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#07-70 New Neutron Signal Acquisition and Processing Platform for Nuclear Safeguards

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The neutron coincidence counting is one of the fundamental techniques for non-destructive assay of Nuclear Safeguards. Several types of data acquisition modules are currently in use for this technique that is used for nuclear material monitoring and verification. However, some of those modules are obsolete or approaching the production discontinuity, and this aspect represents a serious issue for the Safeguards activity. The subject of this paper is a new platform of devices that addresses the current situation of limited availability of maintainable instrumentation and reflects the recent advances in microelectronics. Those devices shall satisfy the needs of attended and unattended measurements, bringing improvements from all perspectives: guaranteeing nominal performances in a wider range of measurement conditions, combining bigger storage capability, modern user interfaces and low power consumption. The main functions of the new devices of the platform are to collect the signals from neutron detectors, process and convert them into digital information and store them in data files. The devices share a common programmable hardware with industrial grade components for high reliability even in case of high temperature operational conditions. They embed a Field Programmable Gate Array for generating time stamped list of neutron signals for up to 32 input channels. The internal multithreaded microprocessor records the data, reproduces the functionality of shift register, multiplicity register and pulse train recorder. It provides at the same time a web server for a multiplatform graphical user interface. All the above-mentioned processing capability, the high and low voltage power supplies are integrated in a module with a power consumption of less than 10 W, which can be easily dissipated in sealed enclosures of unattended monitoring systems as well. The systems of the the platform in subject have been verified against the reference instruments commonly used the Safeguards accountancy and this paper shows the results of those comparisons.

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