

NARO (KSLV-1)

The First Korean Space Launch Vehicle



2013. 2

Launcher Program History in Korea

Soundin
g
Rocket/
Launch
Vehicle



KSR-1('93)



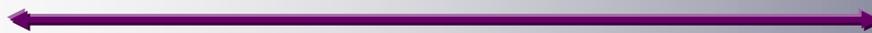
KSR-2('97)



KSR-3('02)



KSLV-1('09/'10/'13)



Ground
Infra.



Launcher integration
fac. ('01)



Simulation test fac.('04)



Launcher
integration fac.
Extension ('08)



Naro Space Center('09)



Burning test fac.('98)



Jeju Tracking
Center('09)





Sounding Rocket Programs

KSR-1



- June 1993
- One Stage Solid Motor
- Alt. 49.4Km
- Weight 1,268 Kg

KSR-2



- July 1997
- Two Stage Solid Motor
- Alt. 137.2Km
- Weight 2,048 Kg

KSR-3



- November 2002
- Liquid Engine
- Alt. 42.7Km
- Weight 6,000 Kg



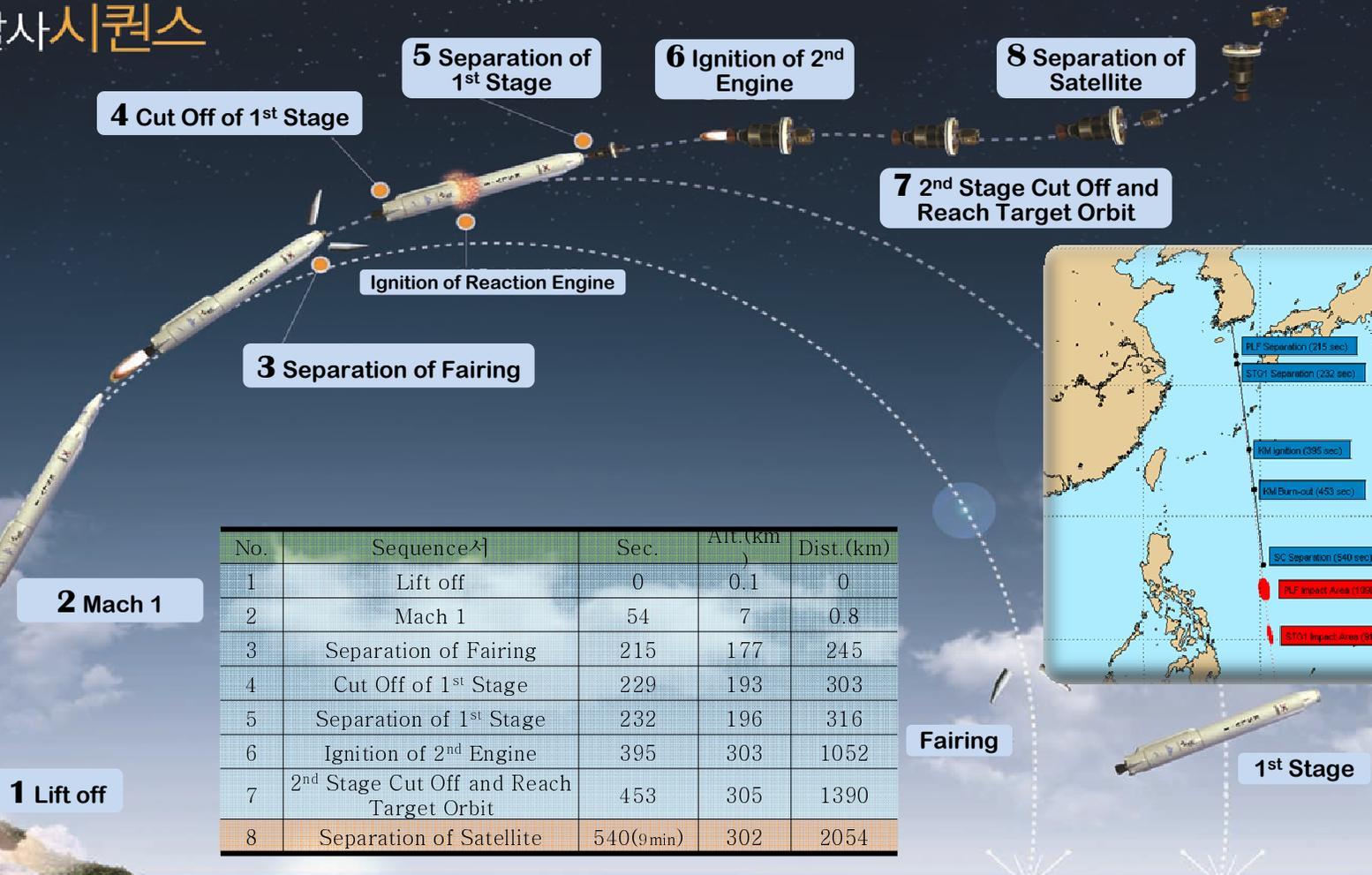
❖ NARO (Korea Satellite Launch Vehicle)

