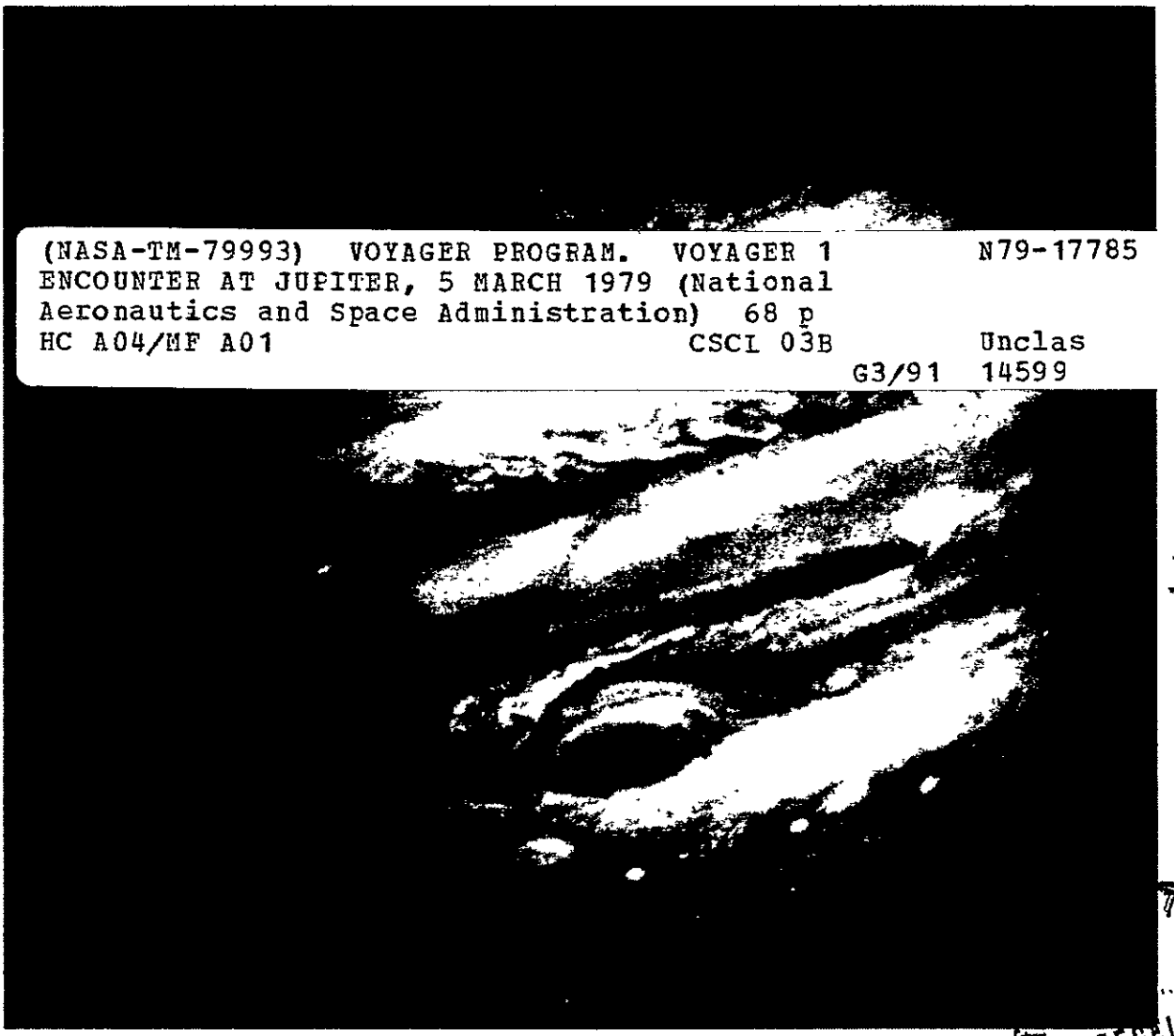
NASA
National Aeronautics and Space Administration

Mission Operation Report

OFFICE OF SPACE SCIENCE Report No. S-802-77-01/02



Voyager Program
Voyager 1 Encounter at Jupiter
March 5, 1979

FOREWORD

This Mission Operation Report describes the planned Voyager 1 encounter at Jupiter in March 1979. The report supplements the prelaunch report No. S-802-77-01/02 of July 18, 1977. An additional supplement will be issued for the Voyager 2 encounter at Jupiter in July 1979.

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MISSION DESCRIPTION

A CLOSE ENCOUNTER OF THE JOVIAN KIND

Voyager 1's Encounter at Jupiter

The Voyager project is now in the encounter operations period for the Voyager 1 rendezvous with Jupiter. Closest approach will occur at a distance of 280,000 km on March 5, 1979. As it passes Jupiter, the spacecraft will be accelerated on a trajectory towards Saturn, which will be reached in November 1980. Voyager 1 will travel away from the solar system after leaving Saturn but will be tracked probably out to a distance of greater than 20 AU from the Sun.

The Jupiter encounter period started January 4, 1979. At that time, with the spacecraft 60 million km from Jupiter, the imaging results were better than are obtained from observatories on Earth. Activity in mission operations slowly increased in January and February. Greatest scientific and public interest in the mission began about February 26 when Voyager 1 crossed the bowshock and entered the magnetosphere of Jupiter. Imaging coverage of the planet and its satellites should be spectacular. Climax of the encounter will be on March 5-6 (Figure 1) when the spacecraft comes closest to the planet; disappears behind the planet for 2 hours; passes close to Io and penetrates its flux tube; and then swings closely by both Ganymede and Callisto. The first closeup views of the satellites should reveal their surface characteristics — smooth, rocky, cratered, icy, and salt-crusted are possibilities.

The Voyager encounters are progressive steps in a continuing plan to investigate Jupiter. First there were the Pioneer 10 and 11 spacecraft, with relatively-simple instruments, which measured the fundamental environment at Jupiter. Now we have the Voyagers with very complex remote-sensing instruments, based on Pioneer results. In the future there will be the Galileo mission, during which a probe will be sent into the Jovian atmosphere. Each successive mission builds on its predecessors. This step-wise plan makes sense economically and scientifically for investigating a gigantic planet about which so little is known.

The 11 scientific investigations (Table 1) of Voyager were chosen to give a coordinated view of the Jovian planetary system. Four of the instruments are remote sensors, mounted on a pointing platform, to study the atmospheres and surfaces of the planet and its 13 satellites. Six of the instruments are mounted in fixed positions on the spacecraft to measure the field and particle environments. The 11th investigation utilizes the spacecraft's radio equipment to measure atmospheric, ionospheric, and gravitational properties of the bodies. Many of the investigations also have science objectives involving the Sun and the interplanetary medium. Combined results from the investigations will help us understand the following:

VOYAGER 1 JUPITER ENCOUNTER AT 4.9 R_J

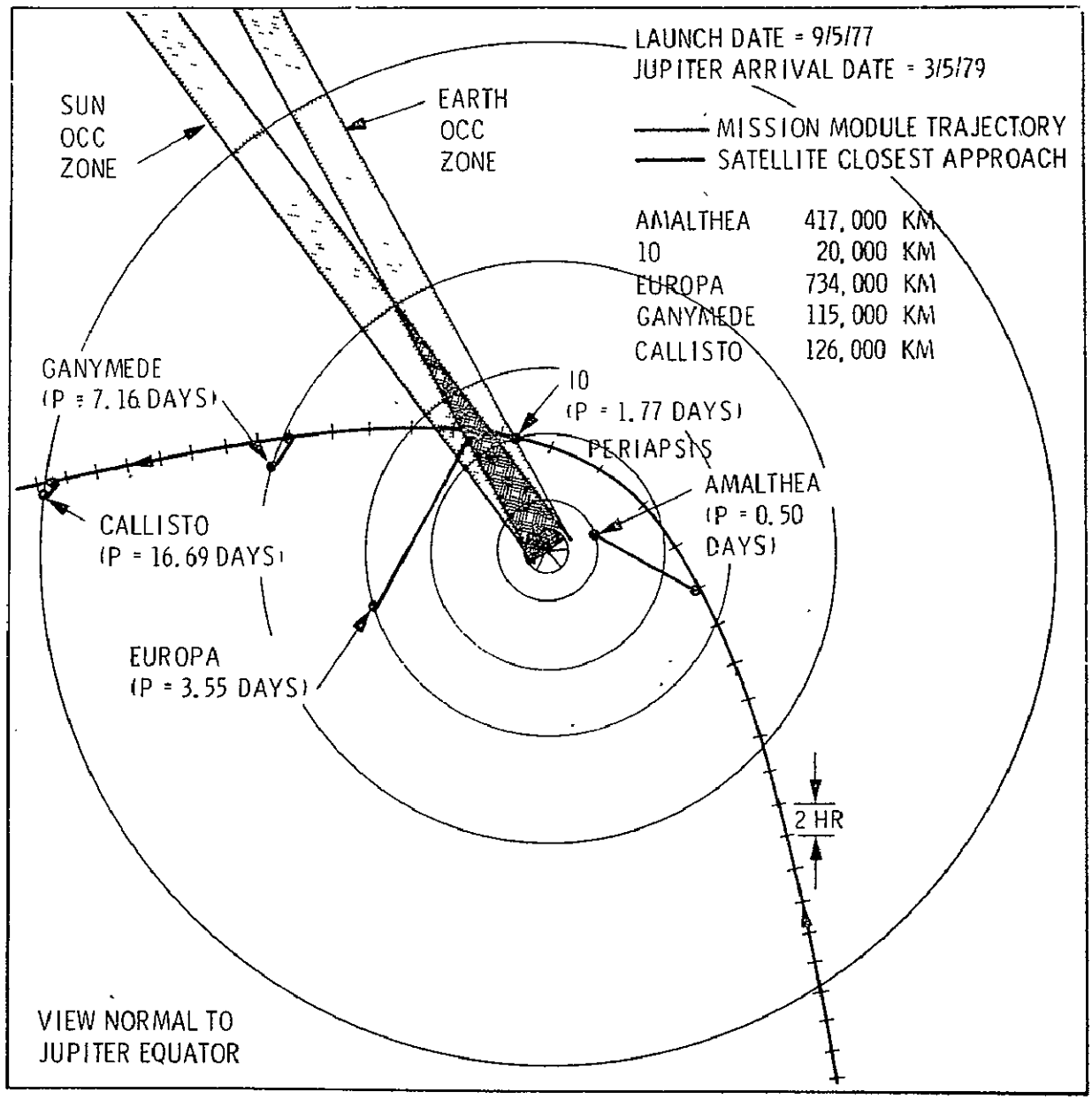


Fig. 1

TABLE 1
VOYAGER SCIENCE INVESTIGATIONS

INVESTIGATION AREA	ABBREVIATION	PRINCIPAL INVESTIGATOR/ORGANIZATION
IMAGING SCIENCE	ISS	Smith/UNIVERSITY OF ARIZONA (Team Leader)
INFRARED SPECTROSCOPY AND RADIOMETRY	IRIS	Hanel/GODDARD SPACE FLIGHT CENTER
PHOTOPOLARIMETRY	PPS	Lillie/UNIVERSITY OF COLORADO
ULTRAVIOLET SPECTROSCOPY	UVS	Broadfoot/KITT PEAK NATIONAL OBSERVATORY
RADIO SCIENCE	RSS	Eshleman/STANFORD UNIVERSITY (Team Leader)
MAGNETIC FIELDS	MAG	Ness/GODDARD SPACE FLIGHT CENTER
PLASMA	PLS	Bridge/MASSACHUSETTS INSTITUTE OF TECHNOLOGY
PLASMA WAVE	PWS	Scarf/TRW
PLANETARY RADIO ASTRONOMY	PRA	Warwick/UNIVERSITY OF COLORADO
LOW ENERGY CHARGED PARTICLES	LECP	Krimigis/JOHN HOPKINS UNIVERSITY - APPLIED PHYSICS LABORATORY
COSMIC RAY	CRS	Vogt/CALIFORNIA INSTITUTE OF TECHNOLOGY

