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Indonesia's geographical condition is a blessing, at the same time a challenge to the continuity of its national development. Its numerous islands, big and small, stretching from Sabang to Merauke makes it imperative for Indonesia to use satellites for communication and other applications purposes.

The National Institute of Aeronautics and Space of Indonesia (LAPAN) has been involved in many space projects since its establishment. Among others are the operation of ground stations for satellite remote sensing and GPS for the benefit of national users.

While applications of space technologies have been in place for more than 20 years in this country, mastery of these technologies is significantly lagging behind, notably compared with some other Asian nations. Facing that strategic challenge, LAPAN has started to develop an Indonesian Micro Satellite, defined as a satellite with a mass between 50 - 80 kg.

The purpose of this satellite will be for remote sensing and e-mail application. In this effort, cooperation with other institutions is a must. The program touches not only on the research efforts, but could and should be linked to other national development issues such as education and manufacturing.

In developing the Micro Satellite, the design is being carried out in Germany by engineers from LAPAN in cooperation with the Berlin Technical University (TU-Berlin) starting in January 2004. For this process in total 15 Indonesian engineers will be dispatched in stages to Germany.

The Micro Satellite being built accommodates several subsystems, namely the Command and Data Handling Subsystem, the Behavior Determination and Control Subsystem, the Telecommunication Subsystem, the Satellite Power Subsystem, the Payload Subsystem, the Satellite Mechanical Subsystem and the Ground Station Subsystem.

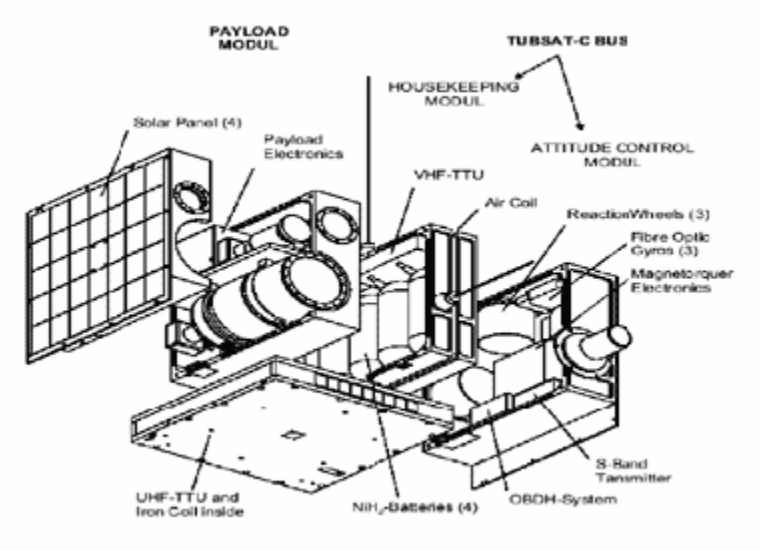
The "LAPAN-TUBSAT" will have telecommand, telemetry & control (TT&C) using the 436.075 MHz frequency in the uplink and downlink. The earth surveillance payload mission, for which two color cameras with 550 mm and 1000 mm focal lengths are installed, will use a downlink frequency of 2220 MHz. The Micro Satellite will also be equipped with "store and forward" communications facilities that will be used to send "electronic mail." The

frequency used for this purpose is also 436.075 MHz. Therefore, e-mail will be used at night time, when the cameras are not activated. Within each 24 hour period, each station can communicate with the satellite 4 times, for a duration of 15 minutes.

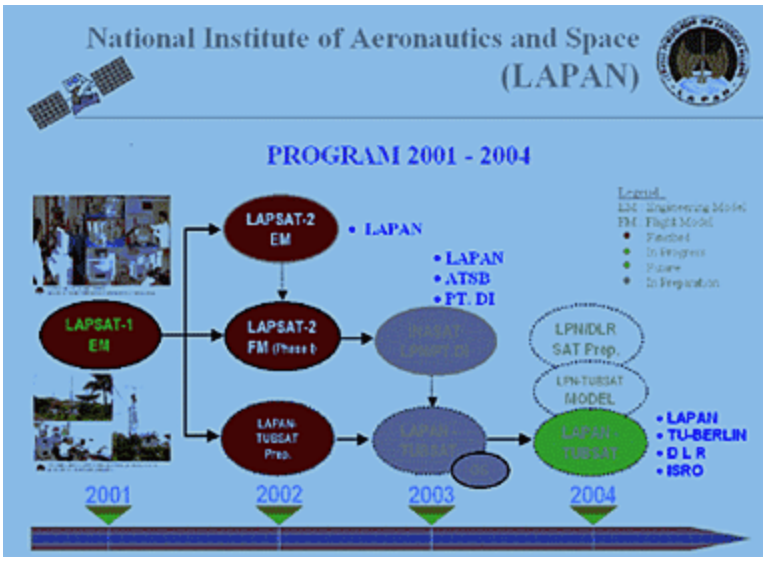
Through the on-board cameras, the satellite's earth surveillance mission can be carried out, resulting in pictures of 3.5 km and 200 m resolution respectively.

The LAPAN-TUBSAT micro satellite has the following features:

- Orbit: Polar
- Altitude: 630 km LEO
- Inclination: 92 O (to be determined - TBD)
- Mass of Satellite: 50 kg (TBD)
- Shape: rectangular
- Dimensions: 45 x 45 x 27 cm
- Power: 14 Watt
- Communications: 2 TTCs, FFSK modulation, 1200 bps, 3.5 Watt RF output



The launch is scheduled for the fourth quarter 2005 by the Indian Polar Satellite Launch Vehicle, as a piggyback load, after which operations of the Micro Satellite will commence. The designed lifetime of the spacecraft is two years, but experience shows that this is a minimum figure. The launch by the ISRO (Indian Space Research Organization) rocket will be another milestone in LAPAN - ISRO longstanding mutual cooperation.



The development and deployment of the LAPAN-TUBSAT is part of the longer range program of the Aerospace Electronic Technology Center of LAPAN, which is based on its vision to become a prominent Center for Indonesian research, development and engineering of satellite systems. Targets to realize this vision are 2005 for Nano Satellite Systems, 2010 for Micro Satellite Systems, 2015 for Small Satellite Systems and 2020 for Satellite Constellations.