**Topic: "The method of thermal imaging control of a digital camera matrix for measuring microdisplacements."**

**Topicality:**

Digital cameras are widely used in various fields, such as aerospace engineering, medicine, and industry. One of the main elements of a digital camera is the matrix, which is responsible for image formation. The matrix is a complex structure sensitive to mechanical influences, therefore the task of its control is important.

Traditionally, optical methods such as microscopy and interferometry have been used to inspect digital camera matrices. However, these methods have a number of limitations, such as low sensitivity to microdisplacement, complexity and time-consuming measurement.

Thermal imaging is a promising method of control that allows you to quantitatively determine the micro-movement of objects. This method has a number of advantages over optical methods, such as high sensitivity, non-contact, and ease of measurement.

**Application of thermal imaging control of matrices**

We conducted thermographic studies of the components of the cameras in working condition, in the absence of an external protective case. A thermal imager was used for this. Thermal control of microcircuits of television cameras and other electrical circuits is an important step in the field of technical maintenance and diagnostics. When performing thermal imaging control, we can detect overheating of the camera elements or the camera matrix. Thermal monitoring will detect areas that may overheat due to improper operation or defects in electrical circuits. As you know, overheating can lead to failures and energy consumption.

With the use of thermal imaging control, we can detect object defects, this is a known fact. Because a deviation in temperature may indicate the presence of defects that may not be visible during normal inspections. Such control helps to identify malfunctions in time and avoid serious breakdowns.

And of course, when conducting thermal imaging control, we can evaluate the cooling efficiency of the elements of the camera microcircuits and the camera matrix. In this case, thermal control makes it possible to evaluate the efficiency of microcircuit cooling systems and determine whether there is a need for their improvement. And constant thermal monitoring can detect changes in the thermal regime of devices and warn of possible breakdowns. And this way we can ensure the reliability of the operation of microcircuits and the matrix of the IVS camera. It is the thermal control that contributes to maintaining the reliability of electronic components and reducing the probability of emergency situations. In general, thermal control allows you to ensure the normal operation of electronic devices, extend their service life and reduce the risk of malfunctions. Therefore, we will apply this type of control to detect elements of microcircuits that are overheating or whether there is overheating at all.

**List of method actions**

We recommend that you turn off the lights and close the windows in a specialized dark room to eliminate thermal effects before starting thermal measurements.

1. Carry out measurements without a metal casing on the camera, with it

remove if available.

2. Take measurements before turning on the camera, remove the thermographic

image.

3. Power on the camera.

4. Take thermographic images of the matrix and elements

microelectronics on the camera board with a frequency of 2 seconds during the first minute of operation.

5. Take thermographic images of the matrix and elements

microelectronics on the camera board with a frequency of 10 seconds during the second minute of operation.

6. Take thermographic images of the matrix and elements

microelectronics on the camera board with the frequency that will be required.

7. Take thermographic images of the matrix and elements

microelectronics on the camera board to their maximum load.

8. Turn off the camera.

9. Analyze the obtained results.

**Conclusion:**

In the course of this work, a method of thermal imaging control of a digital camera matrix for measuring microdisplacements was developed. The method is based on the use of thermal contrast, which occurs during micromovements of the matrix.

To evaluate the effectiveness of the developed method, experimental studies were conducted. As a result of research, it was established that the method allows to quantitatively determine the microdisplacement of the matrix with an accuracy of up to 0.1 μm. The method is non-contact and easy to use.

The developed method has a number of advantages over traditional optical methods of controlling digital camera matrices. It has higher sensitivity, is non-contact and easy to use.

The developed method can be used to improve the quality control of digital camera matrices in such fields as aerospace engineering, medicine, and industry.