SATELLITES

what they do,
where they are,
how did they get there.

PRESENTATION

FOR THE

LEXINGTON COMPUTER AND TECHNOLOGY GROUP

BY

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OVERVIEW

- INTRODUCTION
- THE BEGINNING OF THE SPACE RACE
- TALKING ABOUT NUMBERS
- SORTING BY ORBIT AND FUNCTION
- WHAT IS AN ORBIT? TYPES OF ORBITS
- TYPES OF SATELLITES 1: (UNMANNED, EARTH ORBITS)
- TYPES OF SATELLITES 2: (MANNED, EARTH ORBITS)
- TYPES OF SATELLITES 3: (SPACE PROBES TO OTHER PLANETS/SUN)
- UNUSUAL ORBITS (TRANSFERS AND “SLINGSHOT EFFECT”)
- RELATIONSHIP BETWEEN ORBITS AND OBJECTIVES
- TRACKING TECHNIQUES AND ISSUES (NORAD/GEODDS)
- SPACE JUNK (WHY ISIT STILL THERE, “DISPOSAL TECHNIQUES”)
- SUMMARY

V2 ROCKET ON

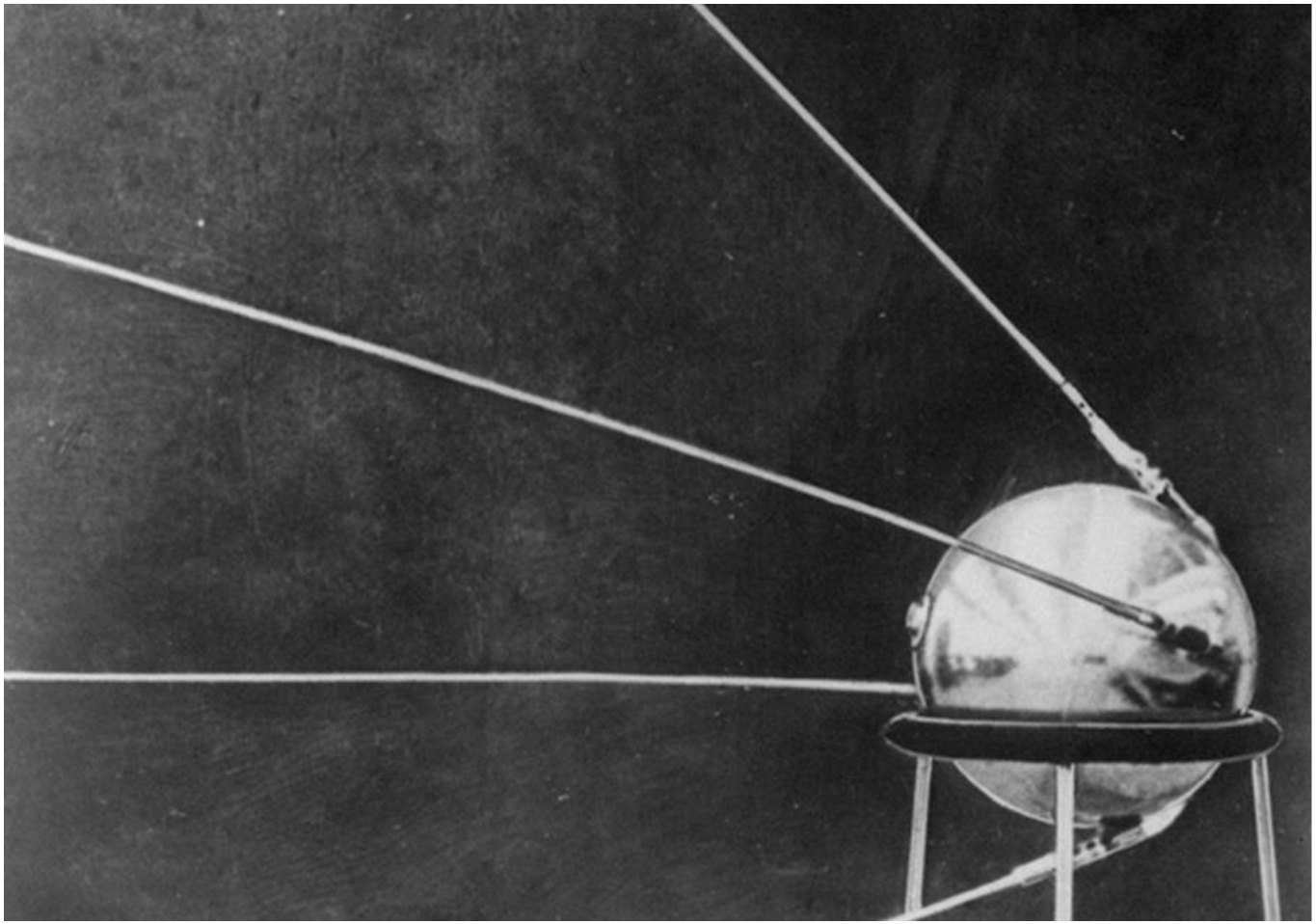
BEGIN OF THE SPACE RACE

1950s [edit]

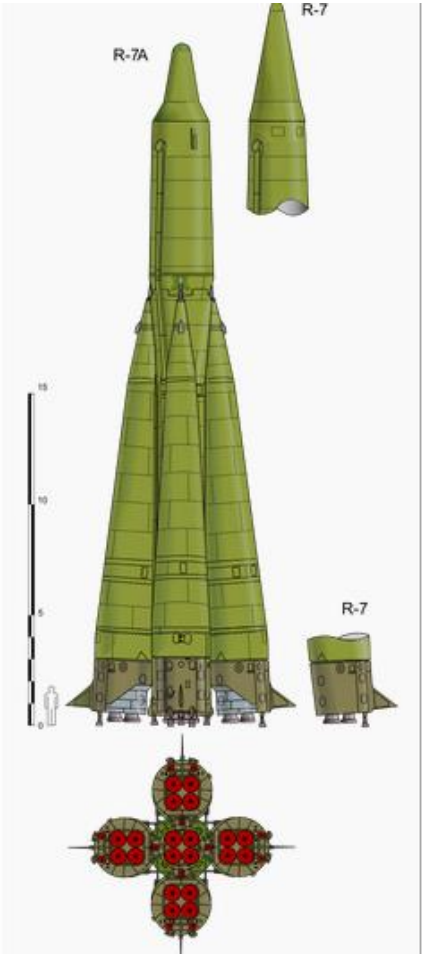
- 1957 – USSR – Sputnik 1 – Success – The first satellite in space.
- 1957 – USSR – Sputnik 2 – Success
- 1957 – USA – Vanguard TV3 – Failed
- 1958 – USA – Explorer 1 – Success – The first American satellite in space.
- 1958 – USA – Vanguard 6.5in Satellite 2 – Failed
- 1958 – USA – Explorer 2 – Failed
- 1958 – USA – Vanguard 1 – Success
- 1958 – USA – Explorer 3 – Success
- 1958 – USSR – ISZ D-1 No. 1 – Failed
- 1958 – USA – Vanguard 20in X-ray 1 – Failed
- 1958 – USSR – Sputnik 3 – Success
- 1958 – USA – Vanguard 20in Lyman-Alpha 1 failure

