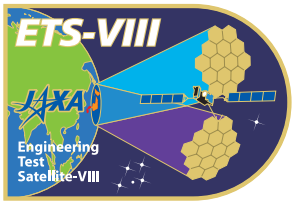
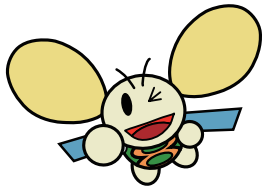
Launch of H-IIA Launch Vehicle No.4





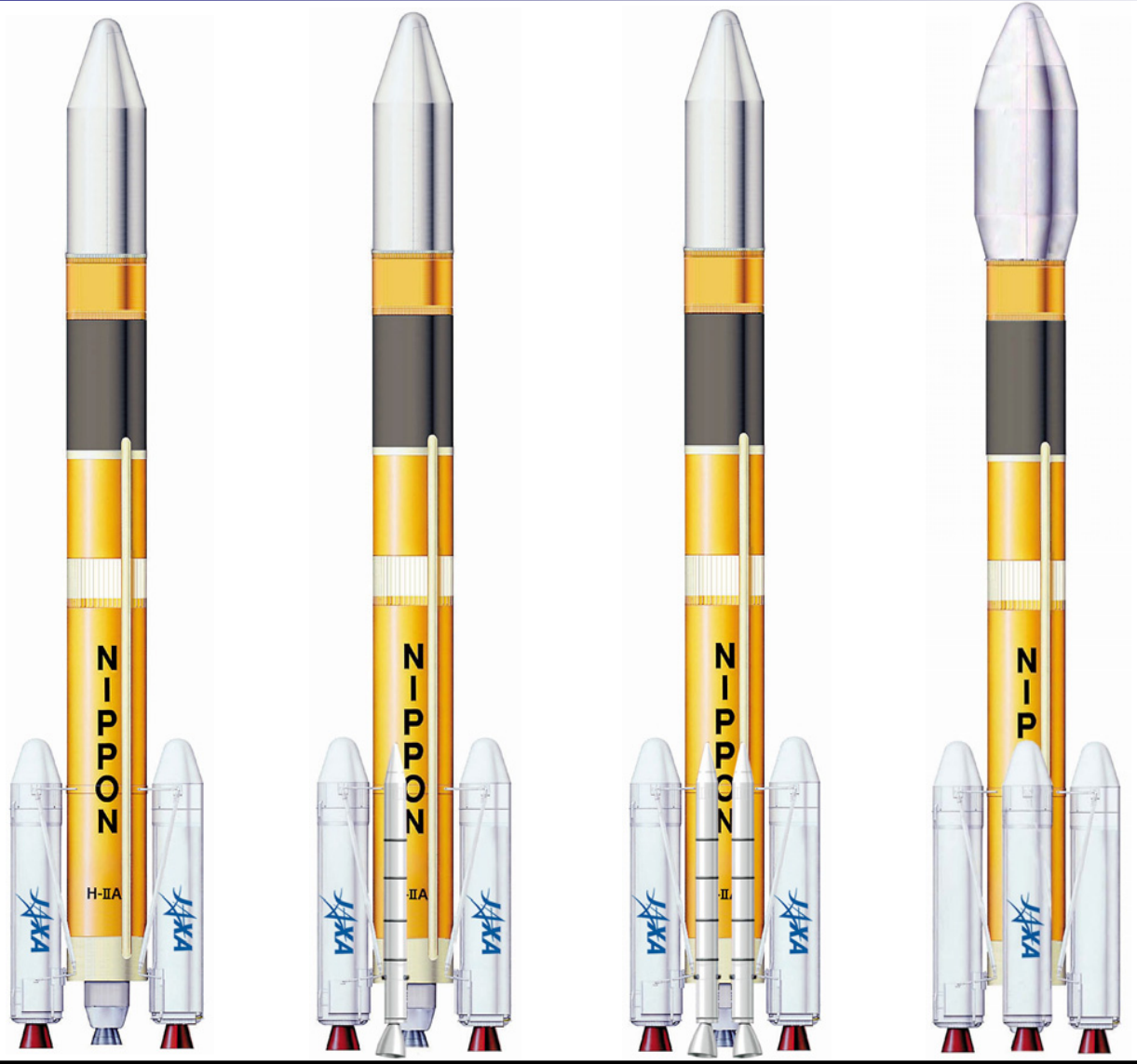
Overview of the H-IIA Launch Vehicle Flight No. 11 (H-IIA F11)

JAXA
Japan Aerospace
Exploration Agency

H-IIA Launch Vehicle

- Liquid oxygen and hydrogen are used as propellant for both the first and second stages.
- Based on technology acquired by the development of the H-II, high reliability is maintained while cost reduction was achieved and the H-IIA family was formed with variations by attaching solid rocket boosters and solid strap-on boosters onto the standard H-IIA.
- Various launch needs can be met by choosing an appropriate type of payload fairing and payload attach fitting (PAF) according to the number and size of (a) satellite(s).
- Since its maiden flight in Aug. 2001, JAXA has successfully launched five H-IIA launch vehicles. However, in Nov. 2003, the sixth flight failed. In February 2005, the H-IIA F7, the return-to-flight mission, was successfully launched, and three consecutive launches since then have also been successful.

