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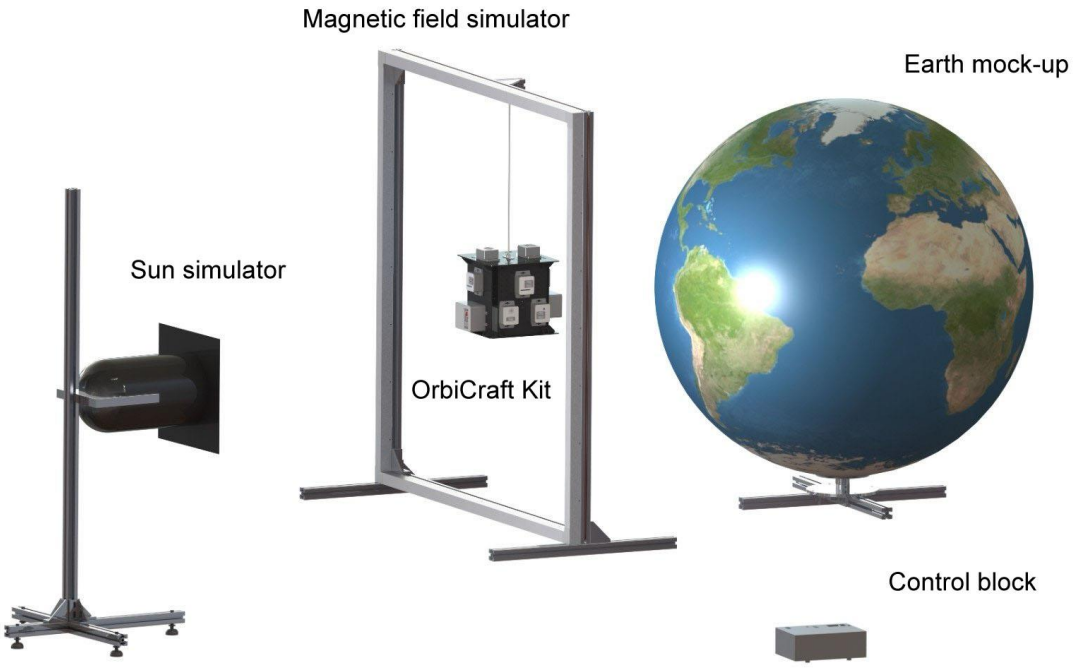
OrbiCraft satellite kit and Terra laboratory equipment

The OrbiCraft satellite kit together with the Terra laboratory equipment, is designed to assemble the working functional model of the satellite and to "launch" it onto the "near-Earth orbit". They can be used, first of all, in educational projects related to the engineering of space systems, within the curricula of universities, engineering schools, as well as by all who are interested in space technology.

General view of the OrbiCraft kit together with the laboratory equipment Terra is shown in the figure.



OrbiCraft satellite functional kit

OrbiCraft satellite functional kit is delivered to learn the basics of a spacecraft design, assembly and testing. The main feature is: instead of separate development of every system the kit helps to concentrate on mission design, quickly obtain a working prototype and implement the control algorithms.

Satellite kit contains:

- payload – camera to take pictures of space around with a resolution of at least 640 by 480 pixels;
- onboard computer based on Raspberry Pi;
- power supply unit;
- command transmission and telemetry acquisition system
- sun sensor, angular rate velocity sensor, magnetic field sensor and flywheel
- software
- a set of manuals and assembly instructions, as well as methodological materials

Software:

- Web interface is used to download the firmware developed by user on board of the kit;
- Preparation for downloading is provided by the provided software development environment based on Notepad ++;
- C or Python programming languages

Terra laboratory equipment

Terra space flight simulation complex is delivered on conducting experiments with satellite models such as OrbiCraft.

It contains:

- Magnetic field simulator;
- Earth mock-up;
- Sun simulator;
- Software

Magnetic field simulator

Magnetic field simulator – closed square-like solenoid (current frame) makes adjustable magnetic flux through the vertical plane. Current frame is a simplified Uniaxial Earth magnetic field simulator.

Earth mock-up

It provides:

- Earth's geometry and surface appearance;
- Satellite ground track along equatorial orbit;
- Same conditions and principals for taking pictures of land surface;
- Connection with "Ground control centers" by command radio to receive telemetry;
- High-speed data transfer to "Ground control centers"

Sun simulator (Spotlight)

The simulator of the Sun is a light source providing a beam of light, for a number of characteristics similar to the solar one, in order to influence the layout orientation system, as well as to the conditions of shooting the globe sections with a camera installed in the satellite mockup.

Software

Software under Windows provides synchronous operation of the magnetic field simulator, rotation of the globe, as well as the operation of ground-based MCCs, reception and processing of telemetry from the tested OrbiCraft kit.