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A METHOD OF IDENTIFICATION OF RADIOELECTRONIC EQUIPMENT FAILURES FOR DIAGNOSTIC SYSTEMS WITH ELEMENTS OF ARTIFICIAL INTELLIGENCE

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A proposal is put forward to extend the classification of types of failures of radioelectronic equipment (GOST 27.002-89). Based on this classification, a new method of classification of types of radioelectronic equipment failures is developed. New proposals on equipment formalization are presented making it possible to realize this method in technical diagnostics systems with artificial intelligence elements.

Experience in maintenance of radioelectronic equipment (REE) in different types of armaments shows that identification of failures in REE presents considerable difficulties. This is because of the structural complexity of the equipment and large variety of failure types. All this necessitates application of artificial intelligence elements (AIE) in systems of technical diagnostics (STD).

Analysis of equipment, with regard for the general concept of failure [1], points to the possibility of the following events: (a) a single parameter is beyond the limits established in the specifications when a single standard changeable element (SCE) is inoperative; (b) several parameters are beyond the limits established in the specifications when a single standard changeable element is inoperative; (c) several parameters are beyond the limits established in the specifications in the case of several standard changeable elements inoperative in a single path of dependent signals; and (d) several parameters are beyond the limits established in the specifications in the case of several standard changeable elements inoperative in different paths of dependent signals.

In the general case, each of the above events must be mapped by its peculiar method of localizing the site of failure. So, from the viewpoint of failure localization, we can designate the following approaches: independent single-parametric failure (ISPF); independent many-parametric failure (IMPF); dependent failure (DF); and multiple failure (MF).

Generally, by independent failure is meant a failure not related to any other failures [1]. At the same time, based on the above we can isolate two kinds of independent failures: single-parametric and many-parametric. An independent failure is usually accompanied by transition of a single (structurally indivisible at the given hierarchical level) standard changeable element to inoperative state. Then, in the event of a single-parametric failure, some function cannot be performed. The many-parametric failure results in non-performance of several functions.

By dependent failure is meant a failure arising from other failures [1]. Such failures are always many-parametric and accompanied by transition of several (structurally indivisible at the given hierarchical level) standard changeable elements to inoperative state.

By multiple failure is meant a many-parametric failure or a set of failures, possibly of different nature, which, like a DF, are accompanied by transition of several (structurally indivisible at the given hierarchical level) standard changeable elements to inoperative state. Such failures may occur due to fire, mechanical damage, long-term storage of the hardware, or because of violation of the proper failure-repair sequence in maintenance and normal functioning of the equipment.

REFERENCES

1. GOST 27.002-89 (State Standard of the USSR). Reliability in Engineering: Main Concepts and Definitions [in Russian], Izd-vo Standartov, Moscow, 1990.

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