H-IIA Launch Vehicle Family



<Launch History>

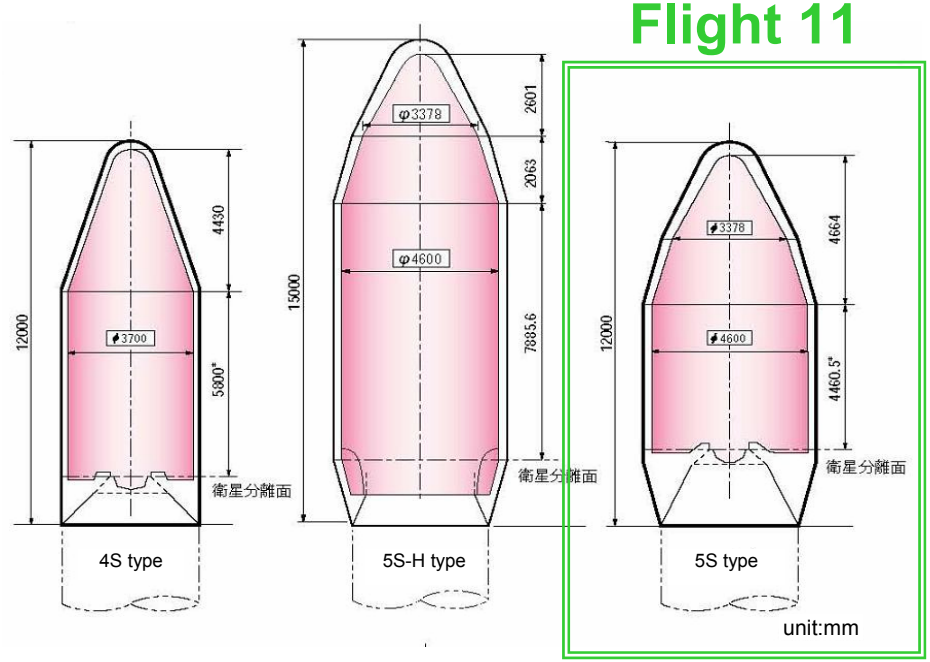
Flight 1	H2A202
Flight 2	H2A2024
Flight 3	H2A2024
Flight 4	H2A202
Flight 5	H2A2024
Flight 6	H2A2024
Flight 7	H2A2022
Flight 8	H2A2022
Flight 9	H2A2024
Flight10	H2A202
Flight11	H2A204

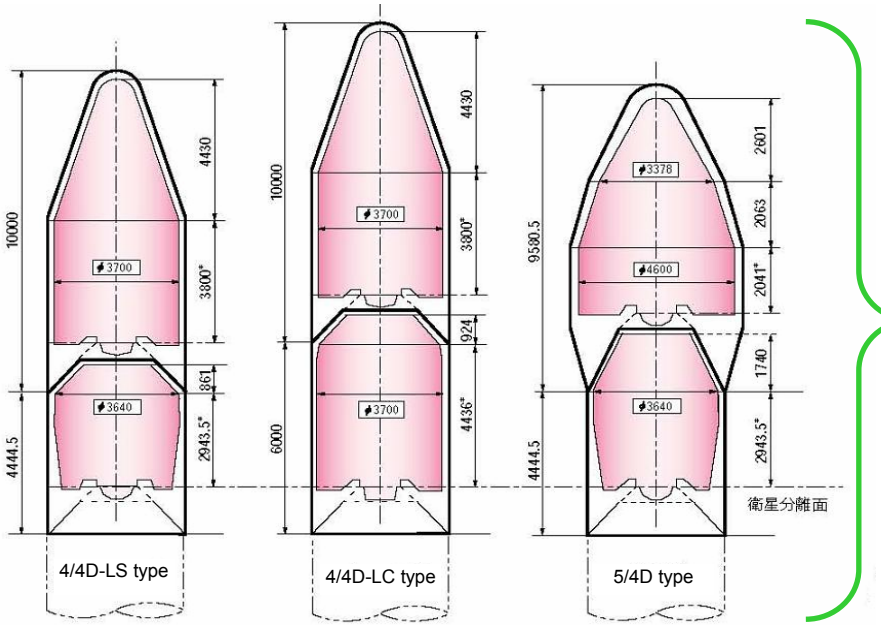
Type	H2A202	H2A2022	H2A2024	H2A204
Launch Capability (to GTO)	About 3.8 tons	About 4.2 tons	About 4.7 tons	About 5.8 tons
	4S Fairing			5S Fairing

