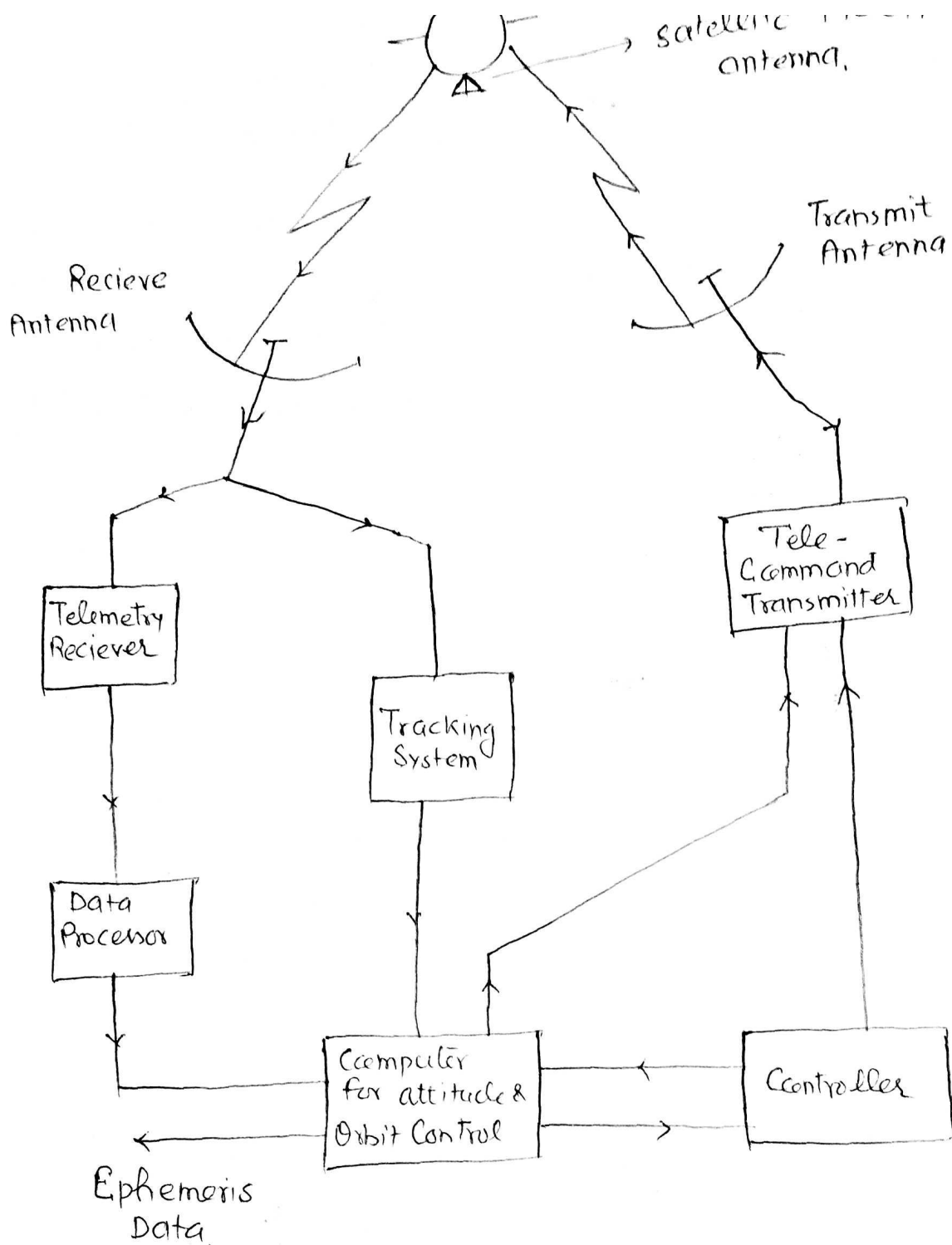
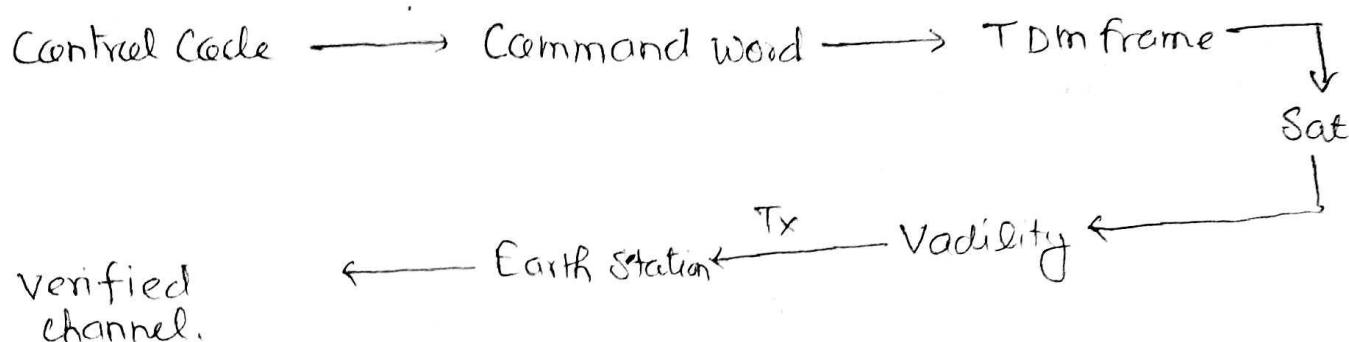




