

## WEB-SITE OF THE BULGARIAN SPACE INSTRUMENTATION INITIATIVE

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**Keywords:** *Bulgarian space instrumentation, spacecraft, web-site*

**Abstract:** *The current status of the website devoted to space payload, instrumentation and complex systems developed by Bulgarian scientists and engineers is presented. The aim of this initiative is to summarize the available information and to provide a short description for each instrument supported by a wealthy photo and video material to be accessed via a public website. The information is organized in decades, starting from 1970s to present day, by scientific programs and alphabetically by the name of the individual instrument. The website is supported by the Space Research and Technology Institute – Bulgarian Academy of Science and is freely accessible at: [www.space.bas.bg/legacy](http://www.space.bas.bg/legacy)*

## УЕБ-САЙТ НА ИНИЦИАТИВАТА ЗА БЪЛГАРСКА КОСМИЧЕСКА АПАРАТУРА

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**Ключови думи:** *Българска космическа апаратура, спътници, уеб-сайт*

**Резюме:** *Представяме настоящото съдържание на уеб-сайта, предназначен да показва космически уреди, апаратура и комплексни системи създадени от български учени и инженери. Целта на настоящата инициатива е да се систематизира наличната информация и да се представи кратко описание на всеки уред, заедно с богат фото и видео материал на публично достъпен уеб-сайт. Информацията е организирана по десетилетия, започващи от 70-те години на миналия век до днешни дни, по научни програми и по името на индивидуалния уред в азбучен ред. Уеб-сайтът се поддържа от Института за космически изследвания и технологии – Българска академия на науките и е със свободен достъп на адрес: [www.space.bas.bg/legacy](http://www.space.bas.bg/legacy)*

### Introduction

The objective of the current initiative is to create a comprehensive listing of all Bulgarian innovations for space exploration that were implemented as components, payloads, instrumentation or/and complex system aboard satellites, interplanetary missions or/and orbital stations. The background of this project and the initial stages devoted to the setting up of the web-site are described in a previous report [1]. There, the main structure of the web-site is also presented and the overall structure is still kept. In this report we present our results from gathering relevant information, structuring the contents and editing the web-site. We used currently available to us materials, such as: books [2–6], conference proceedings books [7,8], description of payloads [9], concise reviews on specific missions [10], different popular newspapers articles, as well as numerous external links (for brevity, web-links are not listed here but are given at the appropriate places in the web-site). The focus here is on the first two decades of instrumentation, 1970s and 1980s.

### Web-site

The website of the initiative of the Bulgarian Space Instrumentation can be accessed at the following address: [www.space.bas.bg/legacy](http://www.space.bas.bg/legacy)

Screen views of the home page in English and in Bulgarian are shown in Fig. 1 and Fig. 2, respectively. Video materials are to be hosted at an external web-pages in order to facilitate the viewing of the various video formats and to provide alternative access to them.