- **First 204 type flight**
- **With Flight 11, all H-IIA variations will have been launched.**

Types of Payload Fairing and Payload Attach Fitting (PAF)

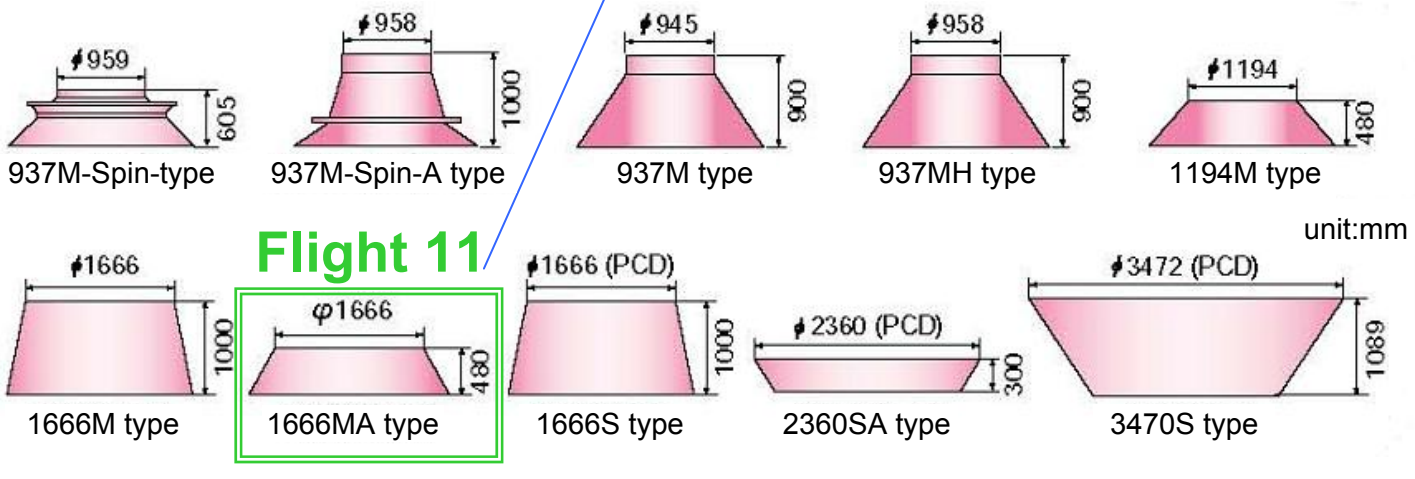
Flight 11

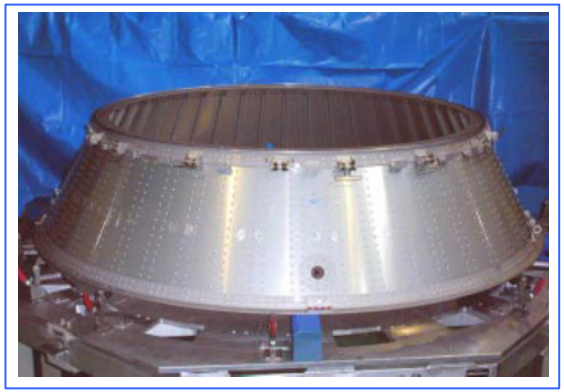




Payload Fairing

PAF





Objective of H-IIA F11 Launch

●Mission

To inject the Engineering Test Satellite VIII (ETS-VIII) into Geostationary Transfer Orbit

●Scheduled launch day and time

Day: December 16 (Saturday), 2006
Time: 15:32 thru 15:44

●Injection orbit

Altitude: Perigee approx. 250 km
Apogee approx. 36,156 km
Inclination: approx. 28.5 degrees
Argument of perigee: approx. 179 degrees
Geostationary Transfer Orbit (GTO)