SPUTNIK 1

October 4, 1957. p = 230 km; a = 950 km

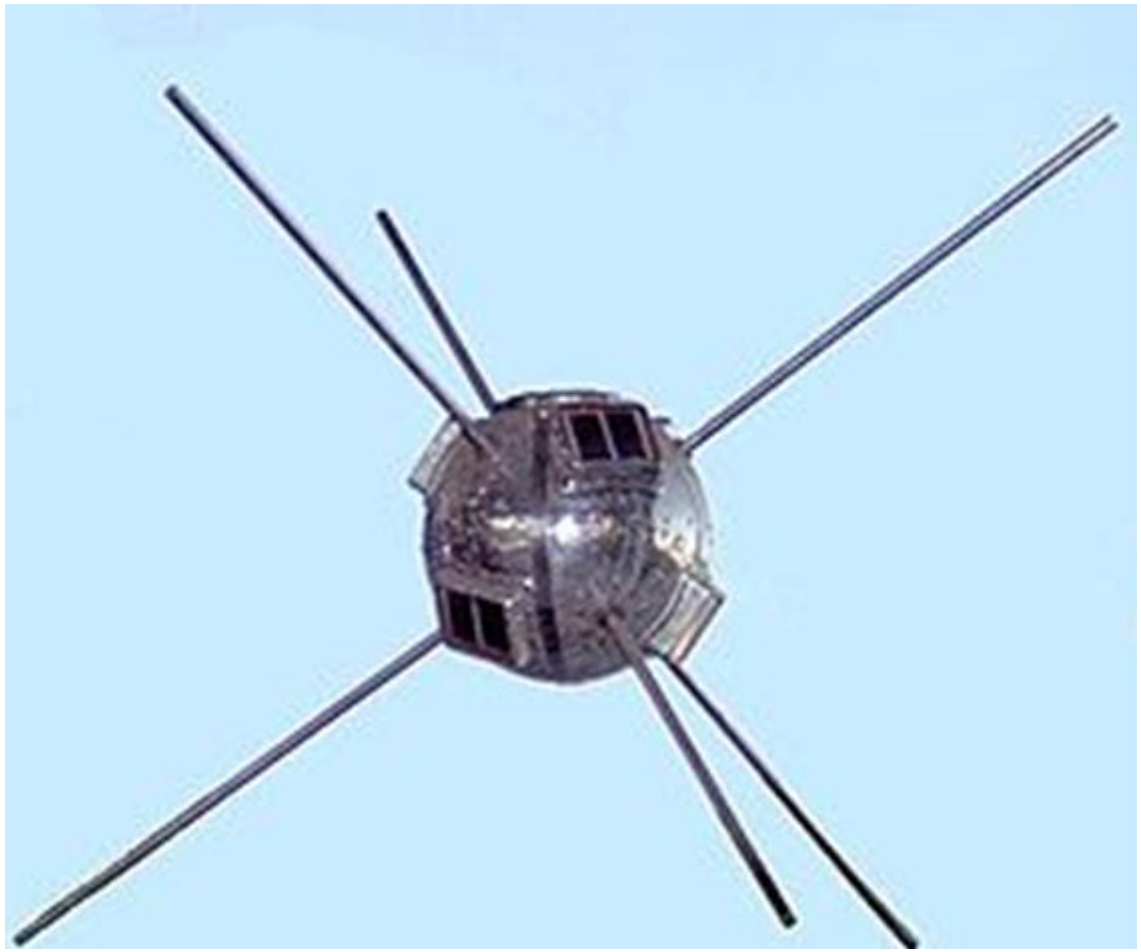


SPUTNIK 1 LAUNCH ROCKET



EXPLORER 1

VANGUARD 1

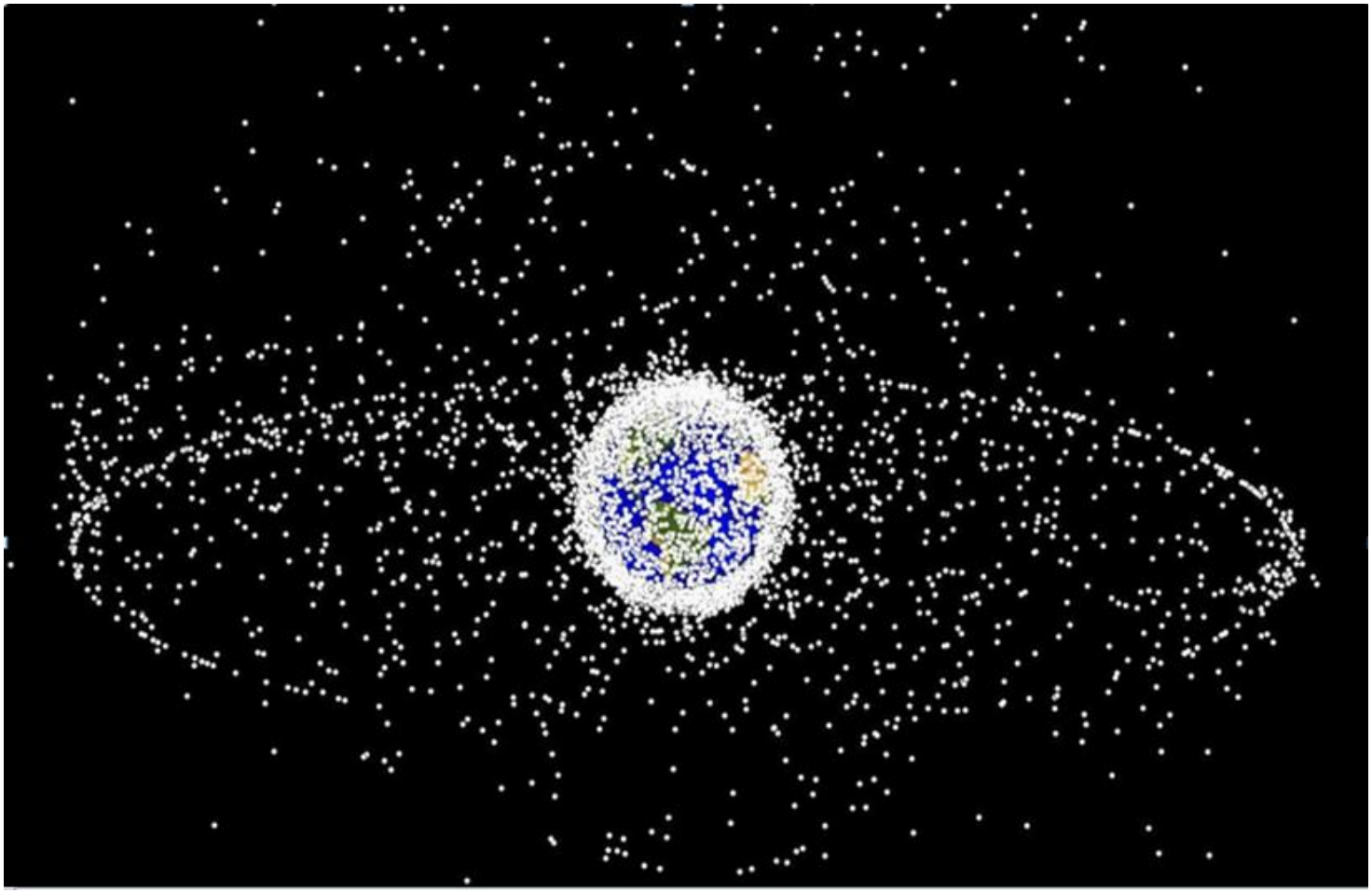


“LIVE SATELLITES”

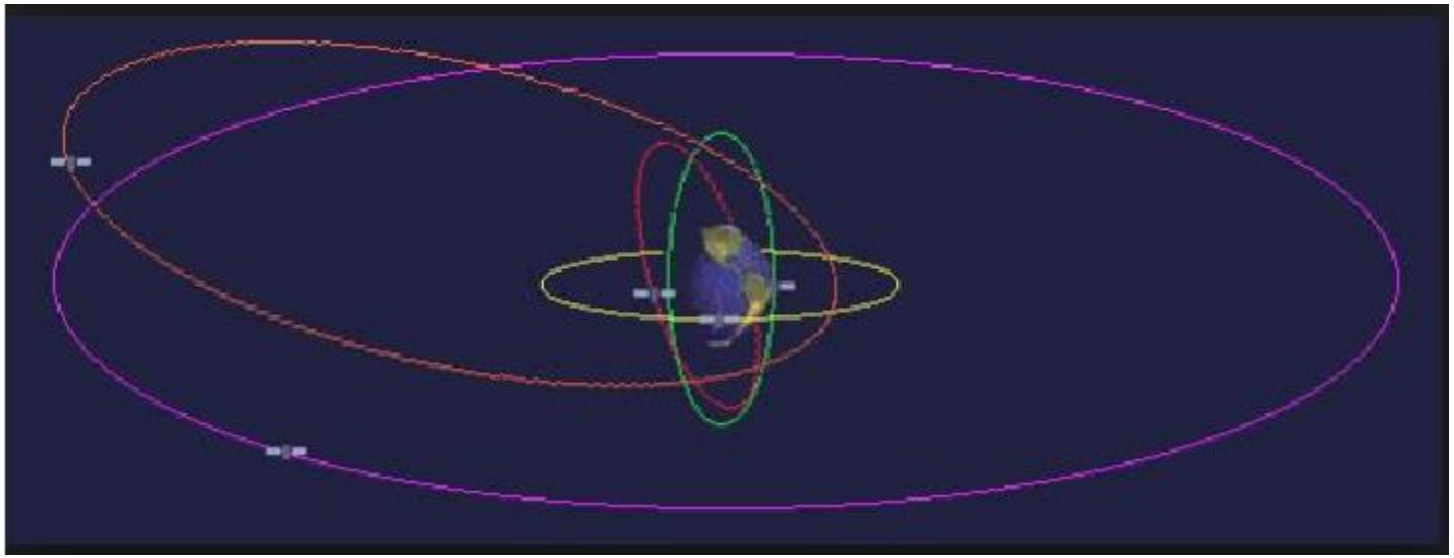
Satellite Quick Facts			
Total number of operating satellites: 1167			
LEO: 605	MEO: 77	Elliptical: 38	GEO: 447
United States: 502	Russia: 118	China: 116	
Total number of U.S. Satellites: 502			
Civil: 20	Commercial: 210	Government: 120	Military: 152

