

Satellite Surveying - History & Development

I. Use of satellites for location on/near earth's surface

- **Passive satellites - BC4 Camera takes pictures of sky**
- **Active satellites - transmit signals to ground receivers**

II. Launch of Sputnik I in October, 1957

- **Russian satellite transmits radio signal.**
- **John Hopkins scientists record Doppler shift of signal.**
- **With many passes, compute trajectory of satellite.**

III. Invert process to compute position of ground receiver

- **Transit satellites put up by U.S. Navy, operational 1964**
- **Polar orbit with period of 107 minutes - 1075 km high**
- **Polaris submarines get fixes & update gyroscopes**
- **Declassified in 1967 - basis of Doppler surveying**
- **Ultimate relative ground positioning at about 0.1 - 0.5 m**
- **Requires multiple satellites/passes**

IV. GPS system based upon NAVSTAR satellite system

- **Established and maintained by US DoD**
- **System declared "operational" in December 1993**
- **24 satellites provide global coverage - 24 hours per day**
- **Satellites broadcast signals on several frequencies - coded**
- **Passive receivers collect data to determine time & location**
- **Uses include both military & civilian applications - many**