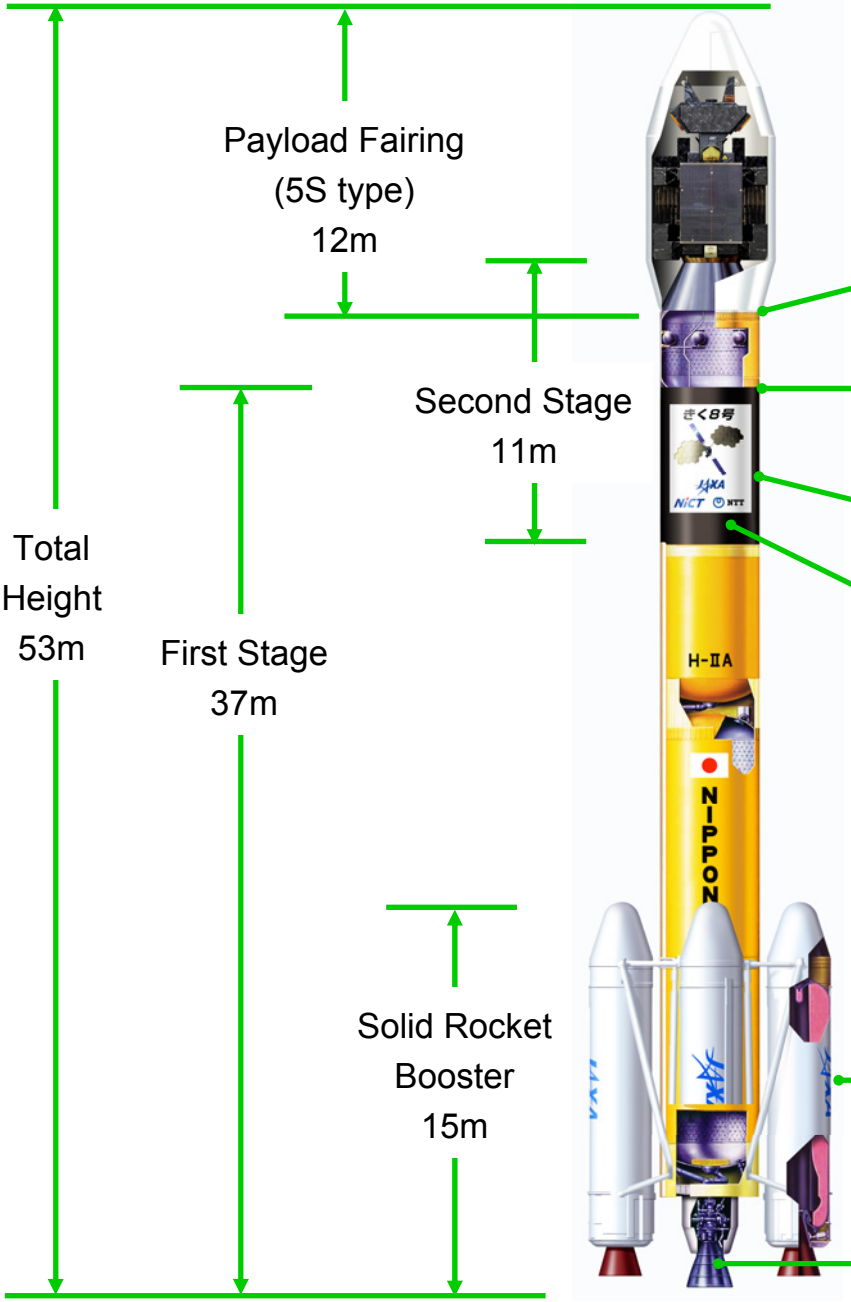
●Basic specification of launch vehicle

H2A 204 type
・5m diameter fairing

●Characters

First 204 type flight
With Flight 11, all H-IIA variations will have been launched.

H-IIA F11 Configuration



Payload fairing separation plane

First and second stage separation plane

Interstage section

Second stage engine (LE-5B)

Solid Rocket Booster
（Improved SRB-A）×4

First stage engine
（LE-7A, long nozzle type)

