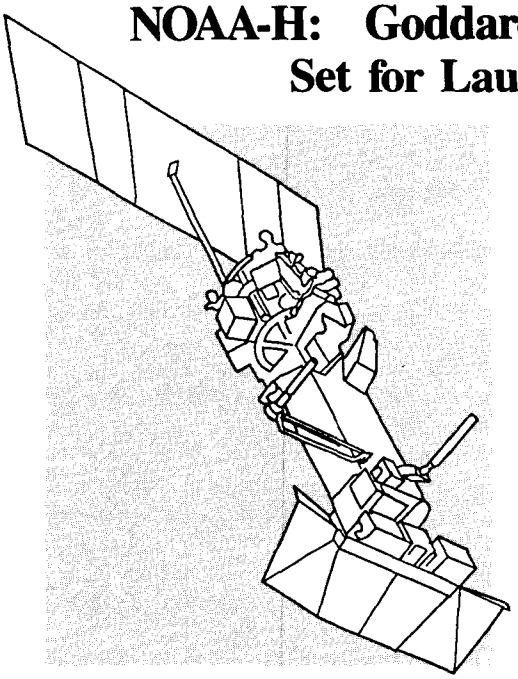
NASA
National Aeronautics and Space Administration
Goddard Space Flight Center

Special Edition
Goddard News

Greenbelt, Maryland and Wallops Island, Virginia
Fall 1988

Goddard Projects Highlight NASA's Fall '88 Launch Schedule

NOAA-H: Goddard–Managed Satellite Set for Launch



By Carter Dove

The Goddard-managed NOAA-H, a NASA-NOAA meteorological weather satellite, is set for launch aboard a U.S. Air Force Atlas E expendable launch vehicle from Vandenberg Air Force Base, CA, no earlier than September 24, 1988.

The satellite—to be designated NOAA-11 when on orbit—will join the now-orbiting NOAA-9 and NOAA-10 spacecraft in collecting meteorological and ocean data for transmission directly to users around the world.

It eventually will replace the NOAA-9 spacecraft, now nearing the end of its useful life.

In addition to assisting in global and local weather forecasting, data from the NOAA series of satellites are used for hurricane tracking and warning; global sea ice monitoring; atmospheric studies, such as the global effort to solve the puzzle of ozone depletion; and for agricultural, commercial fishing, forestry, maritime and other industrial uses.

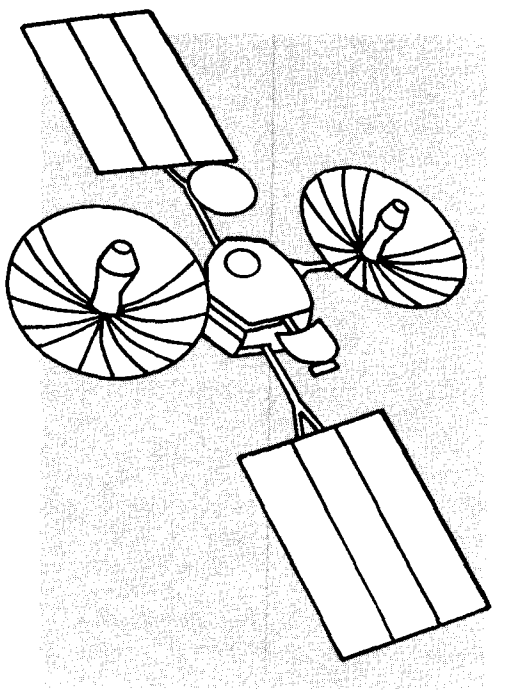
The launch of NOAA-H—managed by Goddard, for the National Oceanic and Atmospheric Administration (NOAA)—will be from Vandenberg's Space Launch Complex 3 (SLC 3). The launch vehicle, the Atlas E, is a one-time Air Force ballistic missile, refurbished and modified to boost spacecraft into a variety of low Earth orbits.

A team of Goddard engineers and technicians will monitor the health and safety of the spacecraft through its activation and evaluation for approximately 30 days. At that time, the satellite will be turned over to NOAA for operation.

NOAA-11—from its 450-mile (869-km) Sun-synchronous, near-polar orbit—will circle the Earth approximately every 102 minutes. As the Earth turns below, the satellite will observe a different portion of

Continued on Page 7

STS-26 Carries TDRS- C as Primary Payload



The Space Shuttle will return to flight when the Orbiter Discovery lifts off on a four-day mission which has as its primary objective the deployment of the Goddard-managed Tracking and Data Relay Satellite (TDRS)-C.

TDRS-C is the third in a series of communications spacecraft planned for the Tracking and Data Relay Satellite System (TDRSS) that provide high-capacity communications and data links between Earth and the Shuttle, as well as other spacecraft and launch vehicles. TDRS-A, now in orbit and known as TDRS-1, was launched from the Space Shuttle Challenger on April 5, 1983. TDRS-B was destroyed when Challenger exploded in January 1986.

TDRS-C will be deployed on the first day of the shuttle mission approximately six hours, 14 minutes after launch on orbit five (over the Pacific south of Hawaii).

A third operational Tracking and Data Relay Satellite, TDRS-D, is manifested to be deployed from Discovery on STS-29. It will serve as an in-orbit spare.

The TDRS satellites are built by TRW, Redondo Beach, CA, owned by Space Communications Company (SPACECOM), and operated for NASA by CONTEL Corporation. Key Goddard personnel involved with the project are Robert Spearing, Director, Mission Operations and Data Systems; Dr. Dale Harris, TDRS Project Manager; and Charles Hunter, TDRS Deputy Project Manager.