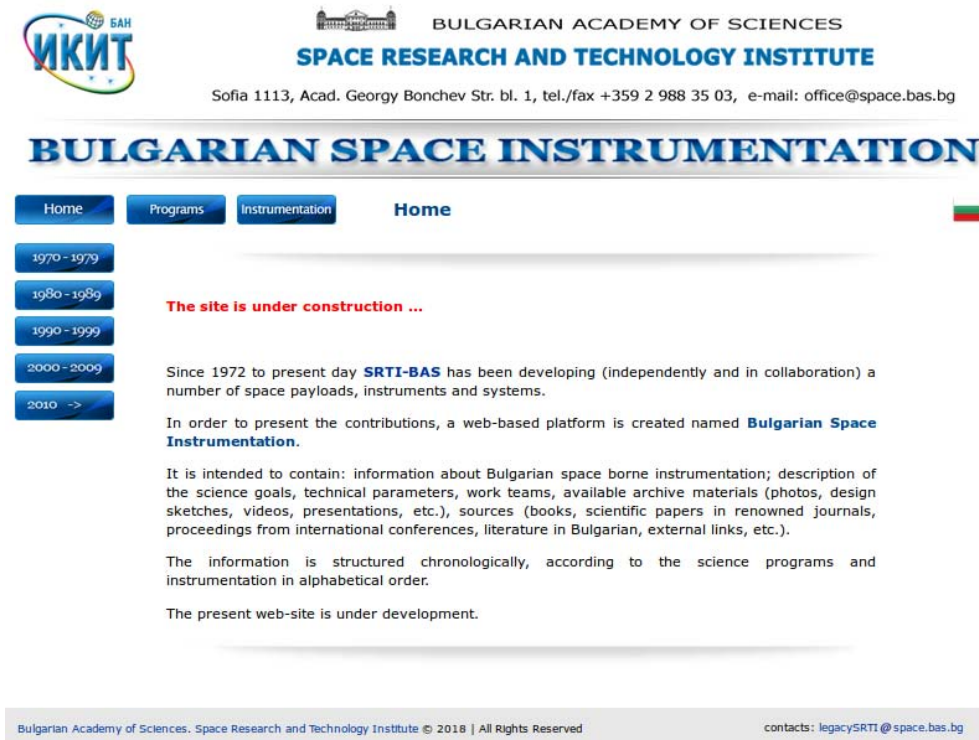


Fig. 1. Screen-view from the web-site home page in English

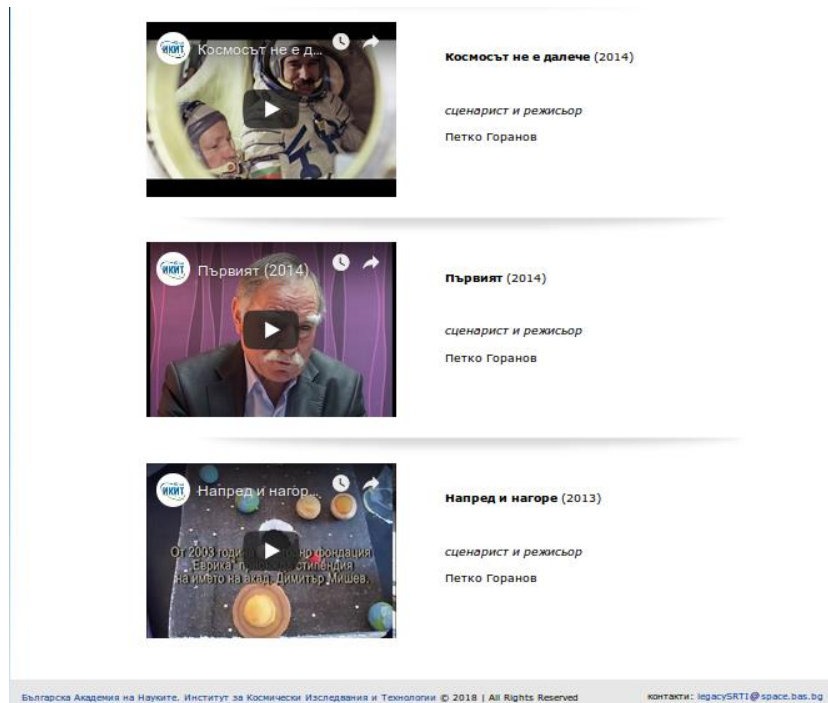



Fig. 2. Screen-view from the lower part of the home page in Bulgarian

## BULGARIAN SPACE INSTRUMENTATION


Home Programs Instrumentation 1970 - 1979

1970 - 1979  
1980 - 1989  
1990 - 1999  
2000 - 2009  
2010 ->




**Interkosmos 8**  
01.12.1972

- P-1




**Interkosmos 12**  
31.10.1974

- P-2




**Vertical 3**  
02.09.1975

- P-1R




**Interkosmos 14**  
11.12.1975

- P-3




**Vertical 4**  
14.10.1976

- P-2R




**Vertical 6**  
25.10.1977

- P-3R
- EMO-2R




**Vertical 7**  
07.11.1978

- P-3R
- EMO-2R
- 4ELI




**Centaure II**  
11.1978

- RIKI
- EMO-1R



**Interkosmos 19**  
27.02.1979

- P-4
- EMO-1



**First Bulgarian cosmonaut – Georgy Ivanov**  
10.04.1979

- Spectrum 15
- Duga
- Sredets
- Vital

Fig. 3. Screen-view from the 1970s instrumentation

### Concise description of the 1970s instrumentation

The current list of instrumentation launched at space vehicles in the 1970s (1970–1979) is shown in Fig. 3. In total 10 different missions were identified that carried about 17 different instruments (or their improved versions) aboard.

This decade is the starting point for the Bulgarian space efforts, both in terms of launching equipment (in 1972, ranking 18th among the space nations) and sending an astronaut to a near Earth orbit (in 1979 and thus ranking at 6<sup>th</sup> position).

The payload of the series P and P-R (for ‘pribor’) were build, tested and used at several missions of the *Interkosmos* satellite series and *Vertical* heavy vertical rockets. In addition, the first Bulgarian electro-photometer (EMO) and the first in the world four-electrode ion trap (4ELI) were designed and took part in launches during the latter half of the decade.

The 1970s end with the narrow escape of a failed mission to the orbital station *Salyut-6*, when an engine failure of *Soyuz-33* cancels the docking and puts the team, Nikolai Rukavishnikov and Georgi Ivanov, into a life hazard situation. This is the first safe landing over a ballistic orbit for a space crew. All scientific experiments planned during this mission were successfully performed by the next mission crews at *Salyut-6*. Georgi Ivanov is Bulgaria’s first astronaut and with his flight (on 10.04.1979) Bulgaria achieves the sixth position among all astronaut countries.

