

Satellite Subsystems

A Complete Satellite consists of several subsystems, but the most important of them are as follow:

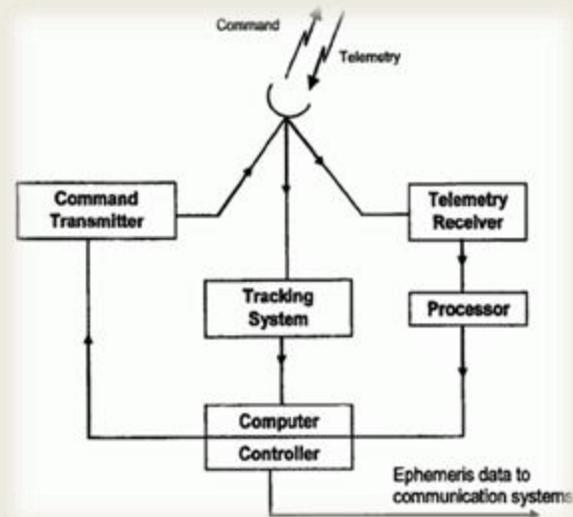
- 1) Power Supply System.
- 2) Attitude and Orbit Control System.
- 3) Telemetry, Tracking and Command System.
- 4) Communication Subsystem.

Telemetry, Tracking and Command System

Data received from the Satellite about status of attitude, orbit and other involve parameters is processed at the ground station. Telemetry, Tracking and Command Subsystem is a part of satellite management task and it is involves an Earth Station. The main function of the TT&C Subsystem are as follow:

- a) Measuring of angle and range for the localization of the satellite.
- b) Transmission of housekeeping information.
- c) Status of a satellite to the ground control station.
- d) Receiving command signals for the station keeping operations of the on-board equipments.

Following diagram typical arrangement of a Telemetry, Tracking and Command System.



Telemetry: Telemetry system collects the data from many sensor and sends this data to the controlling Earth stations. The sensors are mounted on the satellite and they monitor:

- The pressure in fuel tanks.
- Voltages and currents in the communication electronics.
- Temperature of other subsystems.
- Position of switches and attitude.

Typically 100 sensors are required to monitor these data. When the satellite is in transfer orbit, the telemeter transmitter is connected to a TWTA in the satellite repeater. The telemetry data is digitized in nature and transmitted as frequency or phase shift keying of a low power telemetry carrier using time division techniques.

Monitoring: This subsystem deals with the monitoring of the maintenance and working of the components soldered with the Satellite like pressure sensors measures the pressure on the fuel tank of the satellite and sends the information to the monitoring subsystem on the Earth Station.

It determines the slant range for accurate determination of a satellite orbit. It can be done in following ways:

- 1) By transmitting a command carrier modulated by multiple tones from the Earth Station to the satellite. The carrier is received by the command receiver in the satellite, demodulated and then goes to the telemetry or beacon transmitter for the re transmission toward the Earth Station where the phase difference of the received signal is measured with respect to the transmitted signal.
- 2) Velocity and acceleration sensors that can be used in the satellite to sense the change observed in the orbit. The data can be sent to the Earth Station through telemetry, where commands are generated and then sent to the satellite for the orbit correction.

Command: In command subsystem the earth station deals with the problem and sends back the command to the satellite through an electrical signal on air. If it wants to turn off the transponders it can easily send the command and the respective operation will be done at the satellite side.

This subsystem uses many sensors which senses the situation and sends data to the earth station. Sensors like pressure sensor, temperature sensor, altitude sensor etc.

Every thing happening in space is controlled by subsystem which is established on the earth station. It helps in reducing the cost of the maintenance by controlling everything from earth station.