An Inertial Upper Stage (IUS) will be used to place TDRS-C into geosynchronous orbit. The IUS is mated to the TDRS-C and the combination spacecraft and upper stage will be spring ejected from the orbiter cargo bay. The orbiter maneuvers to a safe distance following the ejection and the two-stage IUS is ignited about 55 minutes after deployment.

STS-26: Fast Facts

Crew: Frederick H. (Rick) Hauck, Commander; Richard O. Covey, Pilot; John M. (Mike) Lounge, Mission Specialist (MS-1); David C. Hilmers, Mission Specialist (MS-2); George D. (Pinky) Nelson, Mission Specialist (MS-3)
Orbiter: Discovery (OV-103)
Launch Site: Pad 39-B, Kennedy Space Center, FL
Launch Date/Time: No earlier than Sept. 25, 1988, 9:50 a.m. EDT
Launch Window: 3 hours
Orbital Inclination: 28.45 degrees
Altitude: 160 nautical miles
Mission Duration: 4 days, 1 hour
Landing Date/Time: No earlier than Sept. 29, 1988, 10:50 a.m.
Primary Landing Site: Edwards Air Force Base, CA
Weather Alternate: White Sands Space Harbor, NM
Trans-Atlantic Abort: Ben Guerir, Morocco
Abort-Once-Around: Edwards Air Force Base, CA
Secondary Payloads:
Automatic Directional Solidification Furnace (ADSF)
Physical Vapor Transport of Organic Solids (PVTOS)
Infrared Communications Flight Experiment (IRCFE)
Protein Crystal Growth Experiment (PCG)
Isoelectric Focusing Experiment (IEF)
Phase Partitioning Experiment (PPE)
Aggregation of Red Blood Cells (ARC)
Mesoscale Lightning Experiment (MLE)
Earth-Limb Radiance Experiment (ELRAD)
2 Shuttle Student Involvement Program (SSIP) Experiments

TDRS-C Deployed on Day 1 of Shuttle Mission

By Jim Elliott

The flight plan for STS-26 calls for deployment of the Tracking and Data Relay Satellite (TDRS)-C from Space Shuttle Discovery six hours and 14 minutes after launch at an altitude of 184 statute miles (114 kilometers) on orbit five.

Although there is no reason to believe the deployment will be delayed, contingency plans make provisions for six deployment opportunities during the mission.

The window for the first deployment opportunity opens at 6:12:39 Mission Elapsed Time (MET) and closes a little less than eight minutes later at 6:20:19. Ignition of the Inertial Upper Stage (IUS) first stage (a four-minute burn) is planned for seven hours, 13 minutes MET (Discovery will be on orbit six), if deployment takes place anytime during the eight-minute deployment window.

The STS-26 crew begin preparations for the deployment shortly after liftoff. After the payload bay doors are opened about one hour and 20 minutes MET, the crew will check the IUS power and make communicatons checks with the TDRS.

At 4:30 MET, the crew will elevate the tilt table to 29 degrees. The tilt table is part of the airborne support equipment, called a cradle. The IUS/TDRS undergo a one hour, 31 minute checkout at the 20 degree elevation.

The IUS/TDRS payload has to be elevated for thermal purposes. Power amplifiers in the TDRS transmitters must be turned on before deployment; however, they build up heat in the nesting position in the payload bay. By elevating the payload and exposing it to a cooler environment, the equipment can be turned on without a heat buildup.

At 5:35 MET, the crew will maneuver the Shuttle to an attitude that will allow deployment of the payload and, at 5:45 MET, it will start the final deployment countdown.

At 6:00 MET, the crew will start the tilt table on its 3.5-minute elevation to 58 degrees, an elevation that permits the payload to clear the Shuttle crew cabin when it is deployed.

The IUS/TDRS and the cradle, weighing approximately 45,000 pounds, are propelled from the payload bay by an ejection device that has six 1 1/2-inch in diameter, six-inch long steel springs that exert 147 pounds of force each. A pyrotechnic charge, known as Super Zip, releases the tension on each spring, thrusting the payload forward at a separation velocity of .35 feet per second. The IUS and TDRS leave the orbiter, and the cradle is retracted into the payload bay.

After appendage deployment, the spacecraft will begin an eastward drift at three degrees a day and drift to 150° West Longitude for testing. Avionic and electronic testing will be completed approximately 54 days after launch.

At that time, checkout of the payload will begin, and those tests will continue for 14 days.

Following payload testing, 17 days of tests will be made with user spacecraft.

TDRS-C will remain at 150° West through the Space Shuttle STS-27 mission, scheduled approximately 54 days after STS-26. STS-27 will be supported by TDRS-1 (East) and TDRS-C (TDRS-3 in orbit).

Immediately following STS-27, TDRS-3 will start drifting toward 171° West Longitude at three degrees a day. The position change is expected to take 11 days. Once at 171°, antenna calibrations will be performed.

At the completion of calibration testing, about 131 days after launch, TDRS-3 will be ready for normal user support.

STS-26

Discovery Leads Return to Flight

Shuttle Orbiter Discovery (OV 103) joined NASA's fleet of reusable winged spaceships in November 1983 when it was delivered to Kennedy Space Center for flight processing.

On the morning of August 30, 1984, Discovery roared away from Complex 39's Pad A on its first space mission. On flight 41-D, the 12th Space Transportation System mission, Discovery earned its operational wings by carrying three communications satellites aloft for deployment by its first astronaut crew.