H-IIA F11 Launch Sequence

LIftoff

SRB-A first pair jettison
2 min 7 sec

Altitude 77km

SRB-A second pair jettison
2 min 11 sec

Altitude 80km

Payload fairing jettison
4 min 5 sec

Altitude 170km

First and second stages separation
6 min 48 sec

Altitude 256km

Second stage engine first ignition
6 min 54 sec

Altitude 259km

Second stage engine second ignition
23 min 1 sec

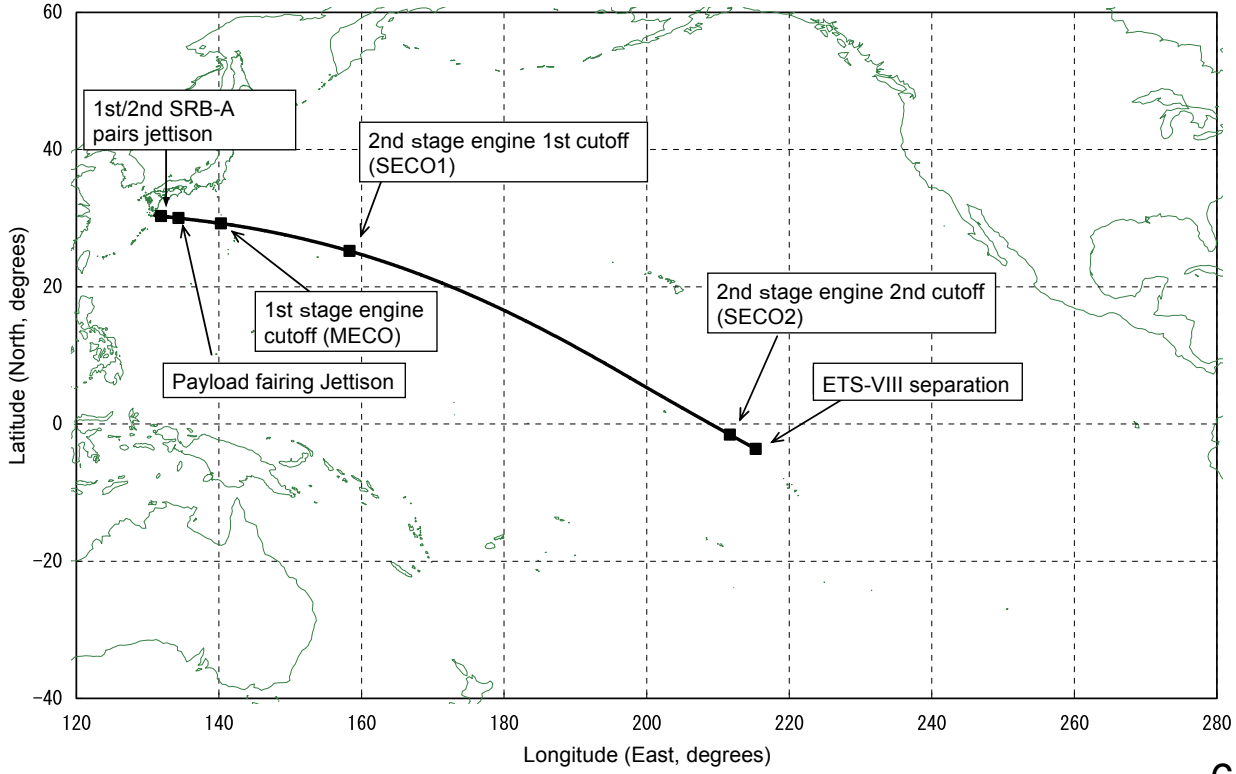
Altitude 264km

Second stage engine cutoff
26 min 46 sec

Altitude 258km

ETS-Ⅷ separation
27 min 36 sec

Altitude282km



H-IIA Launch Vehicle 204 Type

The largest launch vehicle in Japan to launch the world's largest class satellite

The H-IIA 204 type is in a configuration with two additional Solid Rocket Boosters (SRB-As) in addition to two conventional SRB-As (=total four) in order to increase launch capability up to approximately six tons to Geostationary Transfer Orbit (GTO).

H2A202

Major points that have been improve

- Additional fittings and increased strength for installing four SRB-As on the first stage core structure (liquid hydrogen tank and engine areas).
- Optimizing the thrust pattern of the SRB-A to equalize the flight dynamic pressure and acceleration to axis direction with the H2A202X type (being equal to the improved SRB-A) that are design conditions of the core vehicle.
- Renovating ground facilities to accommodate four SRB-As.

Most parts are inherited from the H2A202X type design

↓

Developed and operated as one configuration of the H-IIA standard type family

H2A204

Renovated Items for the H2A204 Type

<Legend>
Renovated items for 204 type
Measures for improved reliability that are taken separately or together.
No change

Payload Fairing
(Common configuration with H2A202X)

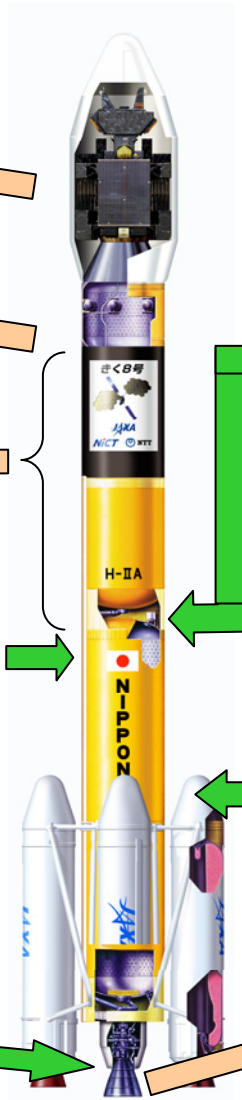
Second Stage Vehicle & Engine
(Common configuration with H2A202X)

