Analysis of failure physics to estimate reliability indices of the radio-electronic devices in modern radar systems

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The authors considered problems of heightening efficiency and reliability of the radio-electronic equipment. The assaying and synthesis of the existing domestic and foreign methodical approaches at trial of radio-electronic devices, failure physics is carried out from the point of view of an estimation of reliability indexes. Expediency and directions of perfecting and introduce radio-electronic devices in a complex of state standards being developed now for projection radar systems are justified. The place and a role of physical and mathematical sciences in the theory of reliability and casual processes are displayed. Mean lifetime and failure rate questions are examined. Areas of a safe work and gears degradation refusals are determined. The assaying of effective methods of stabilisation of a surface charge in radio-electronic structures, sample pieces of a fatigue crack of contact joints in semiconductor gears, and also the assaying of probes of microscopic contacts of an aluminium conductor in integral circuits is carried out. Refusal of powerful transistors, the gear of refusal of aluminium intercircuit connections and current-carrying elements depending on design features and technological conditions, and also at a load mismatch is studied. Influences of ionising radiation on degradation of electric parameters of integral circuits and effect of radiation for the purpose of detection of defective gears REA are considered. Refusals of silicic planar transistors by means of gamma handling, an ageing mechanism of kermeth resistors, refusals of non-wire variable resistors are studied. Methods of physical prediction of refusals of capacitors are offered. Causes of failures of high-voltage ceramic small-size capacitors and influence of thermoelastic voltages as the reasons for mechanical destruction and refusals of high-voltage high-frequency ceramic capacitors are covered. The assaying of gears of violation of electric strength of ceramic capacitors of a high voltage is carried out.

Keywords*: refusal, the forecast, reliability, the radio-electronic equipment, reliability theory, casual processes, a mean lifetime, failure rate, fatigue crack sample pieces, contact joints, semiconductor gears.*

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