Discovery has flown six space missions to date, including the first dedicated Department of Defense mission and the first flight to retrieve disabled satellites and return them to earth.

In 1988, Discovery will lead the Space Shuttle's return to flight when it lifts off from Pad 39-B at the Kennedy Space Center.

Discovery is named for two famous sailing ships, one which was sailed in 1610-11 by Henry Hudson to search for a northwest passage between the Atlantic and Pacific Oceans and another sailed by Captain James Cook during a voyage that discovered the Hawaiian Islands.

The spaceship Discovery was built under the 1979 production contract with Rockwell International.

During the interruption in Space Shuttle flight activity following Mission 51-L, Discovery underwent an extensive modification program at Kennedy Space Center, FL.

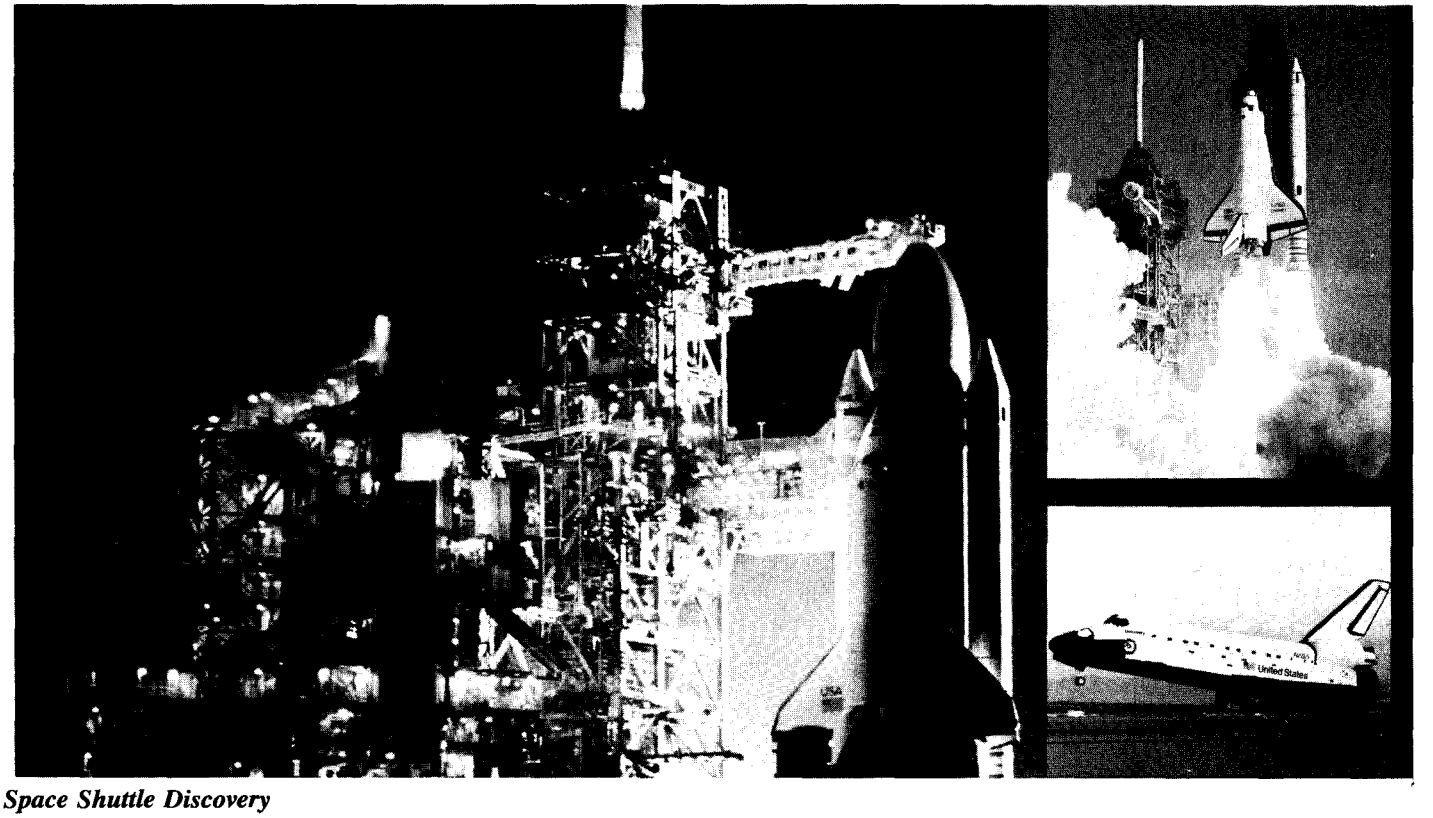
The modifications included various vehicle upgrades and hardware changes that will enhance performance and provide added safety margins. Many of the changes had been planned and authorized prior to 51-L while others resulted from special reviews that followed the Shuttle accident in January 1986.

The Delta winged spaceship looks a lot like an airplane and is in fact about the size of a DC 9. It is launched into space like a conventional rocket, bolted to an external propellant tank and two solid rocket boosters.

Kennedy Space Center engineers and technicians prepare the orbiter for flight by servicing its systems and loading cargo into its bus-sized payload bay. They attach it to the tank and boosters on a mobile launch platform and the entire vehicle is transported out to the launch pad.

After liftoff, the boosters burn for a little more than two minutes. They are jettisoned, and parachutes slow their descent to the Atlantic Ocean, where recovery ships are waiting to retrieve the spent casings and return them to port. The orbiter's main engines continue to burn until about 8 1/2 minutes into the flight. After the engines shut down, the external tank is released to break up upon reentry into Earth's atmosphere.

