Report on Recent and Future Activities

Workshop on Radiation Monitoring for the International Space Station (WRMISS)

7-8 September 2000
Louvaine-La-Neuve, Belgium

Presented by

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Topics

- ❒ Goal of the Workshop
- ❒ Recommendations of the 4th WRMISS held in Farnborough, England
- ❒ Action Items of 4th Workshop
- ❒ Instrument development
- ❒ Intercalbration of instruments at different sources
- ❒ Recent spaceflights
- ❒ Future activities

Goal of the Workshop

- ❒ Provide most recent information on

  - Measurements
  - Instrument development
  - Calibration of instruments
  - Improvements on models

- ❒ Establishing requirements for the design of a radiation monitoring package

- ❒ Discussion of instrument characteristics

- ❒ New instrument developments

- ❒ Establishing of a calibration program

- ❒ Establishing data base containing both calibration data and actual space radiation measurements

- ❒ Issue recommendations to space authorities

Recommendation of the 4th WRMISS Workshop

The major recommendations include

- An update of common models
- Establishing of a data base in a common format
- Intercalibration of instruments to clearly establish their characteristics
- Improvement of active and personal dosimeter measurements along with depth dose measurements inside human phantoms
- Advanced instrumentation for neutron measurement

The participants felt that especially an improvement of electron models is urgently needed to allow projection of EVA doses.

Actions agreed on the 4th Workshop

1) To establish a data base consisting of

- In-flight Measurements
- Calibrations
- table of instruments (characteristics)
- new instrument developments

2) Preparation of calibrations

Calibrations shall be coordinated by Rudolf Beaujean, Tom Borak, Kazunobu Fujitaka, Jack Miller and G. Reitz

A first approach of the calibration program shall include :

Particles	Energies
Protons	10 MeV-800 MeV (5steps TBD)
Heavy Ions	50MeV/n –1 GeV/n (Alpha, C, Si, Fe)
Electrons	0.5 MeV – 10 MeV (3-4 steps)
Neutrons	1-70 MeV (3-4 steps) and 180 MeV mono energetic CERN reference field