Typical Tracking, Telemetry, Command & Monitoring System

\*Command:- A secure and effective command structure is vital to the successful launch and operation of any communication satellite. The Command System is used to make changes in attitude and corrections to the

orbit and to control the communication system. During Launch it is used to control firing of the apogee kick motor and to spin up spiner to extend the solar sails and antennas of three axis stabilized satellite.



There are two levels of Command System are used in the Intelsat satellite. The main system operates in the 6 GHz band an in a gap between communication channel frequencies.

The main telemetry system uses a similar gap in the 4 GHz band. The TTC & M antennas for the 6/4 GHz system

**\*\* Power System** :- All communication satellite achieved electrical power from solar pannels. The solar pannels convert sunlight into electrical energy. Sun is a powerful source of energy. The intensity of radiation falling on satellite is  $1.39 \text{ kW/m}^2$ . The solar cells do not convert all this energy into electrical power. Their efficiency is 25% - 20% at beginning of life (BOL).

The large communication satellites for broadband broadcast operation generate upto 6 kW from solar power. The spin-stabilised satellite usually has a cylindrical body covered in solar cells. because the solar cells are on a cylindrical surface.

In month march & sept, maximum 17' Battery Backup required.

Batteries are normal Nickel Hydrogen type battery.

Intern-6 Has Cylindrical Body, the lower section of cylindrical body slide-up far around, the upper section for leaved as is then extended. when a space craft in orbit.

**\*\* Communication Sub-System :-** The satellite transponders have limited output power and the earth stations are at least 36,000 km away from a Geosatellite  $\longrightarrow$  The recieved power at earth  $10^{-10}$  watt. That is about 0.1 Nanowatt. We have to maintone signal to noise ratio upto 5 dB - 25 dB depending upon various applications.

The earlist Satellites are powerlimited Later generation of communication satellites have transponders with greatly increased output power upto 200W. Present age of satellites are also power limited but spatial frequency reuse.

$\longrightarrow$  Frequency used for transmission  
1 - 10 GHz<sub>2</sub>

$\longrightarrow$  Satellite spacing Restriction 3° Now reduced 2°.

1 - 10 GHz<sub>2</sub>



for 2° restriction.

6/4 GHz - G Band

$\rightarrow$  1. 6 GHz  $\longrightarrow$  uplink Frequency.

$\rightarrow$  2. 4 GHz  $\longrightarrow$  Downlink frequency.

$\rightarrow$  3. 14/11 GHz  $\longrightarrow$  KU Band

$\rightarrow$  4. 30/20 GHz  $\longrightarrow$  Ka Band, for data transmission.