### Concise description of the 1980s instrumentation

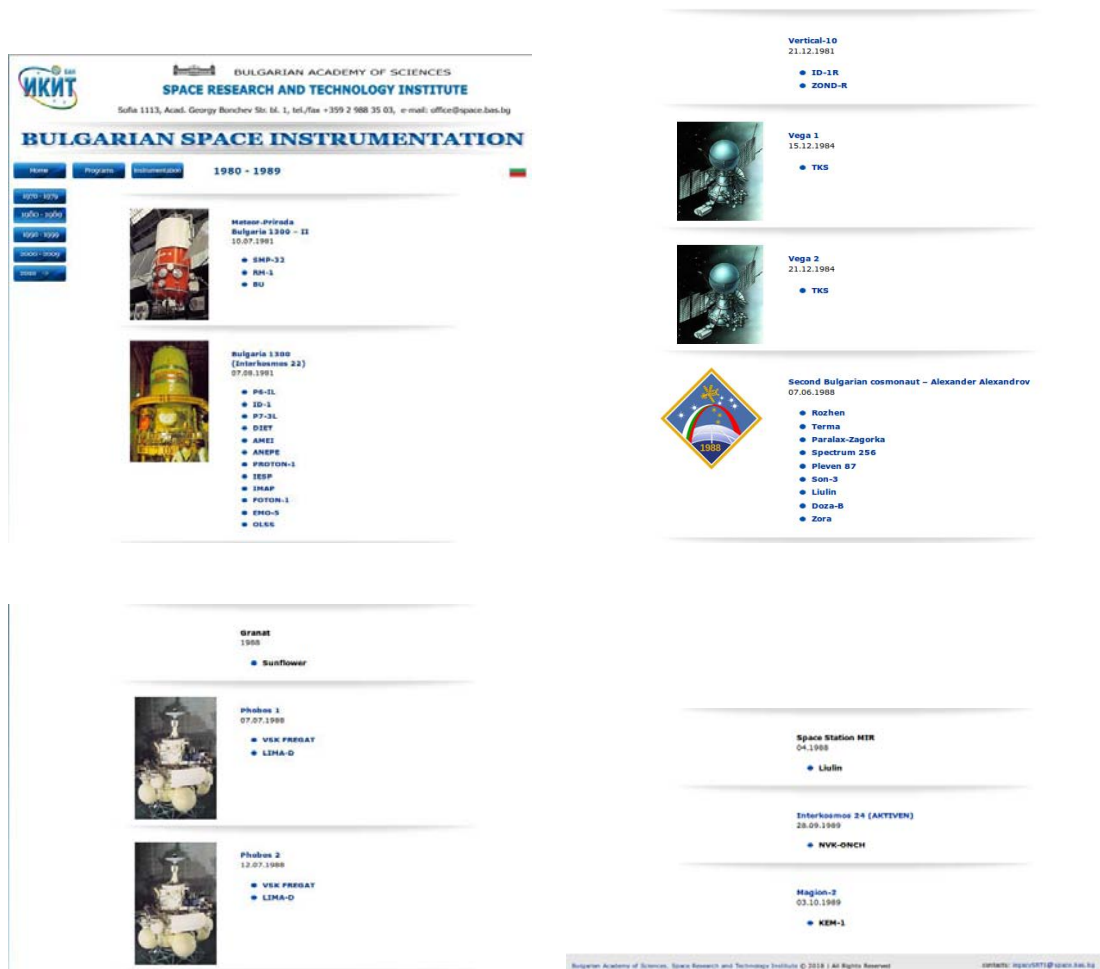


Fig. 4. Panel of screen-views from the 1980s instrumentation

The 1980s (1980–1989) set of instrumentation contains one of the major achievements for the Bulgarian space efforts, namely the initiation and successful completion of two science programs consisting only of Bulgarian payload (see in Fig. 4). These are the *Bulgaria-1300 I* and *II* (*Meteor-Priroda*) missions. Both programs were launched on soviet satellites of different series, *Interkosmos* and *Meteor*, respectively. First chronologically, *Meteor-Priroda* contains only three Bulgarian instruments

aboard, whereas during the *Bulgaria-1300 I* a total of 12 different instruments [10] were designed and implemented for space measurements.

Among the other international space participations during the 1980s, we note the Bulgarian contribution to *Phobos 1* and *2* interplanetary spacecraft, both of which failed to reach their goals. Images of the Martian satellite Phobos from the Bulgarian video-spectrometric system Fregat were the few successful outcomes of this dual mission.

Another highlight from the 1980s is the flight of the second Bulgarian astronaut Alexander Alexandrov on 07.06.1988 together with Anatoly Solovyev and Victor Savinykh. Alexander Alexandrov is the first Bulgarian astronaut to visit an orbital station (*MIR*). During this mission, various experiments from a comprehensive scientific program *Shipka* were performed based on nine different instruments. With the successful mission of a second astronaut, Bulgaria takes at present the ninth place among all astronaut nations.

### **Outlook**

The web-site is currently under development. The main description of the instrumentation from 1990, 2000 and 2010-decade is under completion. The web-site contents will be enriched with information, photos, videos and publication materials as soon as they become known or/and are provided to the developing team.

### **Acknowledgements**

This initiative is supported by the Space Research and Technology Institute – Bulgarian Academy of Science, also hosting the web-site. The authors are grateful to the following contributors (listed alphabetically) who provided us with descriptions, archive materials, private photos and videos (as of end-October 2018): Alexander Bochev, Anna Buzekova, Tsvetan Dachev, Ivan Dimitrov, Lachezar Filchev, Petar Getsov, Petko Goranov, Zoya Hubenova, Rositza Koleva, Alexandar Krumov, Jordanka Semkova, Aleksei Stoev, Yordan Tassev, Dimitar Teodosiev, and Valeri Vashev. We apologize for any omissions from this list.

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