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PEGASUS - An Austrian Nanosatellite for QB50

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The QB50 project is an international project with the goal to send up to 50 Nanosatellites, a.k.a. CubeSat, into the Thermosphere. The scientific goal of this mission is to monitor over a period of up to nine months the prevailing conditions in this rather unknown part of Earth's atmosphere. Each of the 50 nanosatellites will be equipped with one of three possible scientific instruments: (i) a set of Langmuir probes, (ii) atomic oxygen measurement device, (iii) ion/neutral mass spectrometer. All satellites will be launched together and released in a string-of-pearls type fashion. It is predicted that the satellites will drift apart rather rapidly following the release. Therefore, the QB50 missions offers the possibility of a measurement grid in the thermosphere of unprecedented scope and accuracy.
One of the satellites, named PEGASUS, is designed and build by a team of Austrian researches and students. PEGASUS will be equipped with the aforementioned Langmuir probes and will provide information about essential properties of the plasma in the thermosphere such as the electrontemperature and –density. In order to ensure the capability to collect and downlink the data over several months, PEGASUS requires about the same types of subsystems as one would find on large-scale satellites. This includes an attitude control system, an on-board computer, telecommunication devices, an electrical power systems allowing to harvest the solar power and either distribute or store it for later use, a thermal control system – to name only some. In addition to the above, PEGASUS will also feature a propulsion system which, if successful, would be the first time to use such a system on a nanosatellite.
Nearly all of the above systems are designed by the PEGASUS team members rather than procured. The present paper details the design concept of PEGASUS and summarizes the general development efforts in the framework of the individual systems and the verification tests conducted to show compliancy with the QB50 requirements.