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ARGOS: HYPER AMPLIFICATION MANIFOLD FOR ENHANCING GROUND STATION
RECEPTION

Abstract

As a need for accomplishing primary mission objective on the NEE-01 PEGASUS nano satellite we were faced with the need for dramatically enhance the reception sensibility of our actual HERMES-A/MINOTAUR ground station.

HERMES-A was already a powerful and very sensitive ground station, however, much more was needed in order to receive and decode a real time video transmission from orbit arriving to the antenna with signal levels as low as -160dbm. The solution was the ARGOS manifold which resembles more a radio telescope than a normal ground station. ARGOS is inspired in many techniques derived from a quantum physics approach and in some used in SETI systems as the problems we faced were more similar to those encountered in SETI signal reception and amplification than in normal space operations involving satellites in LEO orbit.

The mathematical model of the link budget developed for the CYCLOPS payload was the base for the calculation of the needed gains in each stage of the ARGOS manifold, components were selected and tested and finally the whole manifold was put to lab and field testing with outstanding results The result was a hyper amplification manifold capable of enhancing the sensivity to up 320 dB and able to allow the decoding of video/audio signals as weak as -375dbm and as wide as 25Mhz with minimal signal blurring in an small package and using COTS components which resulted in a modest implementation budget.