includes launches through 1/31/2014

DISTRIBUTION OF TRACKED OBJECTS



DIFFERENT TYPES OF ORBITS



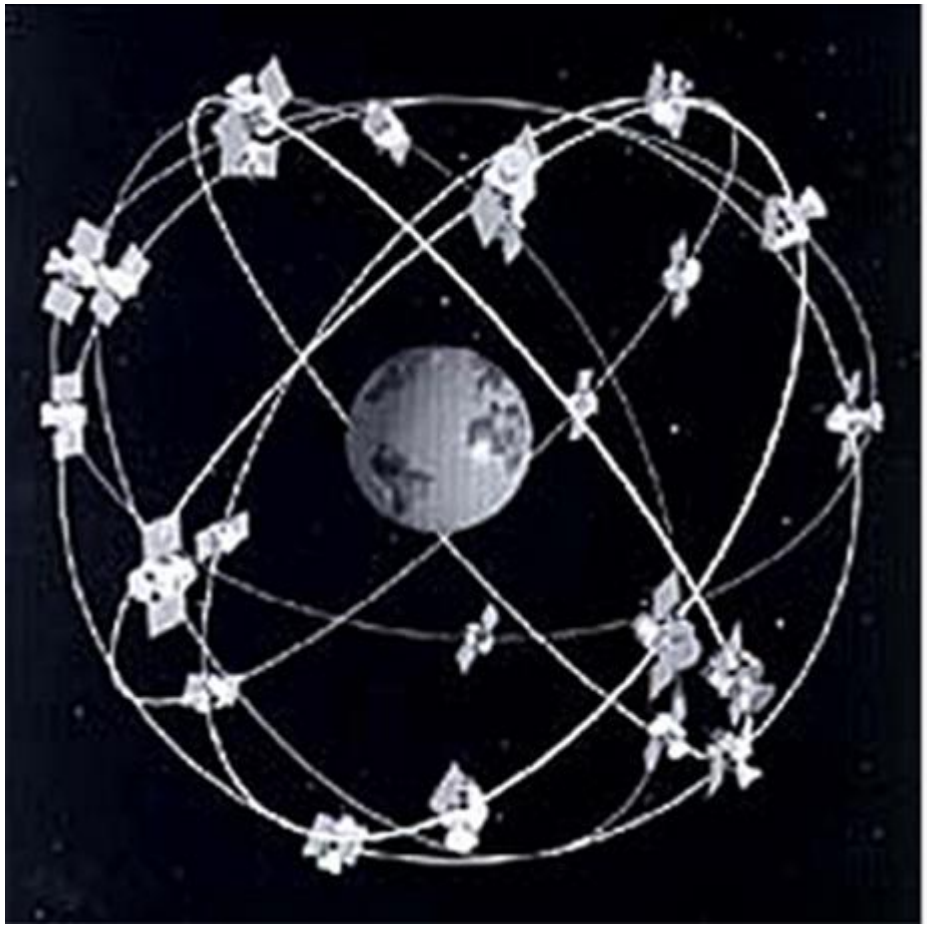
UNMANNED SATELLITES IN EARTH ORBIT

- WEATHER (GLOBAL AND LOCAL)
- COMMUNICATION (TV, INTERNET)
- NAVIGATION (GPS)
- MAPPING (GEODAETIC SURVAYS)
- LANDUSE (AGRICULT. AND DAMAGE ASSMTS)
- GEOHPYSICS (ATMOSPHERE, OCEANS, GLOBE)
- ASTRONOMY (HUBBLE, KEPLER)
- MILITARY