The orbiter then carries out its mission in space and returns to Earth like a glider, landing back at the Kennedy Space Center or alternate landing sites, as required by mission and program objectives.



Space Shuttle Discovery

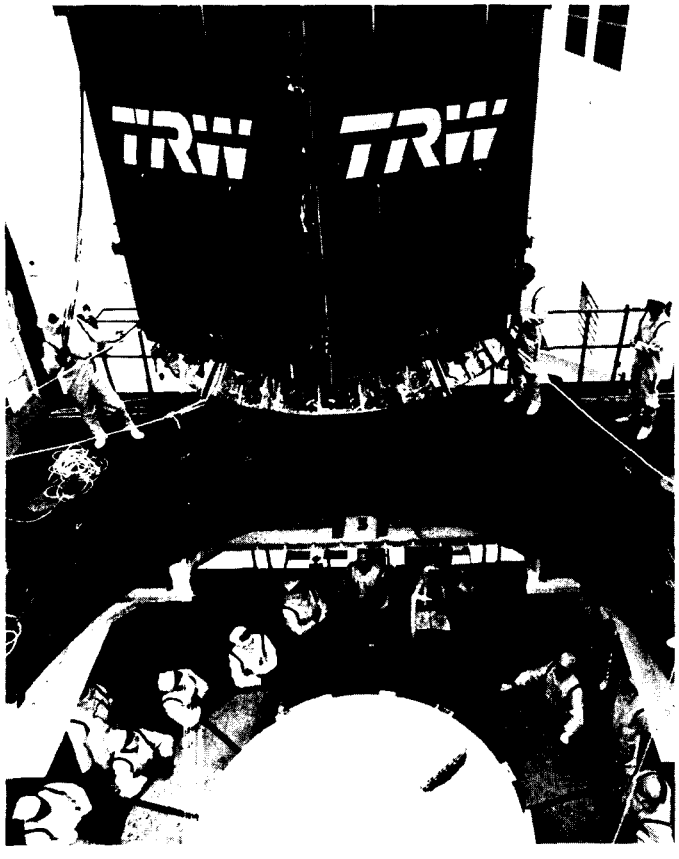
The Space Shuttle orbiter *Discovery* is shown here being readied for launch at Pad 39-A, Kennedy Space Center, FL. The inset image on top shows *Discovery* as it lifts off from Launch Pad 39-A, and the other inset image shows the orbiter as it approaches the landing strip at Edwards Air Force Base, CA.

TDRS-C Meets Its Mate

The Tracking and Data Relay Satellite (TDRS)-C arrived by C5-A military aircraft at Cape Canaveral Air Force Station, FL, May 16. The spacecraft was taken to the Vertical Processing Facility, where it was uncrated and assembly and checkout were finished. TDRS-C was mated to its Inertial Upper Stage on May 31.

The TDRS-IUS test team, assisted by STS-26 mission specialists Dave Hilmers and Mike Lounge, conducted numerous tests of the two components. The tests, using the Cargo Integrated Test Equipment, called CITE, verified that the satellite and the upper stage were mated properly and would function as a unit after their deployment from Discovery.

On July 8, the access platforms in the test cell were removed and the spacecraft was placed in its payload canister and transported to launch pad 39-B on August 15.



***Mating TDRS-C*— Technicians at the Kennedy Space Center, FL, watch closely as the mating continues of the Tracking and Data Relay Satellite (TDRS)-C and the Inertial Upper Stage (IUS) in the Vertical Processinng Facility. The IUS will boost the TDRS-C spacecraft to geosynchronous altitude from low Earth orbit. TDRS-C is the primary payload to be flown aboard shuttle mission STS-26.**

PAYLOAD PROFILE:

Tracking and Data Relay Satellite-C

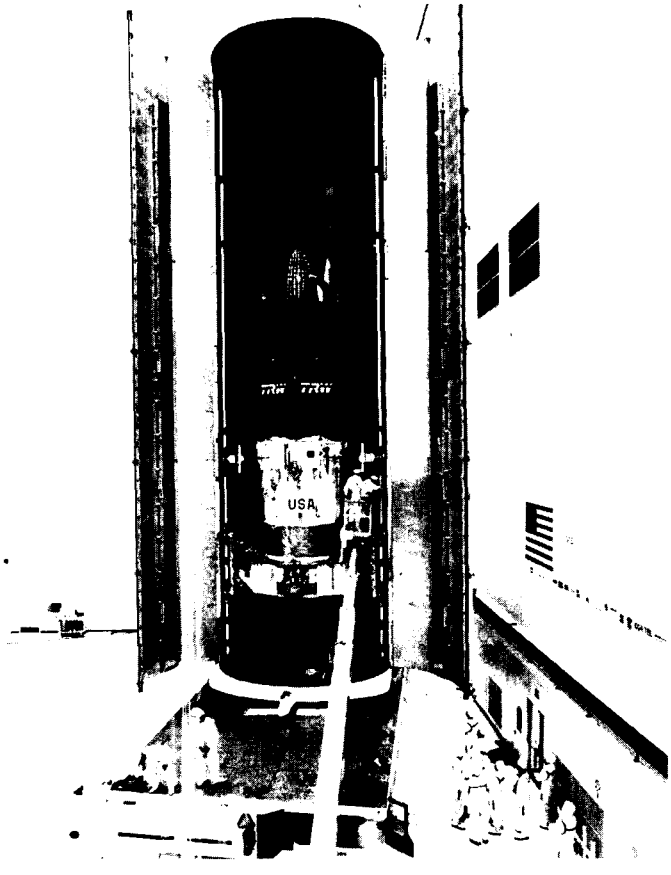
- Height in orbit: 57.2 feet (17.43 meters)
- Diameter in orbit: 42.6 feet (12.98 meters)
- Weight in orbit: 4,637 pounds (2,103 kilograms)
- Design life: 10 years
- Manufacturer: TRW

