

46th IAA HISTORY OF ASTRONAUTICS SYMPOSIUM (E4)
History of Italian Contribution to Astronautics (3A)

Author: Dr. Luigi Bussolino
Bussolino and Associates, Italy, luigi.bussolino@virgilio.it

TSS-1, TETHERED SATELLITE DEPLOYED FROM THE SPACE SHUTTLE

Abstract

The tethered satellite was an idea of an Italian genius Prof. Colombo from Padova University and Harvard Smithsonian Center for Astrophysics in Massachusetts, who was for many years a scientific consultant for NASA providing the calculations of the orbital periods and movements of the Mercury planet, till then partially observed by an American probe, and the idea of VGA using planet orbital encounter to acquire velocity in a space far mission taking profit of the gravitational field of the planet itself. Prof. Colombo proposed to NASA and the Italian National Space Plan of CNR (that later on in 1988 originated the Italian Space Agency) this space mission having the scope of demonstrating in space some physics laws, one of them concerning the production of electrical energy in space in a conducting wire passing through the Earth magnetic field. And other not less important such as using the wire, that had to be at least 20 km long, from satellite to Shuttle as ULF antenna from an idea of another Italian Prof. Grossi. An agreement between NASA and ASI was reached and the system was subdivided in the release and retrieval mechanisms collocated in the Shuttle and the wire to USA (Martin Marietta) and the tethered Satellite with the various scientific experiments on board to Italy (Aeritalia later coming in 1991 Alenia Spazio). The sophisticated mission was started with the "electrodynamics experiment" in July 1992 and was repeated later on 1996, due to a problem of interfaces in the release mechanisms of Martin Marietta that initially allowed a release of only 250 m of wire; in the second mission a problem in the wire (a discontinuity in electrical conductivity due to an imperfection in the characteristics of the wire) when the electricity started to flow in the wire caused a short circuit causing the cut of the wire and the loss of the satellite that later on reentered in the atmosphere. The results of the mission even if shorter than expected were appealing and important; even if the experience has been decided to not be repeated the results obtained are so interesting to support other ideas such as electrical provision for space station as well as the space elevators.