ROCSAT Launched

Yet Another Asian High-Resolution Satellite!

After a series of delays and postponements, the Taiwanese ROCSAT-2 satellite was launched successfully from the Vandenberg Air Force Base in California on May 20th. According to press reports, the delays were caused mainly by some difficulties with the Orbital Sciences' Taurus XL launcher that had been revealed during pre-launch tests. This meant that certain parts had to be replaced and tested before the launch countdown could be resumed. However, in the event, all went well with the actual launch and the satellite was placed first in a suitable parking orbit at an altitude of 737km above the Earth. Over the period of two weeks after the launch, the satellite was then transferred into its final Sun-synchronous orbit having an altitude of 891km and an orbital inclination of 98.99°. According to a report in Space News of 14th June, ROCSAT-2 has already returned its first images successfully - though the satellite will not become fully operational till September 2004.

By Prof. Gordon Petrie

As discussed in the Asian section of my overview article on 'High Resolution Imaging from Space" that was published in the March 2004 issue of GeoInformatics, the ROCSAT-2 satellite and its imager were constructed by Astrium in France with certain components manufactured in Taiwan. The satellite's RSI imager will generate pan images with a 2m ground pixel size (GSD) and multi-spectral images with an 8m ground pixel. Like most other high-resolution satellites, it can point its imager at angles up to 45° off-nadir both in the flight-direction (forward and backward) and sideways with respect to the ground track, so extending the area that can be imaged on each orbit.

While Taiwan's National Space Program Office (NSPO) insists that ROCSAT-2 is intended primarily for scientific applications, commentators are in no doubt that it will be used also to gather images of mainland China for intelligence purposes. The image data will be collected by ground receiving stations located at Chungli and Tainan in Taiwan. However the satellite is also equipped with a large solid-state data recorder with 40 gigabytes of storage capacity. So when it is passing over other parts of the Earth outside Taiwan and China, it is quite capable of capturing and storing images of these other areas. Thus, according to Space News, NSPO is now proposing to supplement its 'scientific' programme with a commercial programme to sell images worldwide. This will be managed by a company that will be selected soon.

Besides the capability of capturing high-resolution images of the Earth's surface, ROCSAT-2 is also equipped with another imager to detect the occurrence of lightning in the upper atmosphere. This device has been constructed through a collaboration between the University of California, Berkeley; Tohoku University, Japan; and the National Cheng Kung University in Taiwan. They will use the resulting data to investigate the occurrence of red sprites that appear as transient luminous events above thunderstorms in the upper atmosphere. These were only discovered first in 1994. ROCSAT-2 is claimed to be the first satellite that is equipped with instruments to observe these phenomena from space.

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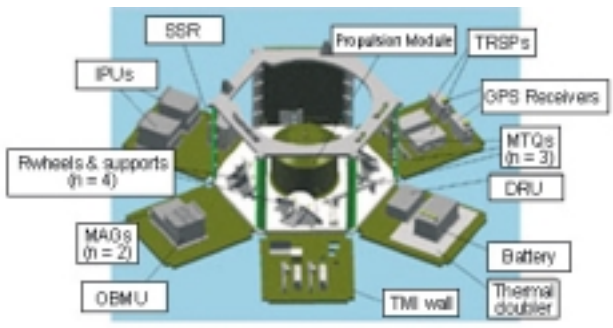

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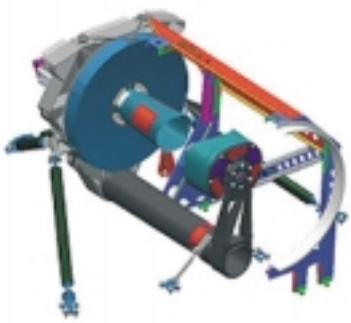

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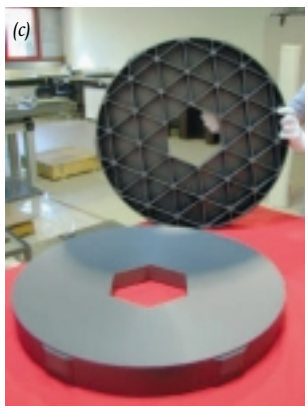

Figure 1:
(a) Showing the basic structure of the bus of the ROCSAT-2 satellite, together with some of its components. The basic structure itself was manufactured in Taiwan. (Source: NSPO)
(b) Shows the basic design of the telescope of the RSI (Remote Sensing Instrument) with its primary and secondary mirrors. (Source: Boostec Industries)
(c) The components of the primary mirror of the RSI telescope with the supporting structure employing very lightweight silicon carbide material. (Source: Boostec Industries)

Figure 2: (a) The completed ROCSAT-2 satellite with its telescope mounted on top of the main body of the satellite - undergoing tests. (b) The ROCSAT-2 satellite about to be enclosed in its protective fairing prior to launch. (c) ROCSAT-2, now in its fairing, about to be transported to the launch pad at Vandenberg Air Force Base (AFB) in California. (Source: National Cheng Kung University)

The four-stage Taurus XL rocket carrying ROCSAT-2 starting to lift off from the launch pad at Vandenberg AFB - with the supporting pylon beginning to fall away to the side. (Source: Orbital Sciences Corporation)