- how, when, and why Jupiter was formed,
- the nature of the unusual atmospheric features and circulation patterns on Jupiter,
- details on the thermal, chemical, and pressure structure of Jupiter's atmosphere,
- the mechanism for the strange radio emissions associated with Jupiter and Io,
- the nature of the immense Jovian magnetosphere and how it interacts with the solar wind,
- the character and surface composition of the Galilean satellites.

The trajectory by Jupiter is not without hazards. Jupiter has an enormous magnetosphere with trapped highly-charged particles. The spacecraft is expected to experience high radiation exposure. Electronic boxes were built with radiation-resistant components and use of radiation shielding. There are redundant units for critical functions, such as attitude control. The possibility of electrostatic discharge is another hazard. Discharges, like miniature lightning, may occur between insulated parts of the spacecraft, or from the spacecraft to the surrounding fields. The spacecraft computers contain self-protection routines to help recover from environmental damage. Special commands are ready in mission control to handle emergency situations, but the roundtrip time to learn about a problem and to take commanded action is over an hour.

Useful information about the Voyager 1 encounter at Jupiter:

- Voyager 1 is the fastest spacecraft ever launched:

Date	Heliocentric velocities		
	km/hr	mi/hr	
9/6/77	143,300	89,000	at launch
2/15/79	47,300	29,400	minimum velocity
3/5/79	130,300	81,000	at encounter
4/1/79	85,100	52,900	post encounter

- Voyager 1 was launched September 5, 1977, 16 days after Voyager 2, but will reach Jupiter 126 days earlier.

- Voyager 1 will have traveled at noon on March 5:

  1,005,967,576 km
  625,079,272 miles

- Time to receive a message from Voyager 1 at noon on March 5 will be 37.8 minutes.

- Voyager pictures at Jupiter are expected to have resolution at least 50 times better than those from the Pioneer 10 and 11 missions.

- Voyager 1 carries a phonograph record with recorded greetings, music, sounds, and pictures from Earth. This record is intended as an interstellar message.

- Voyager 1 should obtain over 15,000 images of the Jovian system, including the planet and its 13 satellites.

- Jupiter has at least 13 natural satellites, three are larger than the Moon, two are larger than the planet Mercury.

- Jupiter radiates more energy than it receives from the Sun. Jupiter's heat may be left from coalescing effects at formation.

- Voyager 1 contains six digital computers, half are redundant backup units.

- The Voyagers are the first deep-space spacecraft to use X-band radio for data transmission. This permits transmission at 115,000 bits/second from Jupiter using only a 20 watt transmitter. Comparative data rates from previous missions:

bits/sec	mission
1,024	Pioneer 11 at Jupiter
16,000	Viking Orbiter at Mars

- The spacecraft and instrument sequences at Jupiter encounter are all pre-planned and are programmed by on-board computers. Late updating of pointing for special features is planned.

- The gravity-assist boost obtained at Jupiter by Voyager 1 will nearly double its velocity, thus reducing the flight time on to Saturn by nearly half. The trip on to Saturn will take 20 months.

- The Voyagers are electrically powered by RTGs - radioisotope thermoelectric generators (small nuclear heaters with thermocouples). Jupiter is five times as far from the Sun as Earth so it receives 1/25 as much solar energy. Solar panels are impractical at Jupiter, even less useful at Saturn where the solar energy is down by a factor of 1/90 compared to Earth.

- Comparison of Jupiter with Earth (Earth = 1):

Diameter = 11.2	Relative density = 0.26
Mass = 318	Mean distance to Sun = 5.2
Volume = 1,340	Orbit period = 11.9

- Jupiter contains 71% of the total planetary mass in our solar system. The four giant outer planets, Jupiter, Saturn, Uranus, and Neptune, together possess 99.5% of the mass. Earth's share is a small 0.22%.

ENCOUNTER SCHEDULE

The length of the encounter period for Voyager 1 at Jupiter is shown in Figure 2. This period is naturally broken into separate phases by the nature of the activities over the 3 months. Highlights of the Observatory Phase, January 4–30, are listed in Table 2. Highlights of the Far-encounter Phase, January 30 to March 4, are given in Table 3. Figure 3 illustrates two examples of the remote measurements which will be made during this phase.

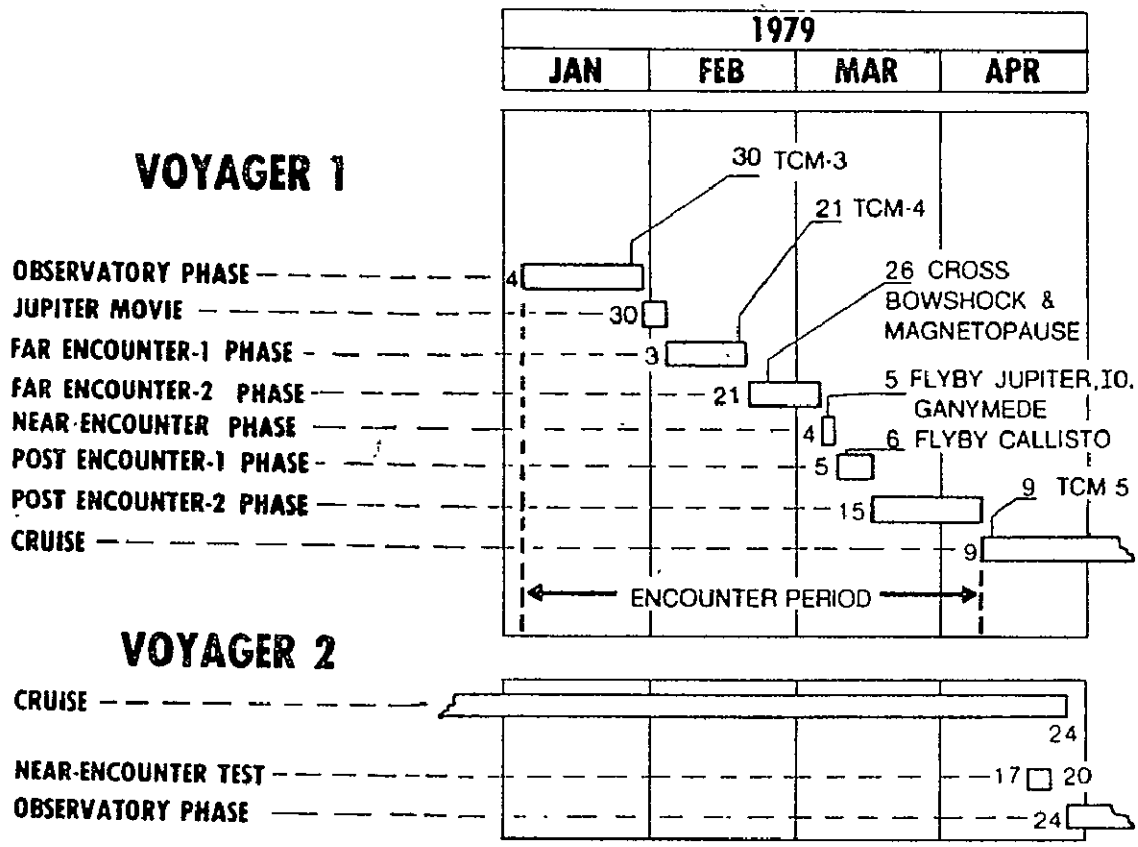


Fig. 2

TABLE 2
VOYAGER 1
OBSERVATORY PHASE HIGHLIGHTS

- Jan 4 to Jan 30, 1979
- Color Photos Every Two Hours
  - Five Longitudes
  - Zoom Movie
  - Daily Playbacks to Spanish Tracking Station
- Eight Daily UVS Scans of Environment Around Jupiter
- Daily IRIS and PPS Observations
- Continuous Fields & Particles Observations
- Trajectory Correction Maneuver on Jan 30, 1979

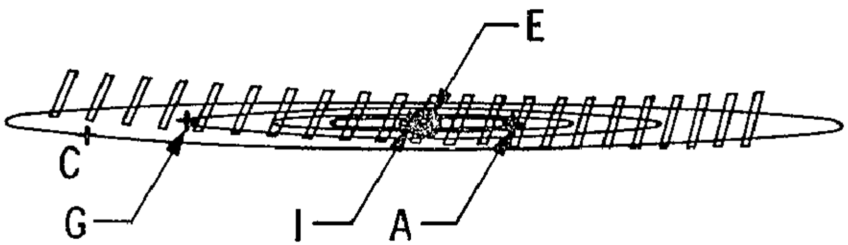
TABLE 3
VOYAGER 1
FAR-ENCOUNTER PHASE HIGHLIGHTS