Inertial Upper Stage (IUS-7):

- Length: 16.7 feet (5.09 meters)
- Diameter: 9.5 feet (2.89 meters)
- Weight: 32,500 pounds (14,742 kilograms)
- Thrust: first stage 41,548 pounds (18,846 kilograms); second stage 18,104 pounds (8,212 kilograms)
- Manufacturer: Boeing

Purpose:

Tracking and communications for the Space Shuttle and other spacecraft in low-Earth orbit. Relays air-to-ground high speed data, telemetry, voice and television. TDRS-C will become TDRS-West in orbit and will be stationed over the Pacific Ocean.



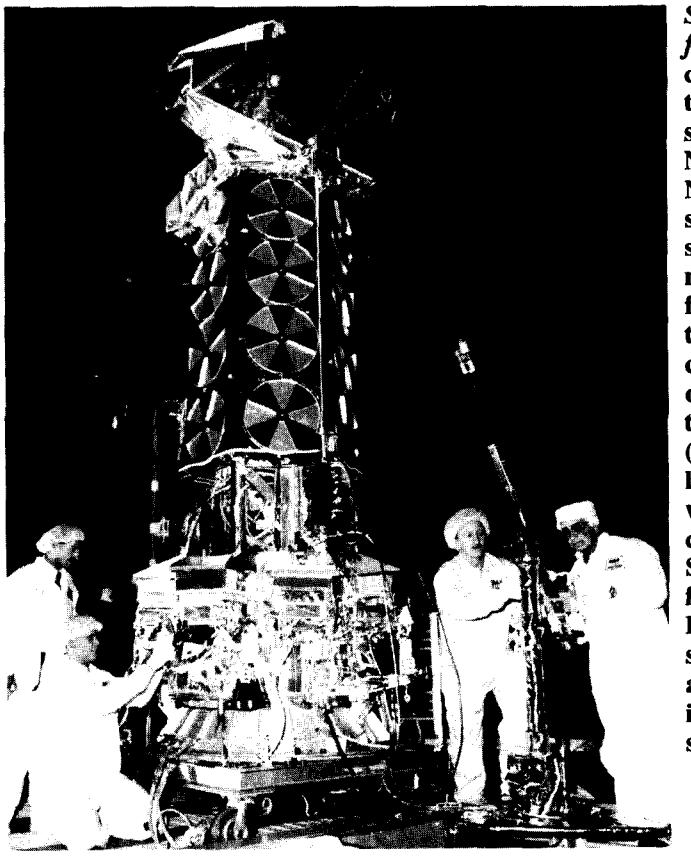
***Payload Transporter*— In the Vertical Processing Facility, Kennedy Space Center, FL, preparations were underway to integrate the Tracking and Data Relay Satellite (TDRS)-C and the Inertial Upper Stage (IUS) into the payload transporter canister. TDRS-C was moved to pad 39-B on August 19 where it will be installed in the Space Shuttle Discovery.**

NOAA-H Passes Rigorous Space Tests

The National Oceanic and Atmospheric Administration (NOAA)-H environmental satellite was shipped to Vandenburg Air Force Base, CA, in early August and is being prepared for launch aboard an Atlas rocket no earlier than September 24.

NOAA-H was manufactured and tested at the General Electric Astro-Space Division (Astro), East Windsor, NJ. During final integration and testing, space-components were integrated, powered and tested in sequence. The spacecraft was tested under simulated launch and flight conditions, using a variety of vibration, thermal, and thermal-vacuum equipment including 30 days in a 58 foot (17.6 meter) vacuum chamber.

NOAA-H is an Advanced Tiros-N satellite. The TIROS system started as a research and development program in 1958, marked by the successful mission of the world's first meteorological satellite, TIROS (Television and Infra-Red Observation Satellite), in April 1960.



***Space in a Chamber for NOAA-H*—Technicians at General Electric Astro-Space Division, East Windsor, NJ, prepare the NOAA-H weather satellite for space-simulating environmental tests in a 35-foot (10.6-meter)-high thermal-vacuum chamber. The tests are designed to assure that the 3,775-pound (1,710-kilogram) satellite will be able to withstand the harsh conditions of space. Scheduled for launch from Vandenberg Air Force Base, CA, the satellite will be known as NOAA-11 once it is in orbit and operating successfully.**