First Stage Interstage,
Liquid Ox Tank, Center Part
(Common configuration with H2A202X)

First Stage Liquid Hydrogen Tank
・Additional fittings for installing SRB-As, Improved strength
・Improved strength (Thicker wall)
⇒ already verified by F9

First Stage Engine
・Improved strength (Thicker wall)
・Improved installation method for the propulsion system
⇒ already verified by F9

Larger Engine Cover
(Measures against increasing plume heat)



H2A204

Changes to the Electric System Design
- Guidance Control System (Onboard compute and software).
- Measurement System (Data collection equipment, umbilical controller).
- Power and Electric Supply Installation System (Power distributor).
※The number of channels was increased for the above systems, and no change was made to the basic function.

Optimization of SRB-A thrust pattern.

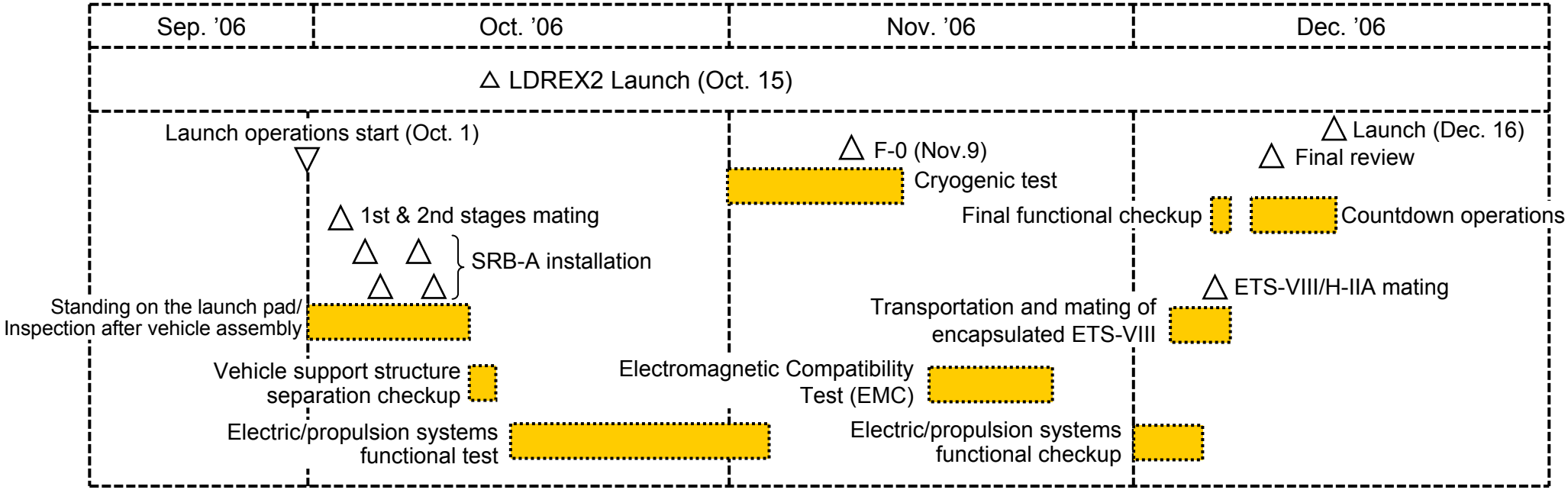
Reliability improvement measures such as against erosion are also taken together.

The improved SRB-A was developed based on the conventional SRB-A for the H2A204 type as a measure against the F6 failure. ⇒ already verified by the F7, 8, 9, and 10. Four improved SRB-As are installed on the F11

LE−7A Engine
(Long nozzle)
⇒ already verified by F8 and 9

Renovation of Ground Facilities
・Additional exhaust holes
・Made the vehicle support structure move away upward at the time of
・Renovated floors for operations in the Vehicle Assembly Building.