- Jan 30 to Feb 21, 1979 (FE1)
  Feb 21 to Mar 4, 1979 (FE2)
- Rotation Movie, Jan 31 - Feb 3
  - One Frame Every 1^{o} of Planet Rotation
  - Ten Jupiter Rotations
- Cruise Science Maneuver, Feb 3
- First Significant Callisto Image (290 KM/Line-Pair), Feb 18
- Trajectory Correction Maneuver, Feb 20
- First Significant Ganymede Image (190 KM/Line-Pair), Feb 25
- Expect to See Jupiter Bow Shock, Feb 26
- Expect to See Magnetopause Crossing, Feb 28
- First Significant Europa Image (110 KM/Line-Pair), Mar 1
- First Plasma Outflow Measurement Maneuver, Mar 1
- First Great Red Spot Mosaic (80 KM/Line-Pair), Mar 1
- First Significant Io Image (50 KM/Line-Pair), Mar 2
- First Attempt at Amalthea Imaging, Mar 4
- First Io Mosaic (20 KM/Line-Pair) Mar 4

VOYAGER 1

FAR-ENCOUNTER PHASE

UVS GALILEAN SYSTEM SCAN ON FEB 20



LAST FULL RED SPOT IMAGING MOSAIC ON MAR 4 (THREE COLORS)

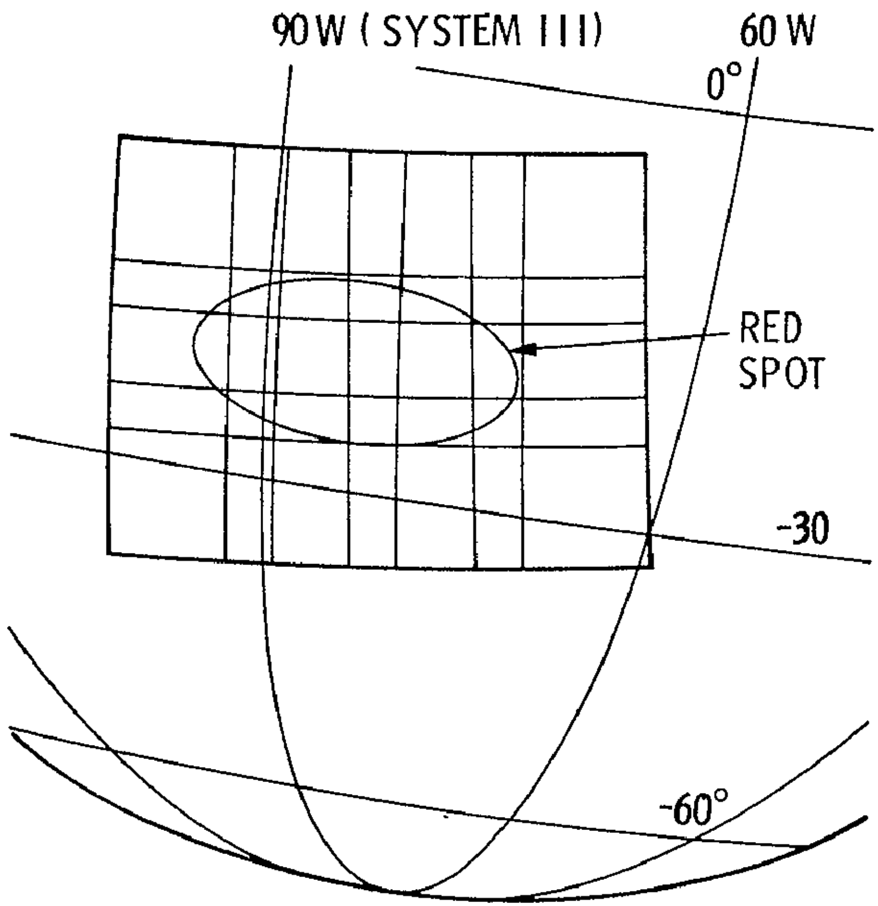


Fig. 3

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The Near-encounter Phase encompasses the 39 hours of highest activity close to Jupiter. Highlights of this phase are listed in Table 4. Figure 4 shows the size of Jupiter at closest approach in relation to the size of a wide-angle imaging frame. The Sun will illuminate only a fraction of the disc. Figure 5 illustrates an imaging mosaic of Io and how the ultraviolet spectrometer will view the Sun as the spacecraft passes behind Jupiter. The appearances of Io and Ganymede at closest approaches are shown in Figure 6.

TABLE 4
VOYAGER 1
NEAR-ENCOUNTER PHASE HIGHLIGHTS

- J-24 hrs to J+15 hrs (J = Mar 5, 1979, 4:42 PST)
- Exposure to Most Intense Particle Radiation, Mar 5
- Closest Approach to Jupiter, Mar 5
- Passage Through Io Flux Tube at J+3 hrs, Mar 5
- Solar and Earth Occultation at J+5 hrs, Mar 5
- Closest Approach to Ganymede at J+13 hrs, Mar 5
- First Ganymede Mosaics, Mar 5
- Amalthea, Io, Ganymede Encounters
    - Imaging Resolutions of 10, 0.5, 2.5 km, Respectively

  Fields & Particles Measurements Deep Inside Jovian Magnetosphere and Radiation Belts

