METHODS FOR MEASURING PARAMETERS IN AVIATION.

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Annotation: Parameter measurement accuracy (measurement error value), measurement range, its sensitivity, size and other important parameters of technical equipment belonging to the aviation field, measurement of the parameter necessary for the operation of the system about methods. This article provides some ideas on how to measure parameters in aviation.

Key words: Measurement, parameter, avition, methods, signals, generating electrical energy.

The first main task at the initial stage of designing (developing) an avionics device is to choose a method for measuring the parameter to be monitored. Currently, two main groups of methods are used for this purpose.

1.Methods in which the measured non-electrical quantity is converted into a corresponding change in the parameters of electrical circuits fed by an external source of e.t.c. In this case, the signals received from the measured object serve only to control the energy of an external source included in the electrical circuit. Since in this case the main thing is the change in the parameters of electrical circuits under the influence of a signal from the measured object, these methods and, accordingly, sensors that make measurements using this method are called parametric.

Parametric methods include methods based on changes in the resistance, capacitance, and inductance of electrical circuits.

2.Methods in which signals received from the measured object are directly converted into electrical signals. At the same time, the desired conversion effect can be obtained without using extraneous sources of e.t.c. Here, the main thing is the direct conversion of various types of signals into electrical signals (generating electrical energy), so they and, accordingly, sensors that make measurements using this method are called generator ones.

Generator methods include electromagnetic, thermoelectric, piezoelectric, and other methods.

In aviation , the following methods of measuring physical parameters are used:

- resistance methods that use the dependence of the electrical resistance of resistors on various non-electrical values (ambient temperature, pressure, strain, resistor length, etc.). Used by temperature sensors;
- a capacitive method based on the known dependence of the capacitance on the dielectric constant of the dielectric, the distance between the electrodes and the effective area of the electrodes. Used by fuel meter sensors.
- inductive method, which is based on the property of a wire coil to change its reactive (inductive) resistance when changing some of its parameters that determine the inductance value, namely, the number of turns of the coil wires, the size and area of the air gap, the length of the middle line and the cross-sectional area of the core, the magnetic permeability of air and the core material. Used by pressure sensors and fuel meter detectors.
- magnetostrictive method based on the use of the phenomenon of magnetostriction-changes in the shape and size of a body during magnetization;
- photoelectric method, which uses various electrical effects that occur when certain materials are illuminated with light rays.

ionization method, based on the use of the flow phenomenon electric current through an ionized gas. Used by sensors of fire-fighting systems.

- an electrochemical method based on the electrochemical transformation of a non-electrical quantity into an electrical signal.
- an electromagnetic method based on direct use of the law of electromagnetic induction. Used by speed sensors.
- thermoelectric method based on the phenomenon of thermoelectricity, which consists in the fact that in a closed circuit consisting of two dissimilar conductors, currents occur if the junctions of the conductors have different temperatures. Used by temperature sensors.
- piezoelectric method based on the use of the piezoelectric effect and others.

Depending on the requirements that are imposed on the characteristics of the sensor regarding the accuracy of measurement of the parameter (measurement error value), measurement range, its sensitivity, requirements for the design of the sensor for use in special operating conditions, reliability, weight, volume and other important parameters, the method of measuring the parameter required for the operation of the system and, accordingly, the sensor is selected. based on this measurement method, which meets all the technical requirements of operation.

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