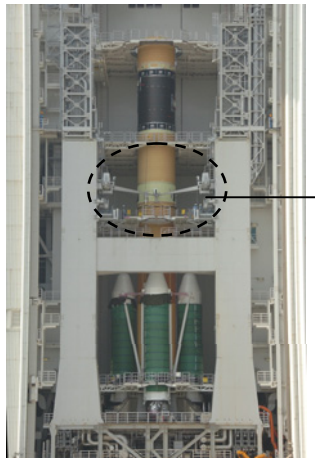
Launch Site Operations Schedule



First stage mating

Oct. 2, 2006

Second stage mating



SRB-A installation completed

Oct. 9, 2006

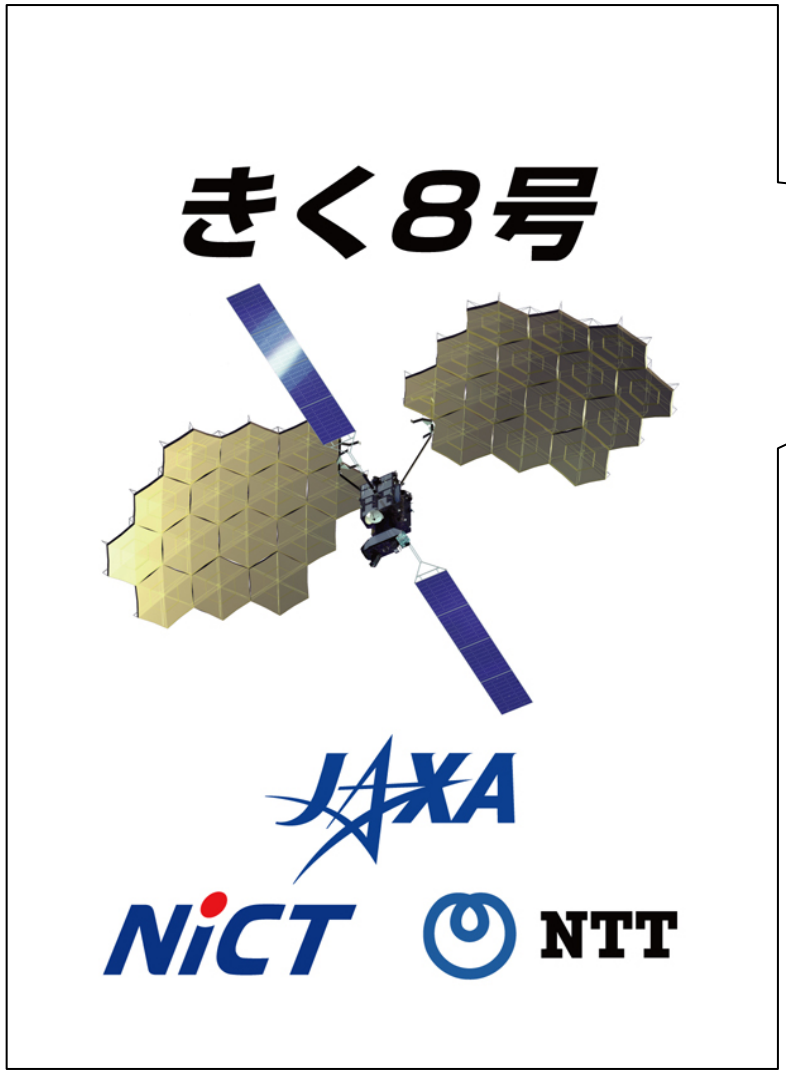
Vehicle support structure

(Move away upward at liftoff)

Cryogenic Test

Nov. 9, 2006

Decal on the H-IIA Launch Vehicle F11



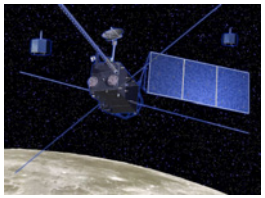
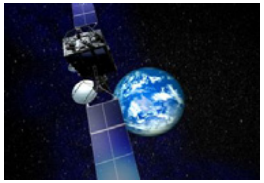
Since the KIKU NO. 8 has been cooperatively developed by three organizations, namely JAXA, the National Institute of Communications Technology (NICT) and Nippon Telegraph and Telephone Corporation (NTT), logos of three organizations are on the decal.

H-IIA Launch History

▲ Geostationary Transfer orbit ■ Sun-synchronous orbit

JFY 2001	JFY 2002	JFY 2003	JFY 2004	JFY 2005	JFY 2006
▲ H-IIA F1 (Test flight) successfully launched on Aug. 29	▲ H-IIA F3 DRTS/USERS successfully launched on Sep. 10			■ H-IIA F8 ALOS (Daichi) Successfully launched on Jan. 24	
	■ H-IIA F4 ADEOS-II (Midori 2) successfully launched on Dec. 14	■ H-IIA F6 IGS launch failure on Nov. 29			■ H-IIA F10 IGS successfully launched on Sep. 11
▲ H-IIA F2 (Test flight #2) MDS-1(Tsubusa) successfully launched on Feb. 4	■ H-IIA F5 IGS successfully launched on Mar. 28		▲ H-IIA F7 MTSAT-1R (Himawari 6) successfully launched on Feb. 26	▲ H-IIA F9 MTSAT-2 (Himawari 7) successfully launched on Feb. 18	