VOYAGER 1
JUPITER
AT CLOSEST APPROACH MAR 5, 1979 12:05 GMT

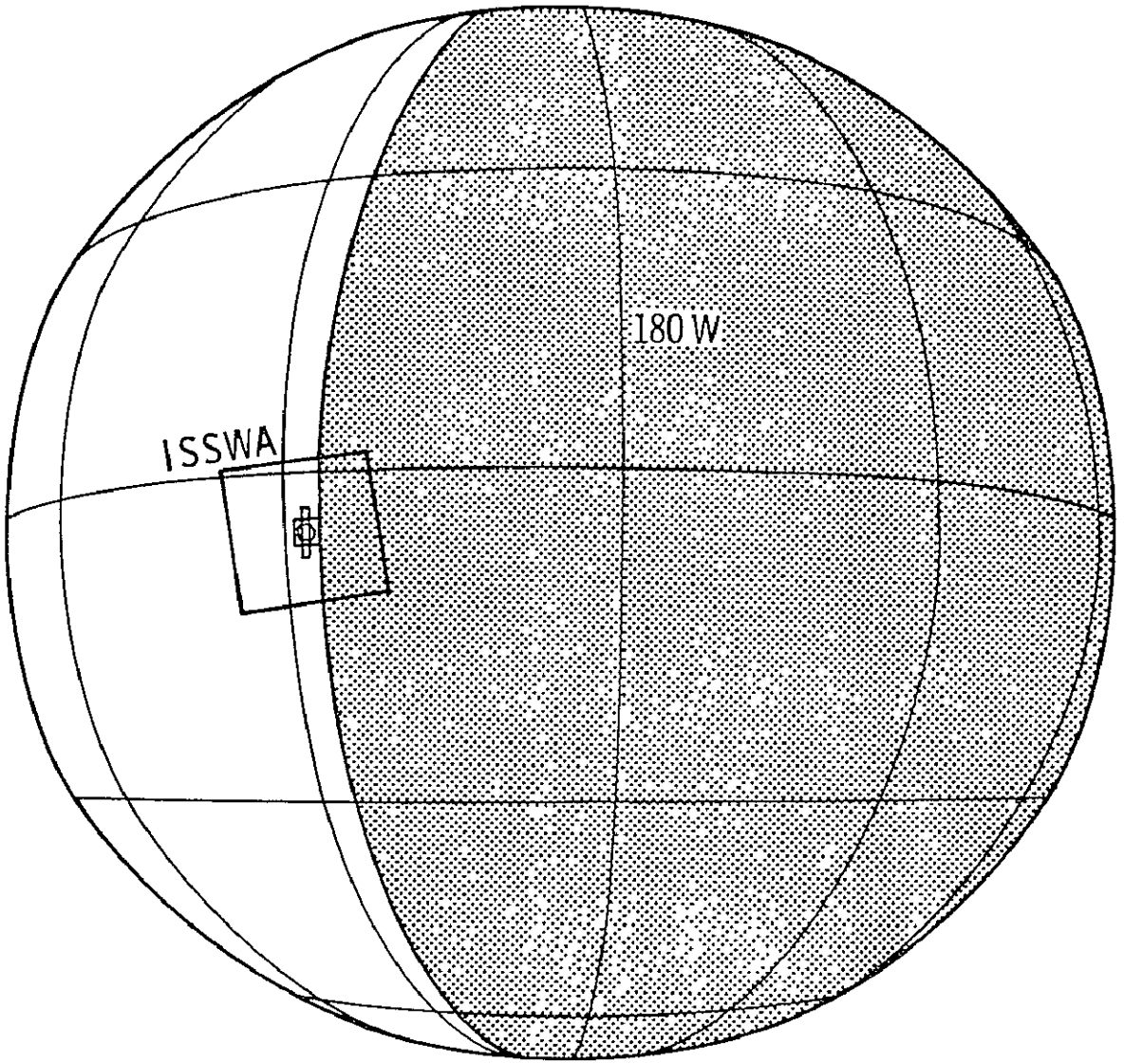


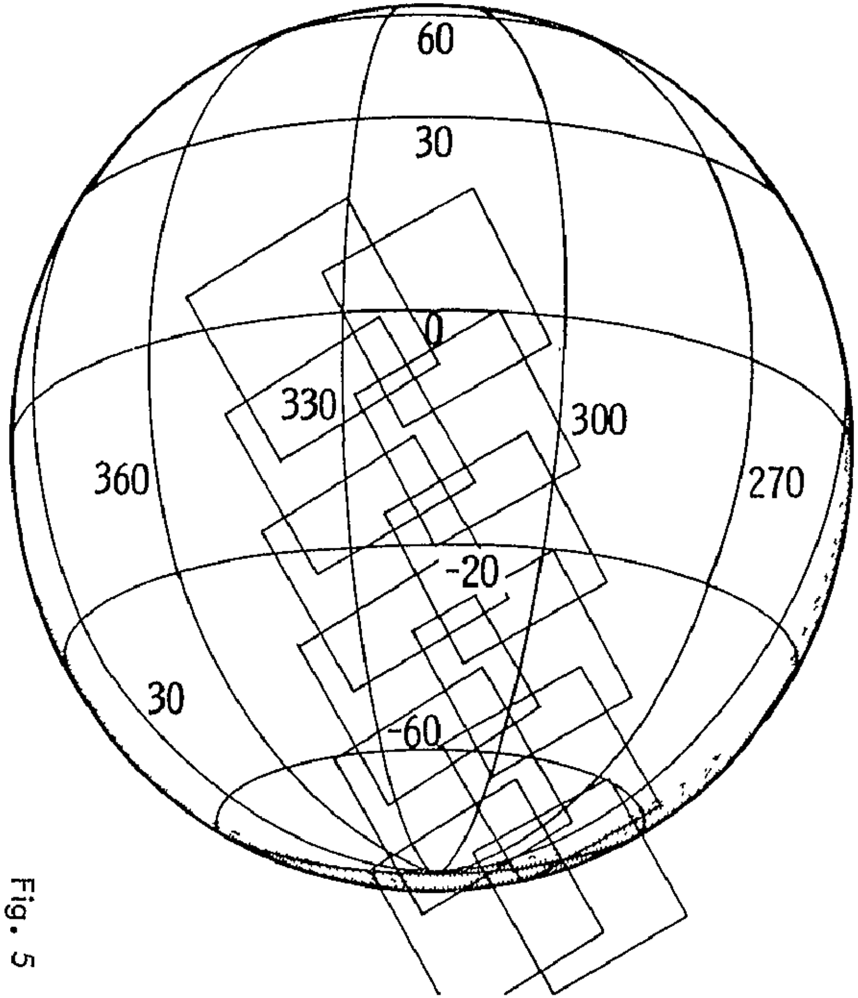
Fig. 4

2/12/79

VOYAGER 1

NEAR-ENCOUNTER PHASE

IMAGING MOSAIC OF IO SHORTLY BEFORE CLOSEST APPROACH AT J + 1.5 HR



UVS SUN OCCULTATION ENTRY AT J + 4.5 HR

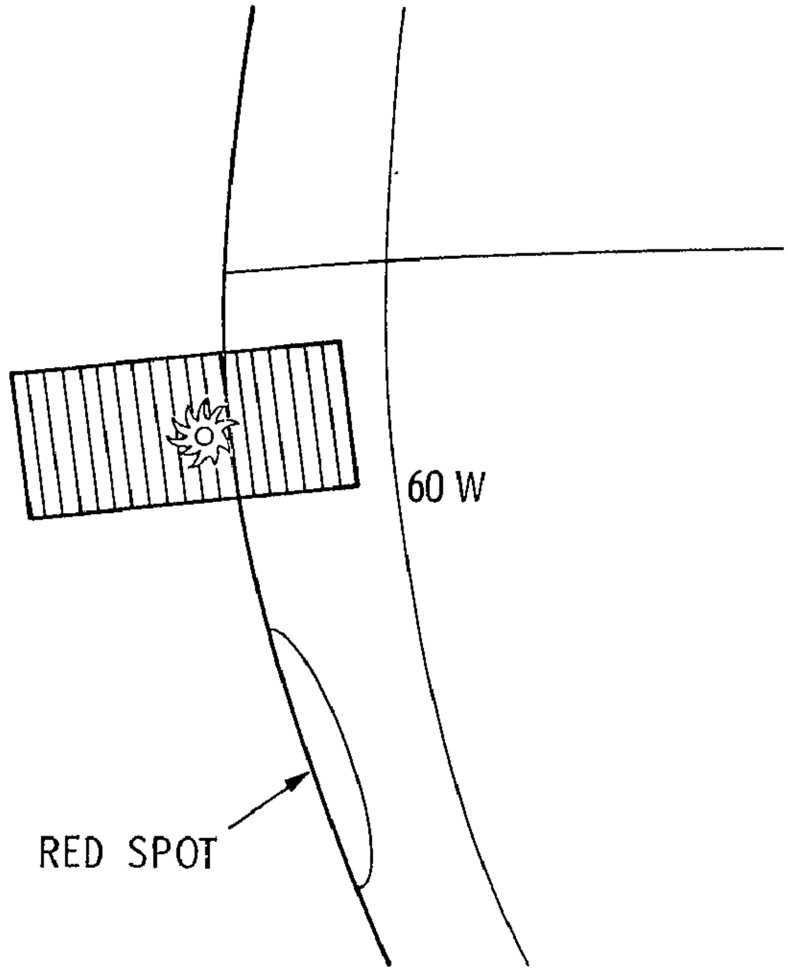


Fig. 5

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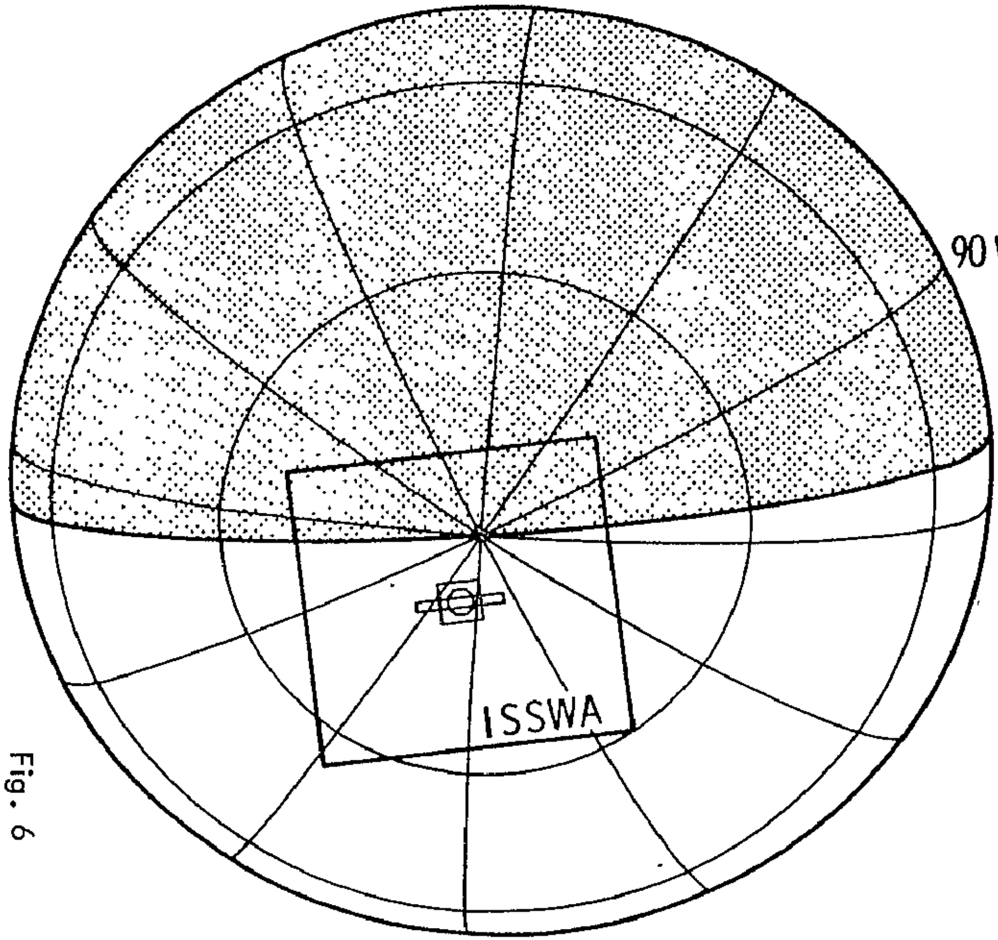
VOYAGER 1

NEAR-ENCOUNTER PHASE

IO

CLOSEST APPROACH J + 3 hrs



GANYMEDE

CLOSEST APPROACH J + 14 hrs

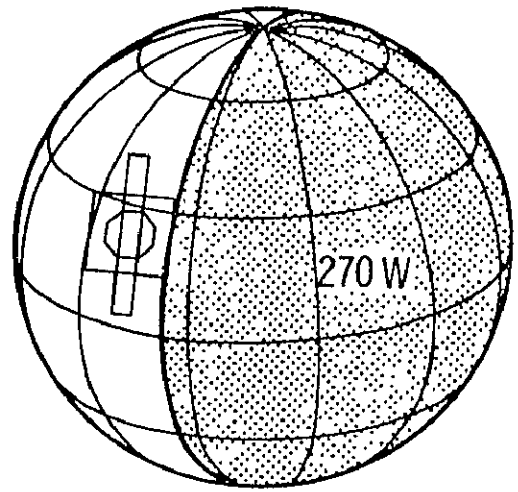


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Fig. 6

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Highlights of the Post-encounter Phase are given in Table 5. Figure 7 shows an imaging mosaic of Callisto which will be obtained in this phase. Also, the figure shows a scan of the dark side of Jupiter which will be made by the infrared spectrometer-radiometer and photo-polarimeter instruments.

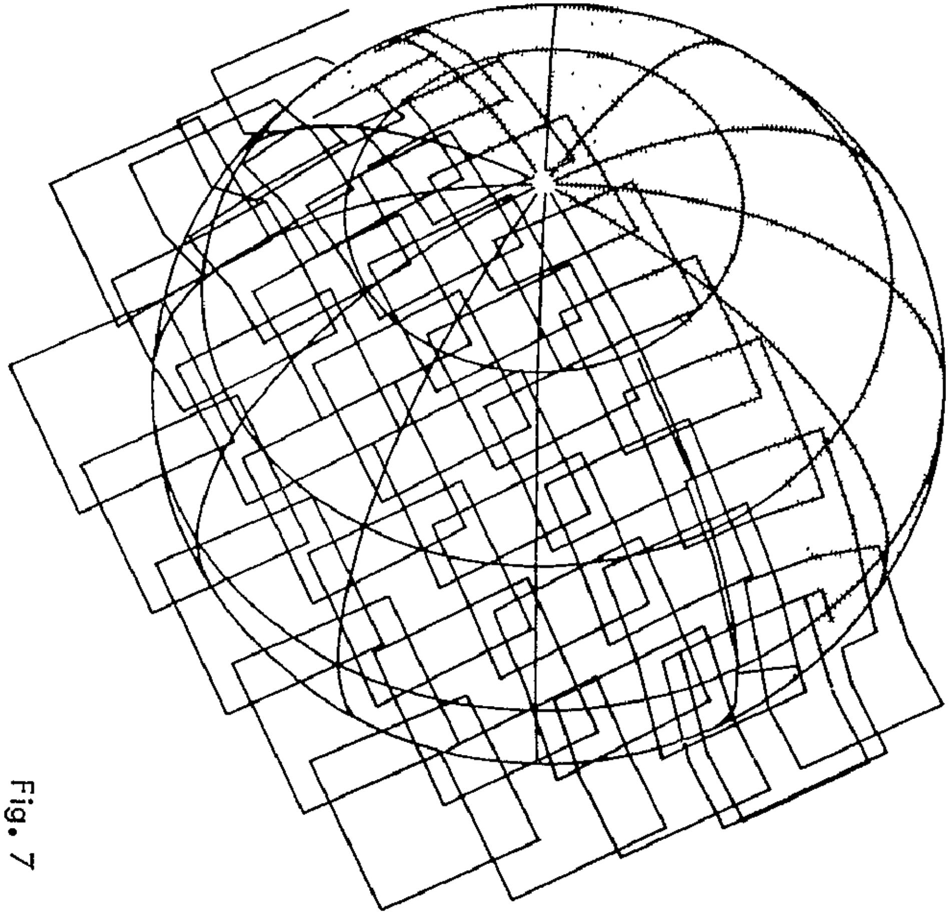
TABLE 5
VOYAGER 1
POST-ENCOUNTER PHASE HIGHLIGHTS