GOES 8 WEATHER SATELLITE

IRIDIUM SATELLITE

GPS SATELLITE CONFIGURATION



Animation at: http://en.wikipedia.org/wiki/File:ConstellationGPS.gif

GPS SATELLITE

SPOT SATELLITE

HERSCHEL TELESCOPE

KEPLER TELESCOPE

MANNED SATELLITES IN EARTH ORBIT

- V2 SUB-ORBITAL FLIGHTS
- MERCURY
- GEMINI
- SKYLAB
- APOLLO
- SPACE SHUTTLE
- INTERN. SPACE STATION
- VOSKHOD
- SOYUZ
- MIR
- SHENZHOU

SKYLAB SATELLITE

INTERNATIONAL SPACE STATION

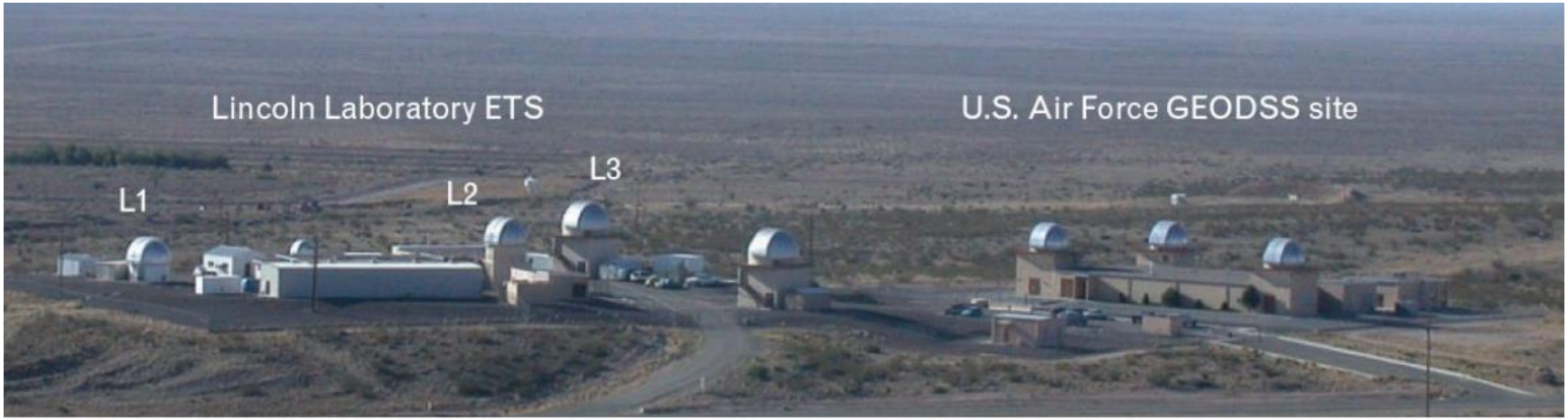
SPACE PROBES

* SPACE PROBES IN “PERMANENT” ORBITS
  AT ALL PLANETS BUT NEPTUNE.
* LANDERS ON MOON, VENUS, MARS,
  ONE ASTEROID AND ONE COMET
* 2 VOYAGERS HAVE LEFT THE SOLAR SYSTEM

