IAF/IAA-93-D.1.117

POSITIONING OF EARTH MOBILES WITH MINI-SATELLITES

F. Bonneau, B Boucher de la Rupelle, D Delobette
Centre National d Etudes Spatiales
Toulouse, France

The French Space Agency CNES is carrying out studies of the positioning of mobiles with the help of mini-satelites. The TAOS project intends to provide the position of some 1000 terminals over Europe, Noeth America and Asia.
As a first phase, a Mini-satellite S80T has been launched, with Topex Poseidon, in August 1992. The orbit of this satellite is circular at 1300 Km altitude, with an inclination of 660 deg. This satellite is dedicated of the testing of the electronic equiment which could be on board TAOS.
Furthermore, this satellite makes some localization measurements. They can Doppler or Range, and the terminal is situated in the Toulouse station.
Those measurements are precessed by the use of a Kalman sorfware, FILON, developed by the Space Mathematics division of CNES. In this software, the state vector has up to 20 components, and each parameter can be solved for or considered. The spacecraft model of motion is an analytical model taking into account the harmonic coefficients J2 to J6. The initial conditions for the spacecraft is given by the navigation team, and are computed independently from the S80T measurements. The ionospheric correction is also modelized.
The localization process is made in different steps:

The first one is on the initialization process. Given the firts couple of measurements, thre software computes the two symmetric positions which satisfy those measurements.

In the seoncd step, starting from those two points, the Doppler and Range are pocesssed, to give two final positions.

In the final step, the 2 solutions are evaluated, by comparision of the residuals, in order to determine the good choice.
This paper will present the methode used, together with the results obtained on different arcs. Those results have been processed, in order to determine the sensibility of the accuracy with respect to the frequency and number of the measurements, relative position of the terminal with the ground track of the satellite, and accuracy of this orbit itself.

IAF/IAA-93-D.1.118

LEOP OPERATIONS OF THE FIRST BRAZILIAN DATA COLLECTING SATELLITE

Pawel Rozenfeld
Valcir Orlando

Instituto Nacional de Pesquisas Espaciais - INPE/CRC
C.P. 515 - São José dos Campos - SP
CEP 12201-970 Brazil

The landmark in the space activities of the National Institute for Space Research (INPE), Brazil, is February 9, 1993. This corresponds to the launch date of the low earth orbit, spin stabilized Data Collecting Satellite (SCD1), the first one designed, manufactured and operated in orbit by INPE. This paper gives an overview of the control operation activities and main difficulties found during the Launch and Early Orbit Phase (LEOP) of the SCD1. Initially, a brief description is given about the INPE Ground Control System developed for controlling the SCD1 and succeeding satellites. Afterwards the SCD1 satellite is described and the pre-launch activities are overviewed. Then, LEOP operations are described with more details. As it will be seen the main problems which were dealt with by the INPE satellite operation team occurred exclusively due to the Ground Control System shortcomings. The procedures adopted to overcome them, which assured the complete success of LEOP operations, are presented and discussed. Relevant aspects concerning the execution of the satellite in-orbit acceptance tests are also commented.

IAF/IAA-93-D.1.119

Title :
Ground Segment and Operations concepts of Small Satellite, Missions

Name of authors : J.M OBERTO (MATRA MARCONI SPACE) ,
J VAN DER HA (ESA/ESOC)

Abstract :

Small Satellite Missions are raising a growing interest among the user community as their potential benefits in terms of cost and schedule are becoming more and more evident.
On the other hand , for the traditional missions , the ever-increasing science and performance requirements lead to corresponding increases in performance , complexity , novelty and high cost of Ground Segment and Operations.
The goal of this study is to increase the ESOC's understanding on the Ground Segment aspects for Small Satellite Missions in identifying areas of potential optimisation with a view to achieve acceptable ratios between Space segment and Ground segment costs.
The study approach is composed of 3 main stages ; firstly , traditional missions are evaluated (HIPPARCOS,ERS1,SPOT,HISPASAT) in order to highlight the main cost drivers for each kind of mission . The analysis of these mission cost elements and cost drivers are used as a reference for the derivation and evaluation of the Ground Segment models and Operations concepts developed for Small Model Missions which are independently defined . In a second step , from the selected Small Model Missions (CUBE/SOLID , Altimetry and S80T) , Ground Segment are designed for each kind of mission (Science,Earth Observation and Telecomms).
Finally, trade-offs of proposed options are performed in terms of costs w.r.t risks and a detailed cost evaluation is achieved on the preferred baseline .

IAF/IAA-93-D.1.120

THE ROLE OF SMALL SATELLITES IN ENGINEERING EDUCATION

Roger Moses
Department of Aerospace Engineering,
Bristol University, UK

Until recently the involvement of European Universities in satellite hardware has been dominated by space scientists based in physics and astronomy departments. As the size, cost and timescale of science payloads and observatories has increased, it has become more and more difficult for students, both undergraduate and postgraduate, to be involved fully in all aspects of the project. The emergence of cheap, short timescale access to space (Getaway Specials, Ariane ASAP), has allowed the quick cheap satellite to re-emerge. These opportunities have been taken up by a different user group, the engineering schools, and the objectives are very different to those of the space scientists. Significantly, the engineering student spacecraft does provide simple but useful space science opportunities, and opens the door to space for dedicated groups of non-student amateurs, who can bring experience and continuity to the project. This paper will describe these new perspectives on building and using small satellites, using European University small satellites as examples.