- Mar 6 to Mar 15, 1979 (PE1)
  Mar 15 to Apr 9, 1979 (PE2)
- First Callisto Mosaic, Mar 6
- Closest Approach to Callisto at J+29 hrs, Mar 6
    - Imaging Resolution of 2.5 KM
- First Outbound Jupiter Crescent Mosaic, Mar 7
- Jovian Dark Side Temperature and Scattering Observations
- Search for New Satellites Between Amalthea and Roche Limit
- Maneuver's to Measure Outward Flowing Plasma at Approximately J+3, 5, 8 Days
- Magnetotail Departure at Approximately Mar 15

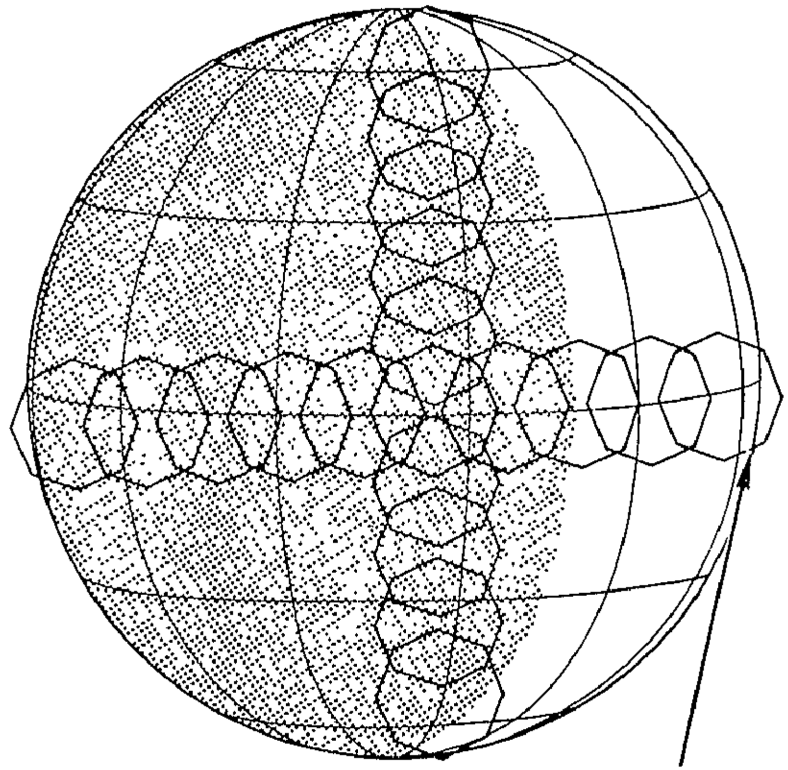
VOYAGER 1

POST-ENCOUNTER PHASE

IMAGING MOSAIC OF CALLISTO AT J+28 HRS



IRIS/PPS NORTH/SOUTH MAP OF JUPITER AT J+2.5 DAYS



PPS EAST/WEST MAP
AT J + 4 DAYS

S-802-77-01/02

Fig. 7

EVENT SEQUENCE - FEBRUARY 26 to MARCH 7

The following pages give the daily sequence of events for the spacecraft from February 26 through March 7, 1979. This period encompasses the greatest encounter activity. Times given are those for receipt of signals at the DSN tracking stations, not actual spacecraft execution times. It is important to note that some data from the Australian stations will be delayed in receipt at JPL because the data-relay lines from Australia to Pasadena cannot handle a 115 kilobit/second bandwidth. A delayed playback from Australia to JPL is necessary. Data will not always be played back from Australia in the same order in which it was received because of differing priorities. Low-rate engineering telemetry will be available at JPL in real-time from the Australian stations even when the high-rate imaging data is delayed.

The ability of the DSN stations to receive data over the X-band link can be strongly affected by local rain storms, especially at low antenna-elevation angles. Rain causes a low signal-to-noise ratio at the higher X-band data rates which are used for transmission of imaging. If bad weather is predicted, the spacecraft can be commanded to operate at a lower data rate. This may result in a picture which has fewer pixels than normal but which is still valuable. However, unpredicted rain may cause serious degradation of pictures unless the image is on the spacecraft's tape recorder and can be re-transmitted.

The notations under the righthand columns headed "DSS" indicate which of the DSN stations is receiving the spacecraft signals. Abbreviations used are: AUS for Australia, MAD for Spain, and GDS for Goldstone.

The event listings tend to emphasize the activities pertaining to the four remote-sensing instruments on the scan platforms. However, the other seven investigations will collect data from their instruments continuously throughout the encounter period.

MONDAY, FEBRUARY 26, 1979

Voyager 1 is 660,222,000 kilometers (410,243,000 miles) from Earth at noon today. One-way light time is 36 minutes 41 seconds.

Distance from the spacecraft to Jupiter at this time is 8,161,000 kilometers (5,071,000 miles).

First contact with Jupiter's bow shock is anticipated today. Voyager 1 will be within Jupiter's magnetosphere from this day through the remainder of the tabulated sequence.

Feb. 26, 1979 Day 57

START (PST)	STOP (PST)	EVENT	COMMENTS	DSS
1:40a	2:21a	18 photos of Jupiter	Search for atmospheric motion less than 100 meters/sec Range = 8,422,000 km (5,233,000 mi)	AUS
2:22a	2:26a	Radio Astronomy, Plasma Wave scan Jovian System	Rapid variations in radio emissions; audio frequencies of plasma waves	AUS
2:40a	5:33a	18 photos of Jupiter	Atmospheric motion studies Range = 8,292,000 km (5,153,000 mi)	AUS
5:38a	6:11a	UVS observes Amalthea	UV albedo and any outgassed materials	AUS
6:12a	6:32a	18 photos of Jupiter	Atmospheric motion studies Range = 8,249,000 km (5,125,000 mi)	AUS
6:58a	7:32a	18 photos of Jupiter	Atmospheric motion studies Range = 8,205,000 km (5,099,000 mi)	AUS
7:43a	8:17a	18 photos of Jupiter	Atmospheric motion studies Range = 8,162,000 km (5,072,000 mi)	MAD
8:21a	8:54a	Infrared observations of Ganymede	Infrared brightness and bulk surface composition	MAD

Feb. 26, 1979 Day 57 (Cont.)

START (PST)	STOP (PST)	EVENT	COMMENTS	DSS
8:21a	8:54a	Six photos of Ganymede	Narrow angle for surface comparison and color mapping Range = 10 million km (6,327,000 mi)	
8:56a	9:32a	IRIS, PPS observe Europa	Measure disc intensity	
9:32a	9:36a	Radio Astronomy, Plasma Wave scan Jovian System	Rapid variations in radio emissions; audio frequencies of plasma waves	
9:55a	10:24a	27 photos of Jupiter	Range = 8,075,000 km (5,018,000 mi)	
10:26a	11:11a	IRIS, PPS observe Io	Surface composition and sodium-atom ejection sites	
11:13a	11:54a	Ultraviolet observations of Amalthea	Search for satellite atmosphere and measure UV surface albedo	
11:48a	12:17p	27 photos of Jupiter	Atmospheric motion studies Range = 7,988,000 km (4,964,000 mi)	
12:25p	12:35p	PPS observes Ganymede	Surface brightness	
12:25p	12:35p	Six photos of Ganymede	Range = 8,670,000 km (color and gross composition)	
12:40p	1:40p	Ultraviolet and sodium-D emissions observations of satellites	Io, Europa, Ganymede, Callisto: determining emissions from atmospheres, and composition of toruses	
1:42p	3:38p	27 photos of Jupiter	Atmospheric motion studies Range = 7,945,000 km (4,937,000 mi)	GDS
3:40p	3:45p	PPS observes Europa	Surface brightness	
4:14p	4:34p	18 photos of Jupiter	Atmospheric motion studies Range = 7,814,000 km (4,855,000 mi)	
4:36p	4:46p	Six photos of Callisto	Narrow angle, color, bulk surface characteristics Range = 8,138,000 km (5,057,000 mi)	
4:36p	4:46p	PPS observes Callisto	Surface brightness, texture and composition	

Feb. 26, 1979 Day 57 (Cont.)

START PST	STOP	EVENT	COMMENTS	DSS
4:48p	5:24p	Infrared observations of Io	Variations in surface intensity	
4:48p	5:24p	Six photos of Io	Narrow angle, color, bulk surface characteristics Range = 7,726,000 km (4,801,000 mi)	
5:25p	6:00p	Ultraviolet observations of Io	Search for atmosphere (hydrogen atoms) sodium-D emission	
6:02p	6:26p	PPS observes Ganymede		
6:02p	6:26p	Six photos of Ganymede	Narrow angle for surface comparison (color) Range = 8,226,000 km (5,111,000 mi)	
6:29p	7:03p	Ultraviolet observations of Europa	Look for extended atmosphere and outgassing	
7:16p	8:01p	IRIS, PPS observe Io	Surface brightness, texture, composition	
7:16p	8:01p	Three photos of Io's sodium cloud	Wide angle, sodium-D filter, supported by sodium measurement by PPS Range to Io = 7,418,000 km (4,610,000 mi)	
8:03p	10:28p	27 photos of Jupiter	Atmospheric phenomena studies Range = 7,235,000 km (4,496,000 mi)	
10:29p	10:59p	Infrared observations of Ganymede	Bulk surface characteristics	
10:29p	10:59p	Six photos of Ganymede	Narrow angle (color) Range = 7,837,000 km (4,870,000 mi)	
11:10p	11:40p	IRIS, PPS observe Io	Bulk surface characteristics and composition	

TUESDAY, FEBRUARY 27, 1979

Voyager 1 is 662,689,000 kilometers (411,776,000 miles) from Earth at noon today. One-way light time is 36 minutes 49 seconds.

Distance from the spacecraft to Jupiter at this time is 7,112,000 kilometers (4,419,000 miles).