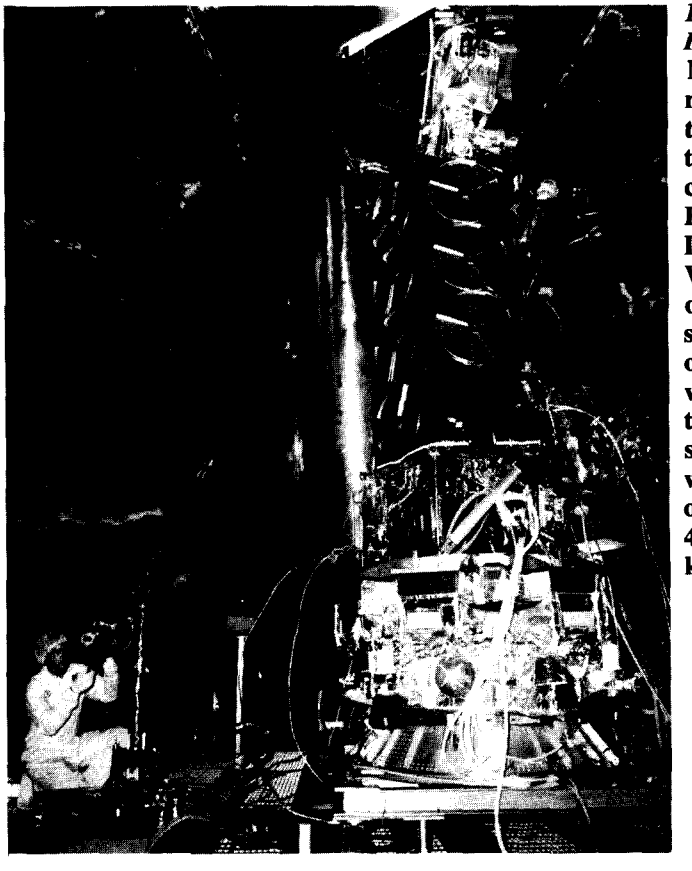
PAYLOAD PROFILE:

National Oceanic and Atmospheric Administration (NOAA)-H

- Height: Main body—13.7 feet (4.18 meters) long, 6.2 feet (1.88 meters) in diameter
  Solar Array—7.8 by 16.1 feet (2.37 by 4.91 meters), 125 feet (11.6 meters)
- Weight in orbit: 2,288 pounds (1,030 kilograms)
- Design Life: greater than 2 years
- Manufacturer: General Electric Astro-space Division

Purpose:

NOAA-H is a cooperative effort of NASA, NOAA, the United Kingdom, and France for providing day and night global environmental and associated data for operational purposes on a regular daily basis. Elements of the Search and Rescue system are provided by Canada and France.



***16-Foot (4.9-meter) High Satellite*—NOAA-H is surrounded by cables and test equipment in a thermal vacuum chamber at General Electric Astro-Space Division, East Windsor, NJ. A month of verification in the simulated conditions of space was part of a wide range of testing that helps assure the success of the satellite when it is in polar orbit at an altitude of 470 nautical miles (871 kilometers).**

Goddard Provides Worldwide Communications Network for STS-26

A worldwide network of ground stations, along with an orbiting communicatons satellite, will provide 24-hour support for the forthcoming flight of Space Shuttle Discovery (STS-26).

Officials at Goddard, where the Spaceflight Tracking and Data Network (STDN) and the NASA Communications Network (NASCOM) are located, said 14 NASA-controlled stations, plus a number of Department of Defense ground sites, are scheduled to support the four-day mission. In addition, communications will be provided by TDRS (Tracking and Data Relay Satellite)-1, which has been in orbit since April 1983 when it was launched from Challenger during the STS-6 mission.

More than 2,500 persons at locations from Australia to White Sands, NM, will keep an "eye" on the Shuttle and its crew, capturing radio frequency transmissions of telemetry and tracking their position with radar, according to Robert E. Spearing, Director of Mission Operations and Data Systems at Goddard. The satellite also will provide television transmissions.

In adddition to the 14 ground stations, there are six major computing interfaces located at the Network Control Center and at the Flight Dynamics Facility, both at Goddard; Western Space and Missile Center, Vandenberg Air Force Base, CA; Air Force Satellite Control Facility, Colorado Springs, CO; White Sands Missile Range, NM; and the Eastern Space and Missile Center, Cape Canaveral Air Force Station, FL.

The network has agreements with the governments of Australia, Spain, Senegal, Chile, the United Kingdom and Bermuda to provide NASA tracking station support to the Space Transportation System (STS) program.

The NASA-controlled stations include Ascension Island (Atlantic); Bermuda (Atlantic); Goldstone (California); Guam (Pacific); Hawaii (Kauai); Merritt Island (Florida); Santiago (Chile); Ponce de Leon (Florida); Madrid (Spain); Canberra (Australia); Dakar (Senegal, Africa); Wallops Flight Facility (Virginia); Yarragadee (Australia); and Dryden Research Center (California).

The Merritt Island station provides the appropriate data to the Launch Control Center at Kennedy Space Center and the Johnson Mission Control Center during prelaunch testing and the terminal countdown. During the first five minutes of launch and during the ascent phase of the mission, the Merritt Island and Ponce de Leon and Bermuda stations (S-band), and C-band facilities at Bermuda, Antigua, Cape Canaveral Air Force Station, Patrick Air Force Base, and Wallops Flight Facility provide tracking data, both high and low speed, to the Kennedy and Johnson control centers.

S-band systems carry radio frequency transmissions of command and tele-telemetry. C-band stations radar (skin) tracking for orbit determination. Ultra High Frequency Air/Ground (UHF A/G) stations provide astronaut voice communications with the ground.

During the orbital phase, all the S-band and some of the C-band stations provide tracking, telemetry, air-ground and command support to the mission control center at Johnson Space Center through Goddard.

During the entry and landing phase planned for Edwards Air Force Base, CA, the NASA/Goldstone and Dryden Flight Research Center, CA, sites and C-band stations at the Pacific Missile Test Center, Vandenberg AFB, CA, and Edwards AFB, CA, will provide highly-critical tracking, telemetry, command and air/ground support to the orbiter and send appropriate data to the Johnson and Kennedy control centers.

