

Multipactor Space Test System

Today's communication requires more and more speed in data transfer (Internet, data streaming, etc.). Therefore, satellites need more and wider communication channels. At the same time, a higher transmission power is required to maintain the same signal-to-noise ratio.

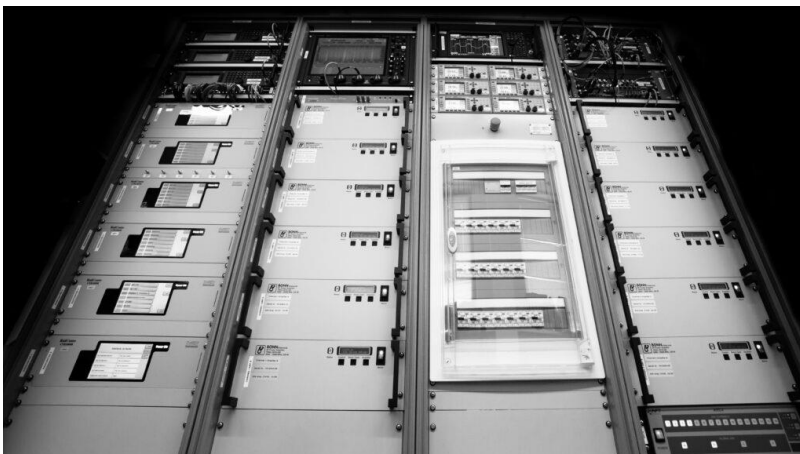
RF components used in satellites must be able to withstand the so-called 'multipactor' effects. This is a phenomenon in radio frequency waveguide components that occurs when a charged particle in space hits the wall of a waveguide component. When this charged particle has enough energy, will free one or more electrons from the metal waveguide wall. The electric field in the waveguide (generated by the emitted RF power) will accelerate this electron until it in turn hits the other side, releasing more electrons. Under the right conditions, this will lead to exponential electron multiplication and consequently, may cause severe damage or even destruction of the RF component.



Raditeq has successfully developed and delivered a second-generation Multi-Carrier, High Power, Broadband Microwave Test System for Multipactor testing. This system is used to test satellite waveguide components in the Ku band for their sensitivity to "multipactor" effects.

The Multi-Carrier Test System is based on the **RadiCentre**[®] modular test system, using 12 broadband high power **BONN Elektronik** amplifiers combined to 6 modulated, carriers of 700 W each. A high power OMUX (output multiplexer) is used to combine all six carriers into a single RF output.

In addition, special 'nulling' modules are used to control the phase between the 6 carriers within 3 degrees and achieve the maximum peak voltage when combining the 6 independent carriers.



The most challenging part of the system is that all phase angles must be measured and controlled, even when the carriers are modulated with complex signals.

The goal of the system is to generate and amplify an accurate Multi-Carrier signal to simulate real-life multipactor effects before launching the satellite into the orbit. Thus, preventing unexpected satellite failures in space.