	DISTANCE	VELOCITY	LIGHT ROUND TRIP
VOYAGER 1	11 BIL.MILES	38,000 M/H	35 HOURS
VOYAGER 2	10 BIL.MILES	34,000 M/H	29 HOURS

DEEP SPACE SURVAILLANCE RADAR

GEODDS OBSERVATION SITE



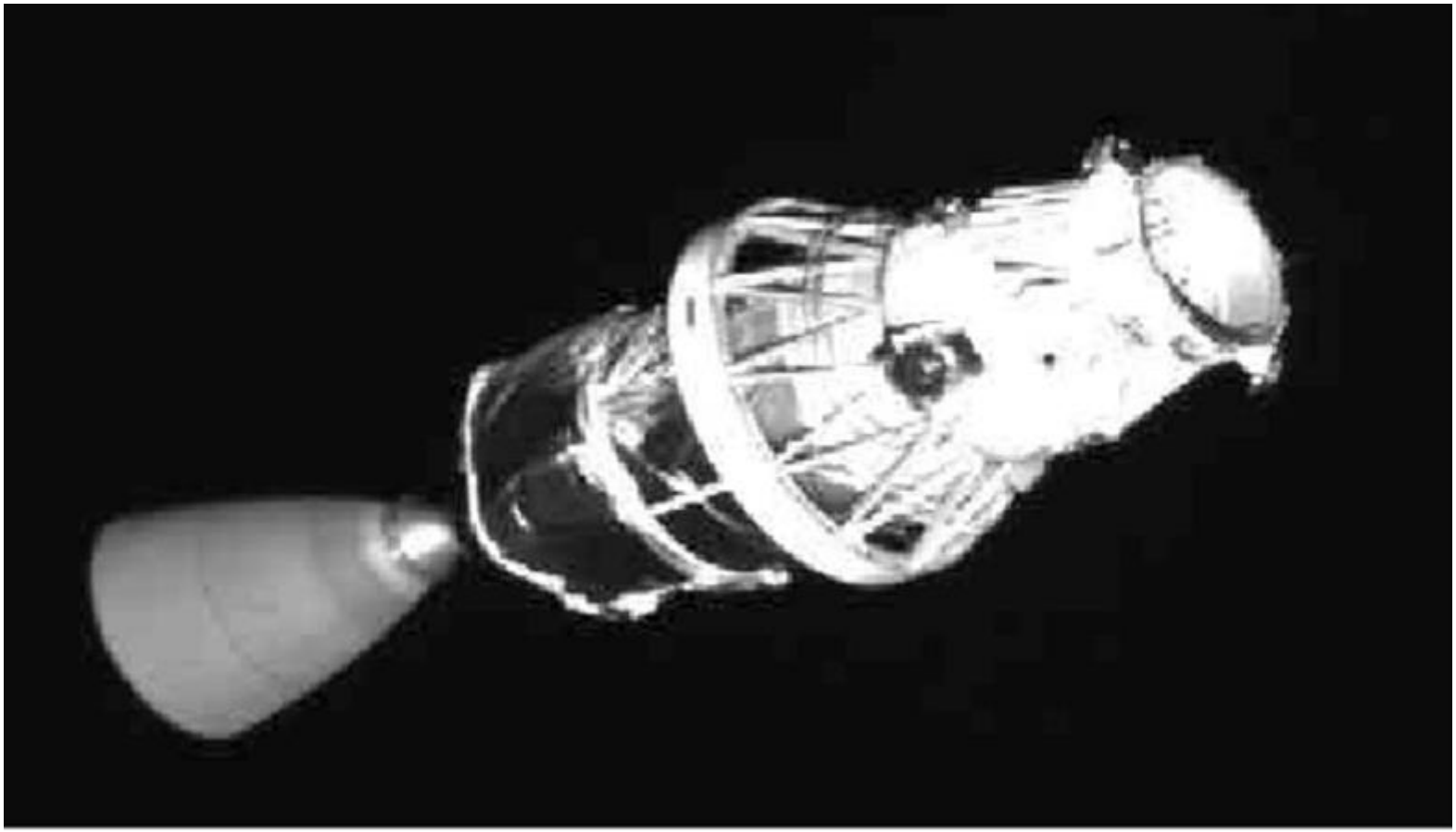
SPACCE JUNK

- Approximate 19,000 Pieces > 5cm (2 inch)
  (Large Pieces are Objects not having reached Orbit, Second Stages, Satellite Components)
- Approximate 300,000 Pieces > 1cm (1/2 inch)
- Most in lower Orbits below 200 km
- Average: One large Piece/year hits Earth
- Two radioactive (Nuclear powered) Satellites, Kosmos 954 & 1402 fell in the Canadian Arctic

Actual disposal now required
(Very High Orbit, very low Orbit Burn-up)

Satellites Intentionally destroyed by
US, Russia and China

ROCKET BODY



SPACE X DRAGON

SUMMARY QUESTIONS