Feb. 27, 1979 Day 58

PST START	STOP	EVENT	COMMENTS	DSS
11:42p	1:38a	27 photos of Jupiter	Atmospheric motion studies Range = 7,465,000 km (4,638,000 mi)	A U S
1:48a	2:01a	Six photos of Ganymede	Narrow angle for surface comparison (color) Range = 7,597,000 km (4,721,000 mi)	↓
2:01a	2:05a	Radio astronomy, plasma wave scan Jovian System	Beginning of measurements inside Jupiter magnetosphere	
2:04a	5:27a	27 photos of Jupiter	Atmospheric motion studies; 3 hr., 23 min. sequence Range = 7,245,000 km (4,502,000 mi)	
5:29a	6:13a	Infrared observations of Io	Bulk surface composition	
6:15a	6:50a	Infrared observations of Ganymede	Bulk surface composition	
6:55a	7:24a	27 photos of Jupiter	Atmospheric motion studies Range = 7,157,000 km (4,447,000 mi)	
7:31a	7:47a	Six photos of Callisto	Narrow angle for surface comparison (color) Range = 7,584,000 km (4,713,000 mi)	
7:53	8:27a	18 photos of Jupiter	Resolution = 134 km (83mi) Range = 7,113,000 km (4,420,000 mi)	M A D
8:44a	9:13a	27 photos of Jupiter	Atmospheric phenomena Range = 7,069,000 km (4,393,000 mi)	

Feb. 27, 1979 Day 58 (Cont.)

PST START	PST STOP	EVENT	COMMENTS	DSS
9:13a	9:33a	18 photos of Jupiter	Range = 7,047,000 km (4,379,000 mi)	
9:33a	9:37a	Radio astronomy, plasma wave scan Jovian System		
9:37a	10:10a	Ultraviolet observations of Ganymede		
10:10a	10:20a	Six photos of Ganymede	Narrow angle Range = 6,946,000 km (4,316,000 mi)	
10:22a	11:20a	27 photos of Jupiter	Atmospheric motion studies Range = 6,981,000 km (4,338,000 mi)	
11:20a	11:33a	12 photos of Jupiter	Range = 6,959,000 km (4,324,000 mi)	
11:35a	12:03p	Infrared observations of Io	Variations in disc intensity, bulk composition	
12:05p	12:12p	Four photos of Jupiter	Wide angle every 72 degrees through color filters Range = 6,937,000 km (4,310,000 mi) Important methane filter images for cloud composition and height	
12:14p	12:42p	Infrared observations of Europa	Bulk composition	
12:42p	12:45p	Radio astronomy, plasma wave scan Jovian System	Paired set for time-variability study	
1:17p	1:21p	Radio astronomy, plasma wave scan Jovian System		
1:21p	2:19p	27 photos of Jupiter	Atmospheric motion Range = 6,849,000 km (4,256,000 mi)	
2:21p	2:52p	Infrared observations of Europa	Bulk composition	

Feb. 27, 1979 Day 58 (Cont.)

START (PST)	STOP (PST)	EVENT	COMMENTS	DSS
2:54p	3:52p	27 photos of Jupiter	Atmospheric motion Range = 6,760,000 km (4,200,000 mi)	GDS
3:52p	4:05p	12 photos of Jupiter.	Evolution of atmospheric features Range = 6,759,000 km (4,199,000 mi)	
4:09p	4:41p	Ultraviolet observations of Io (UVS, PPS)	Extended atmosphere study for outgassed Hydrogen and sodium atoms	
4:41p	5:15p	Three photos of Io's sodium cloud	Wide angle; look for image of sodium cloud around Io Range to Io = 6,943,000 km (4,314,000 mi)	
5:15p	5:28p	Infrared observations of Io	Bulk composition	
5:28p	5.32p	Radio astronomy, plasma wave scan		
5:32p	6:59p	27 photos of Jupiter	Atmospheric motion Range = 6,672,000 km (4,146,000 mi)	
7:00p	7:30p	Infrared observations of Europa	Bulk composition	
7:30p	7:34p	Radio astronomy, plasma wave scan		
7:34p	7:58p	Infrared observations of Ganymede	Variations in disc intensity	
7:34p	7:58p	Six photos of Ganymede	Narrow angle (color) Range = 6,134,000 km (3,811,000 mi)	
8:00p	8:26p	Infrared observations of Io	Bulk composition	
8:27p	11:01p	18 photos of Jupiter	Range = 6,449,000 km (4,008,000 mi) 2 hr, 34 min sequence	
11:01p	11:04p	Radio astronomy, plasma wave scan		
11:04p	11:57p	Ultraviolet scan of satellites	Io, Europa, Ganymede, Callisto Search for emissions in torus and dependence on satellite location	

WEDNESDAY, FEBRUARY 28, 1979

Voyager 1 is 665,211,000 kilometers (413,343,000 miles) from Earth at noon today. One-way light time is 36 minutes 57 seconds.

Distance from the spacecraft to Jupiter at this time is 6,047,000 kilometers.

Feb. 28, 1979 Day 59

PST START	STOP	EVENT	COMMENTS	DSS
11:59p	12:27a	IRIS, PPS observe Ganymede	Cross-calibration observations by Voyagers 1 and 2 during encounter (special calibration sequence)	A U S
11:59p	12:27a	Six photos of Ganymede	Narrow angle (color) Range = 5,819,000 km (3,616,000 mi)	↓
12:29a	2:15a	Ultraviolet scan of satellites	Outgassing and torus study	↓
2:16a	2:35a	Infrared observations of Europa	Bulk composition	
2:33a	2:37a	Radio astronomy, plasma wave scan		
2:37a	2:57a	18 photos of Jupiter	Range = 6,271,000 km (3,897,000 mi)	
3:01a	7:28a	Infrared map of Jupiter (East West Map)	Global atmospheric temperature, composition and heat balance on day side. Look for thermal tides and energy radiation balance in atmosphere. Other measurements by polarimeter, UV spectrometer and cameras. (Segment #1) 4 hr., 27 min. sequence	
3:51a	3:58a	Four photos of Jupiter	Wide angle especially methane images Range = 6,255,000 km (3,887,000 mi)	
5:52a	5:59a	Four photos of Jupiter	Wide angle especially methane images Range = 6,188,000 km (3,845,000 mi)	

Feb. 28, 1979 Day 59 (Cont.)

START (PST)	STOP	EVENT	COMMENTS	DSS
7:28a	8:02a	18 photos of Jupiter	Range = 6,066,000 km (3,769,000 mi)	MAD
8:04a	8:39a	Photometry, ultraviolet of suspected Europa gas cloud	Look for outgassing around Europa especially oxygen atoms	
8:43a	8:47a	Radio astronomy, plasma wave scan		
8:47a	9:20a	Ultraviolet observations of Ganymede	At maximum magnetic latitude (lowest particle bombardment environment)	
9:20a	9:30a	Six photos of Ganymede	Narrow angle for comparison studies (color) Range = 5,154,000 km (3,200,000 mi)	
9:32a	9:37a	PPS observes Io	Surface brightness, texture and composition	
9:37a	9:40a	Radio astronomy, plasma wave scan		
9:40a	2:06p	Infrared map of Jupiter	Global atmospheric temperature, composition and heat balance on day side. Look for thermal tides and energy radiation balance in atmosphere. Other measurements by polarimeter, UV spectrometer and cameras. (Segment #2) 4 hr., 26 min. sequence.	
9:48a	9:55a	Four photos of Jupiter	Wide angle; especially methane frame Range = 6,003,000 km (3,730,000 mi)	
11:46a	11:53a	Four photos of Jupiter	Wide angle; continue methane study Range = 5,868,000 km (3,646,000 mi)	
1:47p	1:54p	Four photos of Jupiter	Wide angle; continue methane study Range = 5,800,000 km (3,604,000 mi)	
2:06p	2:09p	Radio astronomy, plasma wave scan		
2:09p	2:38p	27 photos of Jupiter	Evolution of atmospheric features Range = 5,778,000 km (3,590,000 mi)	
2:38p	2:41p	Radio astronomy, plasma wave scan		
2:41p	2:47p	Photometry of Io	Surface brightness, texture and composition	

Feb. 28, 1979 Day 59 (Cont.)

START (PST)	STOP	EVENT	COMMENTS	DSS
2:47p	3:27p	Three photos of Io's sodium cloud	Wide angle Range to Io = 5,499,000 km (3,417,000 mi)	
3:28p	3:41p	IRIS, PPS observe Ganymede	Bulk surface composition	G D S | | ▼
3:31p	3:41p	Six photos of Ganymede	Narrow angle (color) Range = 4,697,000 km (2,919,000 mi)	
3:43p	3:53p	Six photos of Callisto	Narrow angle (color) Range = 6,919,000 km (4,299,000 mi)	
3:46p	3:53p	Four photos of Jupiter	Wide angle; continue methane study Range = 5,688,000 km (3,534,000 mi)	
3:53p	3:57p	Radio astronomy, plasma wave scan		
3:57p	4:10p	12 photos of Jupiter	Evolution of atmospheric features Range = 5,675,000 km (3,526,000 mi)	
4:10p	8:37p	Infrared map of Jupiter	Global atmospheric temperature, composition and heat balance on day side. Look for thermal tides and energy radiation balance in atmosphere. Other measurements by polarimeter, UV spectrometer and cameras. (Segment #3) 4 hr., 27 min. sequence	
5:46p	5:53p	Four photos of Jupiter	Wide angle; continue methane study Range = 5,626,000 km (3,496,000 mi)	
7:42p	7:49p	Four photos of Jupiter	Wide angle; continue methane study Range = 5,552,000 km (3,450,000 mi)	
8:37p	8:49p	Radio astronomy, plasma wave scan	Monitor changes in atmospheric patterns	
8:49p	9:47p	27 photos of Jupiter	Range = 5,462,000 km (3,394,000 mi)	
10:42p	11:59p	18 photos of Jupiter	Range = 5,325,000 km (3,309,000 mi)	

THURSDAY, MARCH 1, 1979

Voyager 1 is 667,794,000 kilometers (414,948,000 miles) from Earth at noon today. One-way light time is 37 minutes 6 seconds.

Distance from the spacecraft to Jupiter at this time is 4,959,000 kilometers (3,081,000 miles).

First significant imaging of Europa occurs today. Also, the first mosaic images of the Great Red Spot will be taken.