3) Compilation of presentations of the 4th workshop

All presentations shall be compiled on the WRMISS Web page

http://www.magnet.oma.be/wrmiss/wrmiss.html

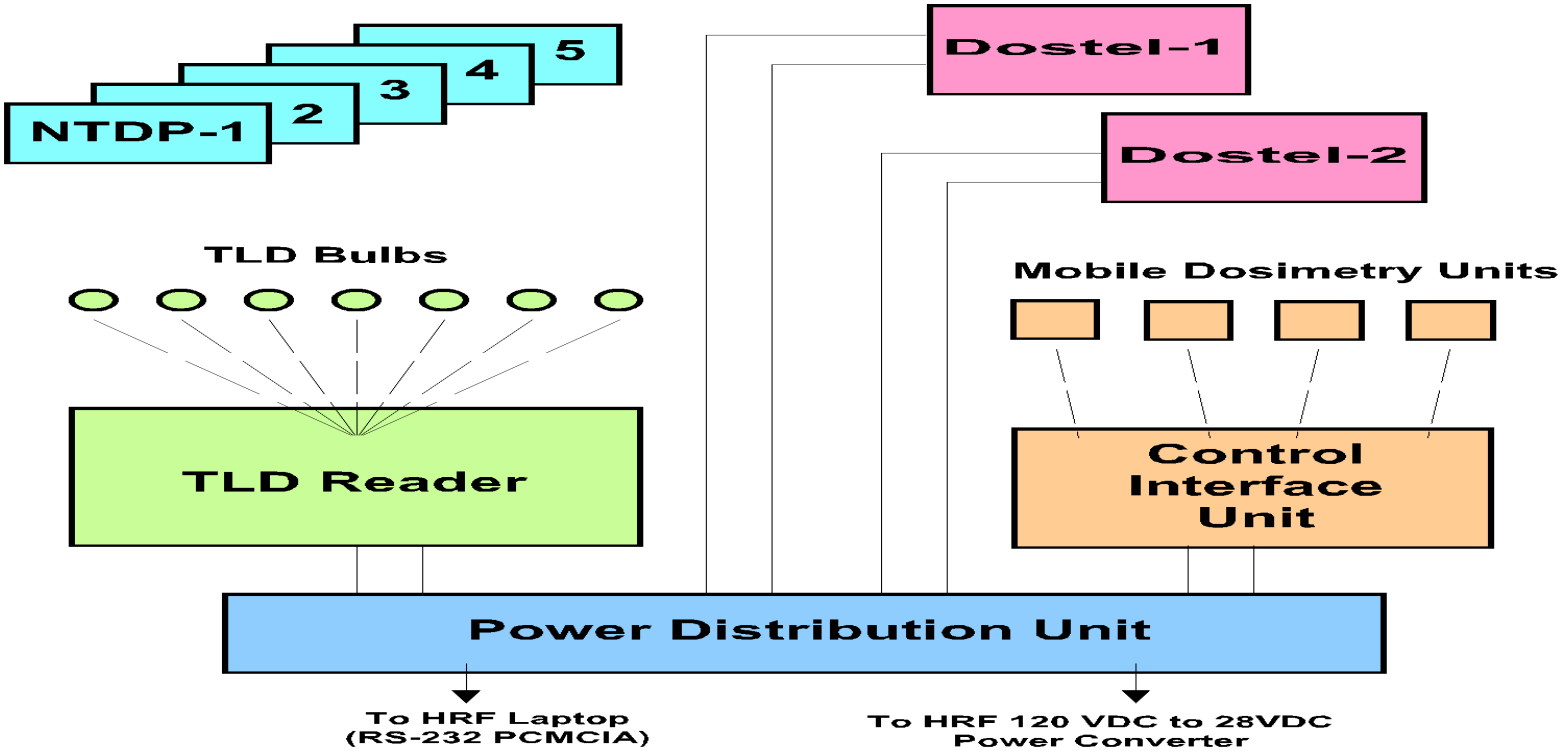
4) Next meeting

Next meeting shall be organized by Joseph Lemaire, Daniel Heynderickx and Guenther Reitz in Louvain-La-Neuve in September 2000

Future Tasks

- Intercalibration of dosimeters in defined fields and in space
- Measurement of the radiation distribution inside the spacecraft and at the body of the astronauts
  - New spacecraft with different shielding thickness
  - Increased importance of secondary particles (especially neutrons)
  - Solar cycle influence
- Radiation field studies
- Development of devices for registration of the neutron component
- Environmental and individual dose records (physical and biological dosimetry)
- Measurement of the depth dose distribution in realistic human phantoms
  - Calculate organ doses
  - Optimize risk estimates

DOSIMETRIC MAPPING EXPERIMENT AS PART OF THE HUMAN RESEARCH FACILITY

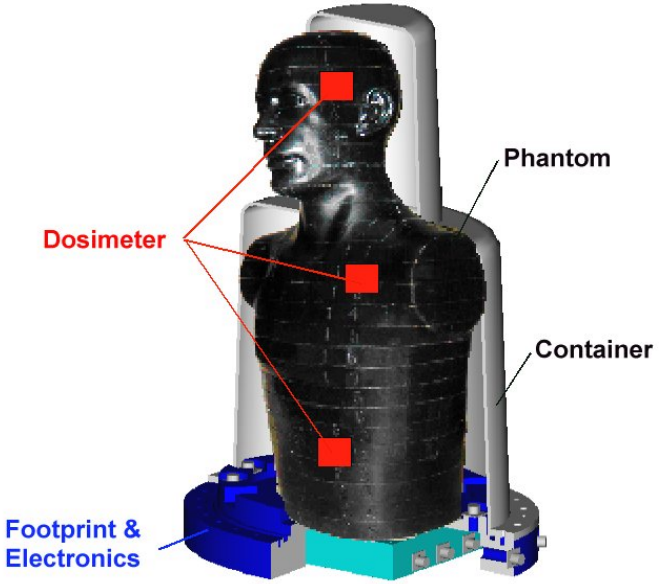


MATROSHKA

The **objective** of this facility is to provide the environment of a human body, which allows measurement of the dose depth distribution of different components of the space radiation field occuring in men who are exposed during Extra Vehicular Activities.

Subsystems:

- **Phantom**
- **Container**
- **Basestructur**
- **Electronics**



Detector Systems for MATROSHKA

Detector Type	Number of sensors
Active Devices	
• Dosimetry Telescope (DOSTEL), (1 W, 300 bytes/min))	1
• Tissue equivalent Proportional Counter (TEPC), (max. 3.5 W, 500 bytes/min)	1
• Silicon/Scintillator Device (SSD), (max. 2W, 1200 bytes/min)	4 to 5
• SRAM Device (PHA),(<1 W, 300 bytes/min)	2
Passive Devices	
• Plastic detector packages (CR39, CN, PC)	4 to 5
• Thermoluminescence dosimeters (TLDs)	numerous
• Neutrondosemeter (CR39, PC, converter foils, TLDs)	3 to 4

ISS Dosimetry Issues

- Limitations of instruments
- discussion of discrepancies in measurements
- Instrument development
- Intercalibration of instruments
- Relevance of secondary products
- Uncertainties in determination of Q
- Definition of necessary improvements of models
- Data base