- Development of a Space Launch Vehicle to launch 100Kg LEO satellite (Fuel : Kerosene/LOX)
- International Cooperation with Russia
 - 1st Stage (Liquid): Khurunichev (Russia)
 - 2nd Stage (Solid): KARI (Korea)
- Specification
 - Total Mass : 140 ton (Propellant Mass: 130ton)
 - Thrust: 170 ton
 - Length: 33.5m
 - Diameter: 2.9m
- Launch
 - 1st : August 25, 2009 (Failure)
 - 2nd : June 10, 2010 (Failure)
 - Final : Jan. 30, 2013 (Success)



Launch Sequence & Flight Path

KSLV-I 발사시퀀스



No.	Sequence	Sec.	Alt.(km)	Dist.(km)
1	Lift off	0	0.1	0
2	Mach 1	54	7	0.8
3	Separation of Fairing	215	177	245
4	Cut Off of 1 st Stage	229	193	303
5	Separation of 1 st Stage	232	196	316
6	Ignition of 2 nd Engine	395	303	1052
7	2 nd Stage Cut Off and Reach Target Orbit	453	305	1390
8	Separation of Satellite	540(9min)	302	2054

NARO Space Center



Total Area : 5,065,234 m²
Facility Area : 367,342 m²







Science & Technology Satellite-2C (STSAT-2C)

■ Mission Objectives

- KSLV-I Launch Vehicle Performance Verification (Orbit Injection Capability)
- Space Science Measurements in the 300km × 1,500km Elliptical Orbit
- Verification of Domestic Space Technology Systems in the Space Environment

■ Program Management

- System Integrator : KAIST
- Participants : KAIST, Korea Aerospace University, I3System

■ Specification

- Orbit : 300km × 1,500km Elliptical Orbit
- Mass : 100kg
- Dimension : 763 × 1,023 × 1,167(mm)
- Attitude Control : 3-Axis Stabilized
- Mission Life : 1year

■ Payload

[Orbit Determination Systems]

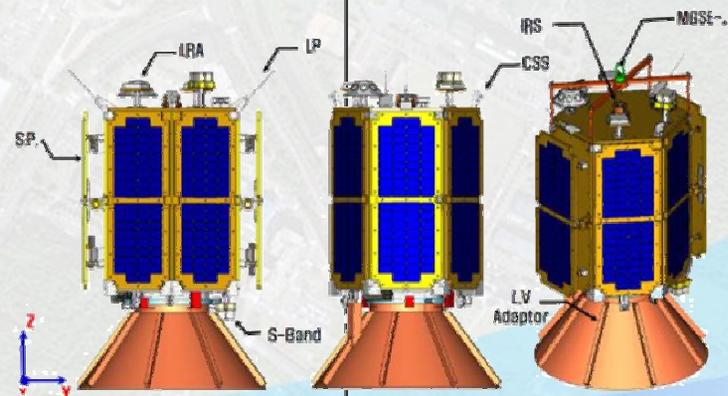
- Laser Retro-reflector Array (LRA) / S-band Transmitter