March 1, 1979 Day 60

START PST	STOP	EVENT	COMMENTS	DSS
12:02a	12:36a	Ultraviolet observations of Callisto	Elevation scan across satellite at magnetic maximum. Look for extended atmosphere.	A U S
12:36a	12:40a	Radio astronomy, plasma wave scan		↓
12:40a	12:47a	Photometry of Io		
12:48a	12:58a	Six photos of Ganymede	Narrow angle (color) Range = 4,212,000 km (2,617,000 mi)	
1:01a	2:05a	30 photos of Jupiter	Track pattern of evolving features Range = 5,234,00 km (3,252,000 mi)	
2:09a	2:21a	Six photos of Europa	Narrow angle (color) Range = 5,883,000 mi (3,655,000 mi)	
2:09a	2:59a	Europa eclipsed by Jupiter's shadow	*IRIS, PPS observe entry to measure brightness changes, evaporites and begin cooling curve study for surface characteristics	
2:59a	3:03a	Radio astronomy, plasma wave scan		
3:04a	4:08a	30 photos of Jupiter	Range = 5,142,000 km (3,195,000 mi)	
4:10a	4:22a	Europa eclipsed by Jupiter's shadow	*Infrared measurements of cooling curve	

*Study of the satellite's heating curve

March 1, 1979 Day 60 (Cont.)

PST START	PST STOP	EVENT	COMMENTS	DSS
4:24a	4:32a	Infrared observations of Ganymede	Measure disc intensity, bulk composition	
4:33a	5:06a	Ultraviolet scan of Io	Search for atmospheric composition and extended atmosphere	
5:06a	5:09a	Radio astronomy, plasma wave scan		
5:09a	5:53a	Europa eclipsed by Jupiter	*IRIS, PPS observe exit from initial eclipse, look for evaporite outgassing and heating characteristics	
5:37a	5:53a	Six pictures of Europa	*Narrow angle (color) Range = 5,076,000 km (3,154,000 mi)	
5:55a	6:27a	30 photos of Jupiter	Range = 5,051,000 km (3,139,000 mi)	
6:32a	6:58a	24 photos of Jupiter		
7:03a	7:20a	Europa eclipsed by Jupiter	IRIS, PPS observe exit from eclipse; look for evaporite outgassing and initial heating characteristics	
7:03a	7:20a	Six photos of Europa	*Narrow angle (color) for surface comparison studies Range = 5,567,000 km (3,459,000 mi)	
7:16a	7:20a	Photometry of Europa	Surface albedo, texture and composition: look for evaporite outgassing and initial heating characteristics	
7:22a	8:07a	24 photos of Jupiter	Range = 4,990,000 km (3,101,000 mi)	MAD
8:09a	8:36a	Six photos of Ganymede	Narrow angle (color) Range = 3,923,000 km (2,438,000 mi)	
8:38a	8:46a	IRIS, PPS observe Io	Bulk composition	
8:47a	8:53a	Infrared observations of Callisto	Bulk composition	
8:55a	9:04a	Six photos of Europa	Narrow angle (color) Range = 5,460,000 km (3,393,000 mi)	

*Study of the satellite's heating curve

March 1, 1979 Day 60 (Cont.)

PST START	PST STOP	EVENT	COMMENTS	DSS
9:05a	9:12a	Six photos of Jupiter	Track pattern of evolving features (Retargetable set) Range = 4,988,000 km (3,099,000 mi)	
9:12a	9:16a	Radio astronomy, plasma wave scan		
9:16a	9:40a	Infrared observations of Jupiter	*Measure composition at five latitudes	
9:40a	9:47a	Six photos of Jupiter	Range = 4,980,000 km (3,094,000 mi)	
9:53a	10:28a	Infrared observations of Jupiter	*Measure composition at five latitudes	
10:28a	10:35a	Six photos of Jupiter	Range = 4,867,000 km (3,024,000 mi)	
10:35a	10:38a	Radio astronomy, plasma wave scan		
10:38a	11:19a	Three photos of Io's sodium cloud	Wide angle look for extended cloud. Map sodium with previous imaging. Range to Io = 5,010,000 km (3,113,000 mi)	
11:19a	11:22a	Radio astronomy, plasma wave scan		
11:22a	1:26p	Photometry, ultraviolet of Io gas cloud	Map sodium, with previous imaging.	
1:28p	1:44p	15 photos of Jupiter	Range = 4,821,000 km (2,996,000 mi)	
1:46p	2:04p	IRIS, PPS observe Europa	Bulk surface properties	
1:46p	2:04p	Six photos of Europa	Narrow angle (color) for surface comparison studies Range = 5,015,000 km (3,116,000 mi)	
2:06p	2:58p	12 photos of Jupiter	Range = 4,729,000 km (2,930,000 mi)	
3:06p	3:26p	Infrared observations of Ganymede	Bulk composition	G
3:07p	3:17p	Six photos of Ganymede	Range = 3,711,000 km (2,306,000 mi) (Color)	D S

*Study of the satellite's heating curve

March 1, 1979 Day 60 (Cont.)

PST START	PST STOP	EVENT	COMMENTS	DSS
3:28p	3:35p	Photometry of Callisto	Brightness measurement	
3:37p	3:44p	Four photos of Jupiter	Wide angle Range = 4,636,000 km (2,880,000 mi)	
3:44p	4:29p	Infrared observations of Jupiter	Atmospheric composition at five latitudes	
4:29p	4:33p	Radio astronomy, plasma wave scan		
4:33p	4:41p	IRIS, PPS observe Io		
4:42p	4:57p	IRIS, PPS observe Europa	Bulk surface properties; cross-calibration observations by Voyager 1 and later by Voyager 2 during the encounters.	
4:47p	4:57p	Six photos of Europa	Narrow angle Range = 4,748,000 km (2,950,000 mi)	
5:07p	5:11p	Three photos of Jupiter	Track pattern of evolving features Range = 453,000 km (2,823,000 mi)	
5:11p	5:36p	Infrared observations of Jupiter	Atmospheric composition at five latitudes	
5:36p	5:46p	Nine photos of Jupiter	Range = 4,490,000 km (2,790,000 mi)	
5:46p	6:51p	Infrared observations of Jupiter		
6:51p	6:55p	Three photos of Jupiter	Track pattern of evolving features Range = 4,450,000 km (2,765,000 mi)	
6:55p	7:27p	Infrared observations of Jupiter		
7:27p	7:40p	12 photos of Jupiter	Evolution of atmospheric features Range = 4,350,000 km (2,703,000 mi)	
7:40p	7:53p	Infrared observations of Jupiter	Atmospheric composition at five latitudes	
7:53p	7:57p	Radio astronomy, plasma wave scan		
9:06p	9:09p	Two photos of Ganymede	Range = 3,583,000 km (2,226,000 mi)	

March 1, 1979 Day 60 (Cont.)

START PST	STOP	EVENT	COMMENTS	DSS
9:46p	10:25p	Mosaic of Jupiter's Great Red Spot	12 frames 3-color mosaic Range = 4,310,000 km (2,678,000 mi)	
10:27p	11:15p	IRIS, PPS observe Io eclipse	Measure temperature and brightness changes at exit	
11:15p	11:18p	Radio astronomy, plasma wave scan		
11:18p	11:56p	12 photos of Jupiter	Range = 4,250,000 km (2,640,000 mi)	

FRIDAY, MARCH 2, 1979

Voyager 1 is 670,452,000 kilometers (416,599,000 miles) from Earth at Noon today. One-way light time is 37 minutes 15 seconds.

Distance from the spacecraft to Jupiter at this time is 3,838,000 kilometers (2,385,000 miles).

First significant imaging of Io occurs today.

March 2, 1979 Day 61

START PST	STOP	EVENT	COMMENTS	DSS
11:56p	12:06a	Nine photos of Jupiter	Rapid evolution of selected features Range = 4,240,000 km (2,635,000 mi)	A U S
12:07a	12:17a	IRIS, PPS observe Io eclipse	Temperature and brightness changes at exit	
12:18a	12:34a	15 photos of Jupiter	Range = 4,217,000 km (2,620,000 mi)	
12:44a	12:47a	Radio astronomy, plasma wave scan		

March 2, 1979 Day 61 (Cont.)

START (PST)	STOP (PST)	EVENT	COMMENTS	DSS
12:46a	1:20a	Ultraviolet observations of Ganymede	Elevation scan when satellite is at magnetic equator. Look for enhanced outgassing.	
1:21a	1:32a	IRIS, PPS study Europa	Bulk surface properties	
1:21a	1:32a	Six photos of Europa	Narrow angle (color) Range = 4,003,000 km (2,487,000 mi)	
1:32a	3:00a	Photometric studies of suspected Europa gas cloud		
3:00a	3:03a	Radio astronomy, plasma wave scan		
3:03a	3:42a	12 photos of Jupiter	Evolution of atmospheric features Range = 4,076,000 km (2,532,000 mi)	
3:42a	3:52a	Nine photos of Jupiter	Evolution of selected features Range = 4,068,000 km (2,528,000 mi)	
3:52a	4:34a	Infrared observations of Jupiter		
4:34a	4:50a	15 photos of Jupiter	Track pattern of evolving features Range = 3,686,000 km (2,290,000 mi)	
4:52a	5:06a	IRIS, PPS observe Ganymede	Bulk surface characteristics	
4:52a	5:06a	Six photos of Ganymede	Narrow angle (color) Range = 4,030,000 km (2,504,000 mi)	
5:08a	5:18a	Six photos of Europa	Narrow angle (color) Range = 3,635,000 km (2,259,000 mi)	
5:19a	5:26a	Photometry of Io	Bulk surface brightness	
5:26a	5:29a	Radio astronomy, plasma wave scan		
5:29a	5:42a	12 photos of Jupiter	Range = 3,981,000 km (2,474,00 mi)	
5:42a	6:17a	Infrared observations of Jupiter	Atmospheric composition at five latitudes	
6:19a	6:52a	Ultraviolet observations of Europa	Elevation scan near magnetic maximum	

March 2, 1979 Day 61 (Cont.)

START (PST)	STOP (PST)	EVENT	COMMENTS	DSS
7:10a	8:19a	Mosaic of Jupiter's Great Red Spot	8 frames (2 color mosaic) Range = 3,839,000 km (2,385,000 mi)	
8:21a	8:54a	Ultraviolet observations of Europa	Elevation scan near magnetic equator Region of maximum particle bombardment	
8:55a	9:10a	IRIS, PPS observe Europa	Bulk properties and brightness variations	MAD
8:55a	9:10a	Six photos of Europa	Narrow angle (color) Range = 3,293,000 km (2,046,000 mi)	MAD
9:43a	9:46a	Radio astronomy, plasma wave scan		MAD
9:46a	10:27a	Infrared observations of Jupiter	Jupiter atmosphere composition study	
10:27a	10:56a	27 photos of Jupiter	Range = 3,700,000 km (2,301,000 mi)	
10:56a	11:32a	Infrared observations of Jupiter	Jupiter atmosphere composition study	
11:32a	11:35a	Radio astronomy, plasma wave scan		
11:35a	11:45a	Six photos of Callisto	Narrow angle (color) Range = 5,495,000 km (3,415,000 mi)	
11:35a	11:45a	Photometry of Callisto	Brightness measurement	
11:46a	12:02p	IRIS, PPS observe Ganymede	Bulk surface properties	
11:52a	12:02p	Six photos of Ganymede	Narrow angle (color) Range = 3,405,000 km (2,116,000 mi)	
12:02p	12:06p	Radio astronomy, plasma wave scan		
12:06p	12:35p	27 photos of Jupiter	Range = 3,647,000 km (2,266,000 mi)	
12:35p	1:01p	North-South map of Jupiter	Range = 3,620,000 km (2,249,000 mi) Cover missing longitudes of map to follow	
1:01p	1:14p	12 photos of Jupiter	Range = 3,610,000 km (2,243,000 mi)	
1:14p	1:25p	9 photos of Jupiter	Rapid evolution of selected features Range = 3,599,000 km (2,236,000 mi)	

March 2, 1979 Day 61 (Cont.)