Scheduled Launches by H-IIA ※1

Scheduled launch year (in Japanese Fiscal Year, JFY)	Onboard Satellite	
JFY 2006	Information Gathering Satellite Radar No. 2 and Optical No. 3 Verification Satellite ※2	
JFY 2007	SELENE (Selonological & Engineering Explorer) 	Japan's first large lunar orbit explorer.
	WINDS (Wideband Internet working Engineering Test and Demonstration Satellite) 	For research and development necessary for establishing future satellite communications networks.
JFY 2008	GOSAT (Greenhouse Gases Observing Satellite) 	Cooperative development project by JAXA and the Ministry of Environment for observing the density distribution of CO2, which is a major cause of the greenhouse gas effect, from space.

※1 The above target launch schedule is based on the budget of JFY 2006, and it is subject to change due to future financial conditions, development status and other factors.
※2 Commissioned launch.

【Reference】The H-IIB Launch Vehicle

What is the H-IIB?

A new launch vehicle developed cooperatively by the public and private sectors based on H-IIA technology for possible future missions

Characteristics

★ **Inheriting the same specifications and structures as much as possible to maintain and improve reliability and to reduce development risks and costs.**

- Two LE-7A engines are installed (clustered).
- Four SRB-As are installed.
- The diameter of the first stage propellant tank is enlarged to 5.2 meters from the H-IIA's four meters, and the first stage is made one meter longer to load about 1.7 times of propellant.

★ **To contribute to invigorate the space industry by accommodating a broader range of launch requests with the H-IIA including the H-II Transfer Vehicle (HTV, a supplier to the International Space Station), and by reducing launch costs by launching two or more payloads together.**

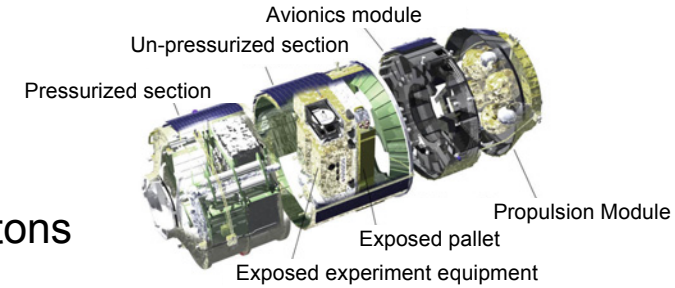
Comparison with H-IIA		H-IIA L/V	H-IIB L/V
		H2A202	H2B
Specifications	Height (m)	53	56
	Mass (ton)	289	551
	Number of LE-7A	1	2
	Number of SRB-A	2	4
Launch capacity	GTO (ton)	approx. 3.8	approx. 8
	To HTV orbit (ton)	—	approx. 16.5

【Reference】H-II Transfer Vehicle (HTV)

The HTV, a supplier to the International Space Station (ISS) is an Inter-orbit Transfer Vehicle to be launched by the H-IIB.

Major Specifications

・Length：about 10 m
・Max. Diameter：about 4.4 m
・Mass at launch：about 16.5 tons
・Onboard cargo capacity: about 6 tons



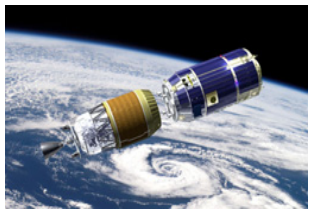
Role

☆Transport various equipment as well as goods necessary to live on the ISS.
☆Take used experiment equipment and clothes back to the atmosphere and discard them there.

Characteristics

☆Japan's first supplier that docks with the on-orbit ISS (Rendezvous vehicle)
☆To be launched by the H-IIB, injected into the appropriate orbit and fly to the ISS orbit (inter-orbit flight), and dock with the ISS by using the ISS robotic arm
☆ISS crews will enter the pressurized area of the HTV while it is docked there to deliver and remove goods. Safety requirements for manned space vehicles are therefore applied to the area.

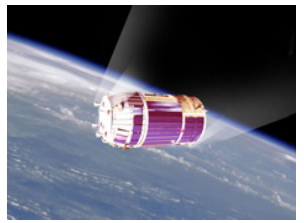
Launch by H-IIB



Separation form H-IIB

Dock with ISS

Departure from ISS



Reentry to the atmosphere

HTV Operation Flow

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TEL: +81-3-6266-6400

JAXA Website	http://www.jaxa.jp
Office of Space Flight and Operation, Space Transportation Program Office Website	http://rocket.sfo.jaxa.jp/
KIKU No. 8 and H-IIA F11 Special Site	http://www.jaxa.jp/countdown/f11/index_j.html
Mail Service	http://www.jaxa.jp/pr/mail/