

Electronic Calibration and Performance Checks of Sirius Alpha Beta Hand and Foot Monitors and Automess Teletector Ratemeters used in the JRC Radiation Protection Sector

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1. INTRODUCTION

The Joint Research Centre located in Ispra, is one of the research sites belonging to the European commission, Directorate General JRC. It was created in the late 50's, in order to lead European research in the nuclear field. Within the Nuclear Decommissioning Unit, the electronics laboratory "LabEI" as a part of the Radioprotection sector, is committed to the preparation, allocation, analysis, electronic calibration and performance check of nuclear instruments.

2. METHOD

Starting from the Italian organisation for standardisation (UNI) guidelines, UNI-9102:1988, UNI-8846:1987, UNI-08143:1980 and UNI-08300:1981 our group developed specific procedures and a programmed maintenance plan, including routine functional tests, calibration checks and electronic calibration, including verification of energy dependence and linear response.

Simulating signal by the signal generator to the giger detector output, by changing the pulse amplitude and frequency is possible to check the electronics dependence from radionuclide energy and also by the radionuclide activity all along the instrument measuring range.

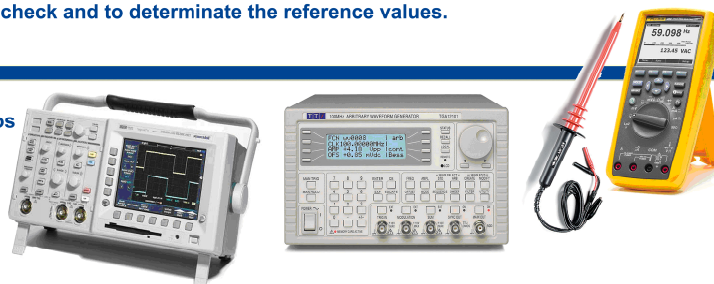
Using these methods we can also check the Alpha -> Beta and Beta -> Alpha spillover in the Hand and Foot Monitors and electronics dead time. The radioactive sources are only used to perform an instrument fast check and to determinate the reference values.

3. ESSENTIAL EQUIPMENTS

Oscilloscope: to check the signal shape coming out from the detectos and HV ripple.

Signal generator: pulse high from 100 mV to 800 mV.
pulse frequency from 0,1 Hz to 200 Khz.

Multimeter and HV probe: to check the HV value.

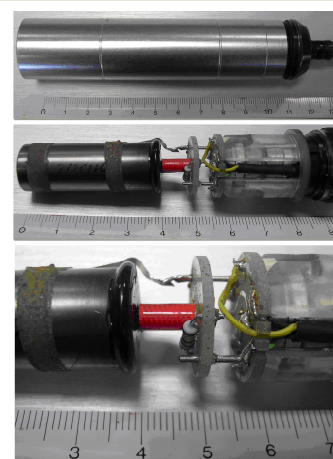
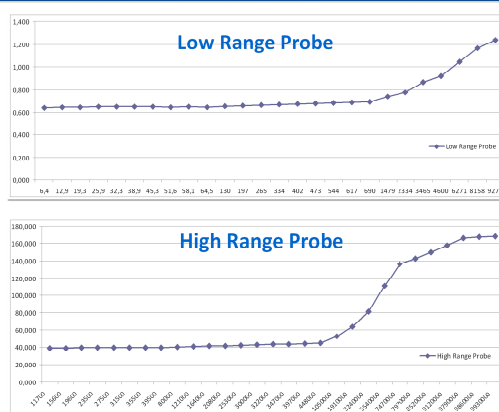


4. AUTOMESS TELETECTOR



The following charts show: $\mu\text{Sv/h}$
Hz

Frequency range from 1 Hz to 100 kHz



5. SIRIUS ALPHA BETA HAND AND FOOT MONITORS



High Voltage value and ripple check.

Simulating signal for Alpha and Beta channels all over the measurement range.

The electronics response is linear for the full measurement range with 1:1 response, frequency range 0,1 Hz - 200 Khz (1 Hz = 1 cps showed to the screen).

The Equipment uses 6 proportional flow gas (P10) detectors.

6. CONTACTS



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