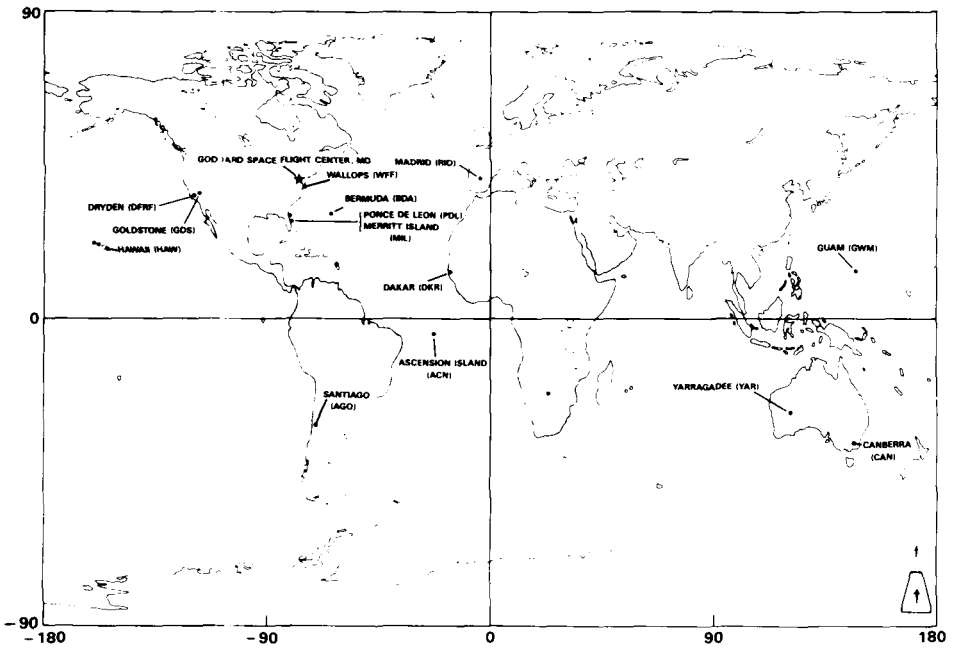
The Goddard Space Flight Center Network Director is Gary A. Morse.

The NASA-controlled stations and their equipment are:

Location	Equipment
Ascension Island (ACN)	S-band, UHF air-ground
Bermuda (BDA)	S-band, C-band, UHF A/G
Goldstone (GDS)	S-band, UHF A/G
Guam (GWM)	S-band, UHF A/G
Hawaii (HAW)	S-band, UHF A/G
Merritt Island (MIL)	S-band, UHF A/G
Santiago (AGO)	S-band
Ponce de Leon (PDL)	S-band
Madrid (RID)	S-band
Canberra (CAN)	S-band
Dakar (DKR)	S-band, UHF A/G
Wallops (WFF)	C-band
Yaragadee (YAR)	UHF A/G
Dryden (DFRF)	S-band, UHF A/G

Key: S-band . . . . . Command and Telemetry Link
C-band . . . . . Skin Tracking (Radar) for Orbit Determination
UHF A/G . . . . . Astronaut Voice Communications to the Ground

NASA-CONTROLLED TRACKING STATIONS



NOAA-H Launch——

Continued from Page 1

the Earth's surface on each orbit, and the entire Earth's surface and cloud cover once every 12 hours.

Among the seven scientific instruments on board the spacecraft will be one for an international search and rescue effort and another for mapping the Earth's ozone layer.

The complete instrumentation "package" of the NOAA-H is:

• **COSPAS/SARSAT**—This is an acronym for a cooperative, satellite-aided search and rescue project of the U.S., Canada, France, and the Soviet Union. Its instrumentation—already operational on NOAA-9, -10 and two Soviet satellites—relays distress signals transmitted from downed aircraft or vessels at sea to ground-sea-air recovery forces. Goddard manages the U.S. research effort on this program for NASA.

•**Solar Backscatter Ultraviolet Spectral Radiometer, Mod 2 (SIBUV/2)**—This is an improved instrument for mapping the Earth's ozone layer. Specifically, the SBUV/2's functions include measurement of solar irradiance and ozone concentration/distribution in the Earth's atmosphere. Provided by Ball Aerospace Division (BASD).

•**Advanced Very High Resolution Radiometer. (AVHRR)**—Provided by International Telephone and Telegraph (ITT), the AVHRR is a radiation instrument used to determine Earth's cloud cover and surface temperature.

•**TIROS Operational Vertical Sounder System (TOVS)**—Consists of three instruments: High Resolution Infrared Radiation Sounder, Modification 21 (HIRS/21) from ITT; the Stratospheric Sounding Unit (SSU) of the United Kingdom; and the Microwave Sounding Unit (MSU) of the NASA/Jet Propulsion Laboratory, Pasadena, CA.

By measuring radiant energy, the TOVS' three instruments will provide data to determine temperatures within the atmosphere, from the Earth's surface to its upper atmosphere.

•**ARGOS/Data Collection System (DCS)**—Provided by France, the DCS receives temperature, pressure and altitude data measured by approximately 2,000 platforms—buoys, free-floating balloons, and remote weather stations—located around the world and retransmits these data to France's ARGOS facility for processing, storage and distribution.

NOAA-11 is scheduled to replace NOAA-9 (launched December 12, 1984) as the "afternoon" satellite—orbiting the entire Earth during the early afternoon (local time). It will join NOAA-10 (launched September 17, 1986), the "morning" spacecraft, which passes over the entire Earth in the morning (local time).

