recorder. To automate recording at changing flight speed, the device is equipped with a supplemental diaphragm case with a threshold of sensitivity higher than the maximal atmospheric turbulence pulsation pressure, connected through a supplemental sensing element to the converter and motor. Orig. art. has: 1 figure.

A DEVICE FOR RECORDING THE VELOCITY OF ATMOSPHERIC
TURBULENCE PULSATIONS FROM AIRCRAFT

Yu. P. Sukhov

The familiar devices for recording the speed of turbulent pulsations, containing a dynamic pressure sensor in the form of a diaphragm case, converter, amplifier, motor with reducer coupled to the converter, and the recorder, require that the speed of the aircraft be constant and that the operator pay strict attention at all times. This substantially limits the use of such devices on aircraft and makes them unsuitable for use on unmanned vehicles.

The proposed device differs from those known in that it is equipped with an auxiliary diaphragm case with a sensitivity threshold above the pressure of maximum turbulent pulsations; this case is coupled across an additional converter sensor to the motor. This makes possible automatic recording at variable flight speeds.

Figure 1 gives a block diagram of the device; Fig. 2 shows the possible design of the converter (potentiometric).

The device contains dynamic pressure sensor 1, including diaphragm cases 2 and 3, converter 4, amplifiers 5 and 6, motor 7, reducer 8, and recorder 9.

Diaphragm cases 2 and 3 have different sensitivity. Diaphragm case 2 should have a sensitivity threshold which corresponds to the upper unapproachable limit of turbulent pulsation velocity. We know

that this velocity very rarely exceeds 15 m/s; therefore it is rational to select the sensitivity threshold of case 2 corresponding to the speed of the incoming flow, equal to 20 m/s. Diaphragm case 2 is designed to receive the dynamic pressure of the unperturbed flow, caused by motion of the aircraft in the atmosphere. Because of the high threshold of sensitivity, fluctuations in the velocity of turbulent pulsations are not recorded.

Diaphragm case 3 is designed to receive the dynamic air pressure caused by the investigated turbulent pulsations against the background of dynamic pressure due to the motion of the aircraft. Its sensitivity threshold should be minimum. The installation of diaphragm case 3 in air pressure receiver 10 improves its dynamic properties and increases the sensitivity.

Converter 4 (see Fig. 2) serves to convert the mechanical displacement of the movable elements of diaphragm cases 2 and 3 into dc or ac electrical signals. It consists of housing 11 and two sensors 12 and 13 of the potentiometric type, whose windings can be moved along the axis when adjusting the unit. Their pickups are mechanically connected with the moving elements of diaphragm cases 2 and 3. On the outside of housing 11 there is gear rack 14 which meshes with the outlet gear of reducer 8. The outputs of each sensing element 12 and 13 are coupled to the input of amplifiers 5 and 6, respectively.

The electrical signal goes from amplifier 5 to the control winding of motor 7 which, through reducer 8, is connected with converter 4. This follow-on system assures reverse tracking according to the signal from converter element 12.

The electrical signal passes from amplifier 6 to recorder 9, which is a storage or a recording device.

Object of the Invention

This device for recording the speed of atmospheric turbulence pulsations from aircraft, containing a dynamic pressure sensor in the form of a diaphragm case, converter, amplifier, motor with reducer

coupled to the converter, and a recorder, is distinguished by the fact that, in order to automate the recording at variable flight speed, the device is equipped with an additional diaphragm case whose sensitivity threshold is above the maximum turbulent pulsation pressure and which is coupled across an additional sensing element of the converter to the motor.

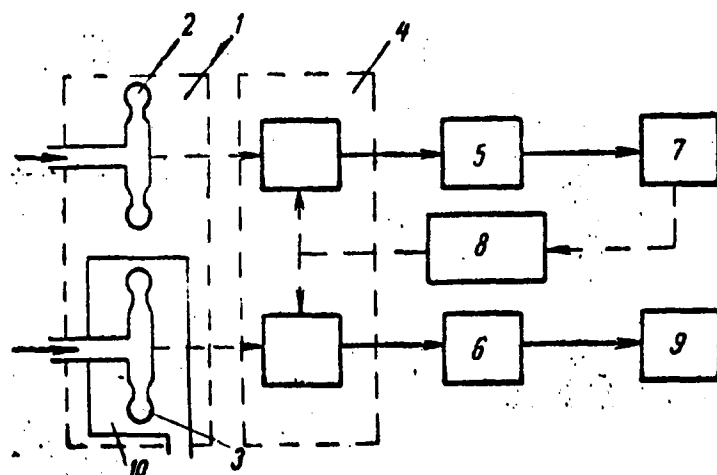


Fig. 1.

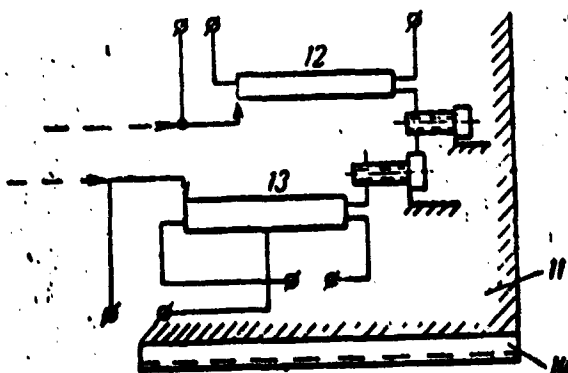


Fig. 2.