[Space Science Instruments]

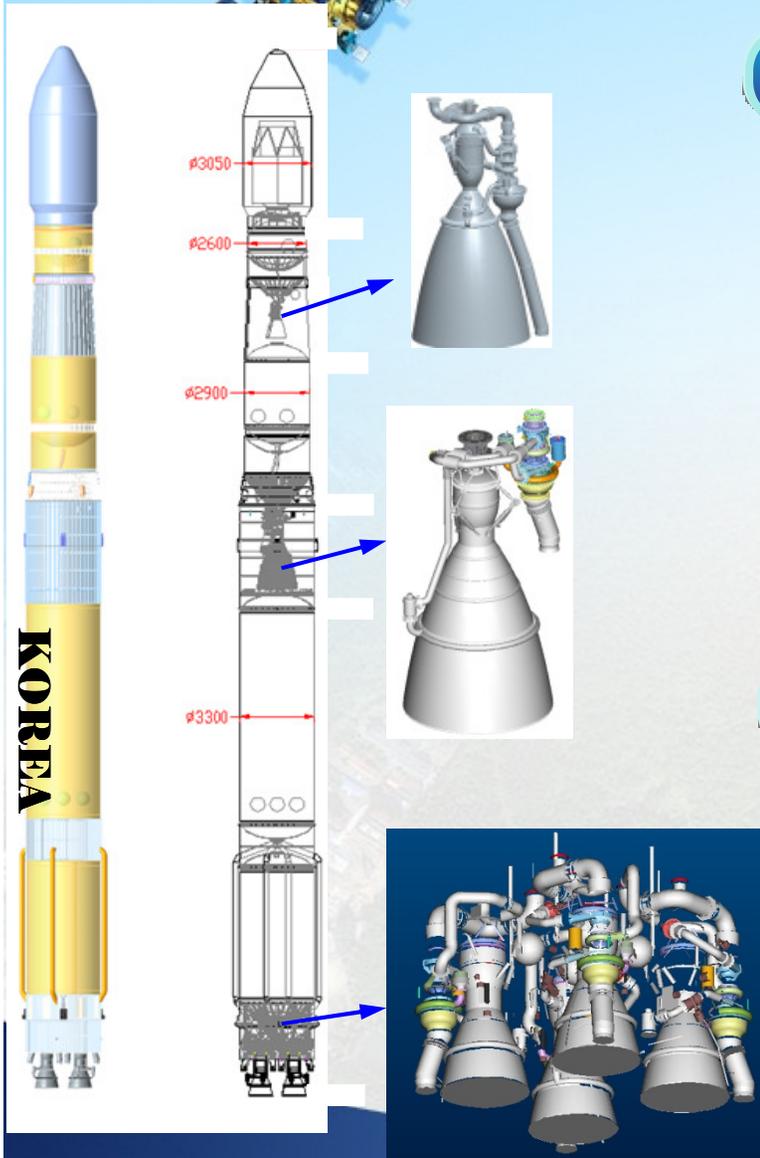
- Langmuir Probe / Space Radiation Effects Monitor

[Space Technology Verification]

- Femto-second Laser Oscillator (FSO) / IR Sensors (IRS)
/ Reaction Wheel Assembly (RWA)



Overview of KSLV-II Program



Overview

- Objective : Development of a Space Launch Vehicle to launch a 1.5 ton LEO satellite
- Dev. Period : 2010 ~ 2021
- Spec.
 - 3 stage Launch vehicle
 - Length : approx. 46 m
 - Orbit : 600 ~ 800km SSO (Sun-Synchronous Orbit)

Work Scope

- Launch Vehicle system, Liquid Engine design, manufacture & test
- Development of related facilities, equipment
- Propulsion system
 - 1st stage : 4 Liquid Engine(75 tonf) Clustering
 - 2nd stage : 1 Liquid Engine(75 tonf)
 - 3rd stage : 1 Liquid Engine (7 tonf)



Thank You!