NOAA-11 has evolved from TIROS-N, a research and development prototype spacecraft launched in 1978. In all, six spacecraft in this series have been placed in orbit; two of them, NOAA-9 and -10, still are operational.

Prime contractor for the spacecraft is the Astro-Space Division of the General Electric Co., Princeton, NJ.; the Convair Division of General Dynamics Corporation is the manufacturer of the Atlas-E expendable launch vehicle. Charles E. Thienel is METSAT projects manager at Goddard. Lawrence T. Draper will be the mission director at Vandenburg Air Foce Base, CA, for the NOAA-H launch.

Goddard employees can view the launch and landing of STS-26 in the Building 8 Auditorium. Watch *Dateline Goddard* for times.

NCC Keeps Eye on Missions

Controllers at Goddard's Network Control Center (NCC) work at consoles as they keep a watch on activities during missions such as STS-26 and NOAA-H. The new control center, located in Building 13, offers the latest in technology and was built to meet the needs of space missions in the 1990s.

The NCC manages the space portion of NASA's Ground and Space Network. The control center schedules and configures the Tracking and Data Relay Satellite System (TDRSS) and monitors the status data sent back for ongoing scheduled services.

Control center operators (see picture) schedule emergency services, isolate any problems in the system, and restore faulty user services. The control center has the ability to communicate with other ground tracking stations through the NASA communications (Nascom) Network, also located at Goddard.

NASA Issues Updated, Mixed-Fleet Manifest

NASA issued recently the newest update of its mixed-fleet manifest for Space Shuttle missions and expendable launch vehicles (ELV's) through Fiscal Year 1993.

Although Shuttle payload assignments are made during the formal integration process approximately 19 months prior to launch, the new manifest reflects NASA's current assessment of the rate at which Shuttle flights can be resumed during 1989.

In addition to supporting Department of Defense mission requirements, this mixed-fleet manifest continues to reflect the high priority assigned to civil space science and applications payloads and the commercial space initiatives.

HST Delayed

NASA's Hubble Space Telescope (HST) has been moved 7 months until 1990. The reasons are the delayed initial launch of STS-26; an orderly flight rate buildup in 1989; maintaining the planetary launch opportunities and avoiding the long mission slippages incurred when planetary windows are missed; and preserving important DOD missions.

The new schedule gives priority to maintaining the fixed launch window opportunities of three interplanetary missions:

Magellan, scheduled to be launched in 1989, will map the planet Venus.

Galileo, a cooperative project with Germany to survey Jupiter and its moons is scheduled to be launched in October 1989.

Ulysses, a cooperative project with the European Space Agency to investigate the properties of the Sun and its environment is scheduled to be launched in October 1990.

Other Changes

The DOD mission on the first flight of the orbiter Columbia has been moved from February to July 1989, following the launch of Magellan. Launch of NASA's U.S. Microgravity Laboratory remains scheduled to be launched in March 1992. All other payloads manifested on Columbia have later launch dates than those published in the March 1988 manifest.

With the move of the HST, the DOD mission, which had been scheduled for February 1990, moved to July 1990. To accommodate this series of changes, one of the two DOD Shuttle missions, previously slated for FY 1991, is now scheduled on a DOD ELV.

Seventeen Space Shuttle missions are planned through the Ulysses launch (STS-42) in October 1990. Of these, seven are DOD, one carries both a DOD and NASA payload (STS-32) and the remaining nine are NASA missions. This mixed-fleet manifest reflects NASA's plans to use ELV's for those payloads not requiring the capabilities of the Space Shuttle. Twenty-eight ELV launches are planned through FY 1993.

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Goddard News

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Senior Editors . . . . . Michael Braukus, Carter Dove, Jim Elliott and Joyce Milliner

Launch Update:

Emergency Control Center Moves to White Sands

If a hurricane had struck the Johnson Space Center (JSC) during one of the 25 Shuttle missions to date, the thirteen-member flight control team would have moved to the Emergency Mission Control Center in Building 3, here at Goddard. From there they would calculate data necessary for immediate return of the crew, and relay that data to the commander aboard the Shuttle.

Now, as the Shuttle resumes flight with STS-26 in September 1988, the responsibility remains with Goddard, but the Emergency Mission Control Center will be physically located at the Goddard-managed NASA Ground Terminal, in White Sands, NM.

In the event of an emergency at JSC, Goddard Network Director Gary Morse, Code 530, will talk to the commander aboard the Shuttle via NASA Communications (NASCOM), while the flight control team flies to the new Emergency Mission Control Center in New Mexico.

"GSFC assumes mission control during the flight control team's transition from JSC to the NASA Ground Terminal (at White Sands)," said Morse.

From there, the team has direct access to the Shuttle crew through Goddard's ground network, or through the Tracking and Data Relay Satellite System (TDRSS).

In addition to the improved voice capability provided by the ground and satellite links at White Sands, the new site is physically closer to JSC, so the time required to transfer mission control is shorter.

"The weather is also better at White Sands," said Morse. "If a hurricane hits JSC and everyone flies to Goddard, the storm is just as likely to sweep east and hit Goddard. But hurricanes tend not to hit the Southwest."

In December 1987 a full dress rehearsal was held. Ten flight control team members were flown from JSC to Holloman Air Force Base, near Alamogordo, NM.

"Things got sticky there," said Morse. "We flew right into the teeth of a blizzard and had to land at Kirtland Air Force Base (near Albuquerque, NM). From there we flew into Holloman, and then in helicopters to the site near Las Cruces. It was quite a logistics effort, under adverse conditions. But we don't anticipate any problem getting there in three hours during an actual emergency."