PST START	PST STOP	EVENT	COMMENTS	DSS
1:25p	1:51p	North-South map of Jupiter	Range = 3,551,000 km (2,207,000 mi) Cover missing longitudes of N-S map to follow	
1:51p	1:55p	Radio astronomy, plasma wave scan		
1:55p	3:22p	Photometry of suspected Europa gas cloud	High spatial resolution study by UVS, PPS of possible Europa outgassing	
1:55p	3:22p	Three photos of Europa	Narrow angle (partial color) Range = 2,865,000 km (1,780,000 mi)	G D S
3:22p	3:38p	Infrared observations of Europa	Bulk surface properties	
3:23p	3:34p	Six photos of Europa	Narrow angle (color) Range = 2,854,000 km (1,774,000 mi)	
3:35p	3:39p	Radio astronomy, plasma wave scan	7 hr., 2 min. sequence	
3:39p	10:41p	PPS, IRIS map Jupiter North-South	Bulk of N-S map. 2 color imaging, one color PPS, full operation IRIS.	
10:43p	10:53p	Eight photos of Callisto	Combine two experiments Range = 5,016,000 km (3,117,000 mi)	
10:54p	11:04p	Wide angle photo of Io and Callisto in single frame	Determine spin-axis orientation Resolution = 50 km (31 mi)	
10:54p	11:04p	Six photos of Io	Narrow angle for surface comparison studies Range (color) =2,890,000 km (1,795,000 mi)	
11:06p	11:31p	PPS IRIS, cameras map Jupiter	North-South (cover missing longitude in N-S Map - above)	
11:32p	11:42p	Eight photos of Callisto	Combine two experiments Range = 4,973,000 km (3,090,000 mi)	
11:32p	11:42p	Photometry of Callisto	Brightness measurement	
11:43p	11:53p	Two photos of Europa	Spin axis determination Europa-Callisto Range = 2,454,000 km (1,525,000 mi)	
11:43p	11:53p	Six photos of Europa	Narrow angle (color) Range = 2,454,000 km (1,525,000 mi) Surface comparison studies	
11:43p	11:53p	Photometry of Europa	Surface brightness, texture and composition	

SATURDAY, MARCH 3, 1979

Voyager 1 is 673,210,000 kilometers (418,314,000 miles) from Earth at Noon today. One-way light time is 37 minutes 24 seconds.

Distance from the spacecraft to Jupiter at this time is 2,665,000 kilometers (1,656,000 miles).

March 3, 1979 Day 62

START (PST)	STOP (PST)	EVENT	COMMENTS	DSS
11:55p	1:59a	PPS, IRIS complete Jupiter N-S map	To determine global and local heat balance	AUS
2:07a	2:20a	12 photos of Jupiter	Range = 2,965,000 km (1,842,000 mi)	AUS
2:20a	3:21a	Infrared observations of Jupiter	Atmospheric components in polar regions	AUS
3:21a	4:00a	Mosaic of Jupiter Great Red Spot	18 frames 3 color, 2 x 3 mosaic Range = 2,915,000 km (1,181,000 mi)	AUS
4:00a	4:04a	Radio astronomy, plasma wave scan		
4:04a	4:15a	Photometry of Europa	Brightness measurement	
4:04a	4:15a	Six photos of Europa	Narrow angle (color) Range = 2,368,000 km	
4:16a	4:42a	PPS, UVS observe Io gas cloud	Study extended atmosphere around Io	
4:42a	4:52a	Six photos of Io	Narrow angle (color) Range = 2,935,000 km (1,824,000 mi)	
4:42a	4:52a	Photometry of Io	Io brightness	
4:42a	4:52a	Two photos of Io		
4:52a	4:56a	Radio astronomy, plasma wave scan		
4:56a	6:41a	PPS, UVS observe Io gas cloud	Combine study of extended atmosphere around Io	
6:43a	7:16a	Ultraviolet scan around Jupiter region	Calibration for background contributed to satellite gas cloud study	

March 3, 1979 Day 62 (Cont.)

START (PST)	STOP	EVENT	COMMENTS	DSS
7:18a	7:35a	Nine photos of Jupiter	Range = 2,715,000 km (1,687,000 mi)	
7:35a	8:12a	Infrared observations of Jupiter South Pole	Measure cloud opacity	--
8:12a	8:29a	Nine photos of Jupiter	Range = 2,665,000 km (1,656,000 mi)	MAD
8:29a	8:41a	Six photos of Jupiter	Range = 2,664,000 km (1,655,000 mi)	
8:44a	8:50a	Photometry of Callisto	Brightness measurements	
8:52a	8:58a	Photometry of Ganymede	Brightness measurements	
8:52a	8:58a	Three photos of Ganymede	Narrow angle (partial color) Range = 3,117,000 km (1,937,000 mi)	
8:59a	9:09a	Infrared observations of Europa	Temperature measurement	
8:59a	9:09a	Six photos of Europa	Narrow angle (color) Range = 2,308,000 km (1,434,000 mi)	
9:09a	9:12a	Radio astronomy, plasma wave scan		
9:12a	9:49a	Infrared observations of Jupiter's North Pole	Measure cloud opacity and temperature	
9:49a	10:54a	12 photos of Jupiter	Range = 2,563,000 km (1,593,000 mi)	
10:54a	10:58a	Radio astronomy, plasma wave scan		
10:59a	12:05p	Plasma outflow measurements (maneuver)	Looking for corotating plasma Fields and particles experiment	
12:07p	12:17p	Nine photos of Jupiter	Study evolution of selected features Range = 2,460,000 km (1,529,000 mi)	
12:17p	12:20p	Radio astronomy, plasma wave scan		
12:20p	12:30p	Six photos of Europa	Narrow angle (color) Range = 2,293,000 km (1,425,000 mi)	

March 3, 1979 Day 62 (Cont.)

START PST	STOP	EVENT	COMMENTS	DSS
12:32p	12:42p	Six photos of Io	Narrow angle (color) Range = 2,865,000 km (1,780,000 mi)	
12:43p	12:53p	Six photos of Callisto	Narrow angle (color) Range = 4,300,000 km (2,672,000 mi)	
12:54p	1:23p	Mosaic of Jupiter Great Red Spot	27 frames 3 color, 3 x 3 mosaic Range = 2,410,000 km (1,498,000 mi)	
1:23p	1:52p	27 photos of Jupiter	motion studies in and around GRS Range = 2,388,000 km (1,484,000 mi)	
1:52p	2:21p	Mosaic of Jupiter Great Red Spot	27 frames 3 color, 3 x 3 mosaic Range = 2,359,000 km (1,466,000 mi)	
2:21p	2:50p	27 photos of Jupiter	Range = 2,358,000 km (1,465,000 mi)	
2:49p	2:52p	Radio astronomy, plasma wave scan		
2:52p	3:02p	Six photos of Europa	Narrow angle (color) Range = 2,281,000 km (1,417,000 mi)	
3:04p	3:14p	Six photos of Ganymede	Narrow angle (color) Range = 2,963,000 km (1,841,000 mi)	
3:17p	3:33p	15 photos of Jupiter	Range = 2,307,000 km (1,434,000 mi)	GDS
3:33p	4:23p	Infrared observations of Jupiter	Cloud opacity at equatorial regions	
4:23p	4:26p	Radio astronomy, plasma wave scan		
4:27p	5:01p	Ultraviolet observations of Amalthea	Elevation scan for high resolution study of Torus and UV albedo of Amalthea	
5:02p	6:05p	Infrared observations of Io eclipse	Temperature change at exit (heating curve = study of surface characteristics)	
5:09p	5:25p	Ten photos of Io eclipse	Narrow angle to measure post-eclipse brightening Range = 2,602,000 km (1,617,000 mi)	
5:25p	5:35p	Six photos of Io	Surface composition studies Narrow angle; camera slews Range = 2,601,000 km (1,616,000 mi)	

March 3, 1979 Day 62 (Cont.)

START PST	STOP	EVENT	COMMENTS	DSS
6:07p	6:40p	Infrared observation of Jupiter west limb	Measure cloud opacity	
6:42p	6:55p	Infrared observation of Io eclipse exit	Continue heating curve study	
6:56p	7:11p	Infrared observations of Jupiter	Measure cloud opacity at selected points	
7:12p	7:23p	Infrared observation of Io eclipse	Continue heating curve study	
7:13p	7:23p	Six photos of Io	Narrow angle (color) Range = 2,449,000 km (1,527,000 mi)	
7:23p	7:27p	Radio astronomy, plasma wave scan		
7:27p	8:04p	Infrared North-South scan of Jupiter	at Noon local time; temperature variation as function of latitude	
7:27p	8:04p	Ten photos of Jupiter	North-South to support simultaneous IR scan Narrow and wide angle Range = 2,067,000 km (1,284,000 mi)	
8:04p	8:23p	Nine photos of Jupiter	Track pattern of evolving features in Northeast quadrant Range = 2,046,000 km (1,271,000 mi)	
8:23p	8:27p	Three photos of Jupiter	Track pattern of evolving features in Northeast half Range = 2,043,000 km (1,269,000 mi)	
8:29p	8:39p	Six photos of Europa	Narrow angle (color) Range = 2,242,000 km (1,393,000 mi)	
8:48p	9:28p	Infrared observations of Jupiter	Measure cloud opacity	
9:28p	9:38p	Nine photos of Jupiter	Range = 1,993,000 km (1,238,000 mi)	
9:38p	10:18p	Infrared observation of Jupiter east limb	Measure cloud opacity	
10:21p	10:31p	IRIS, PPS observe Io	Cross-calibration observations by Voyager 1 and later by Voyager 2 during its encounter	

March 3, 1979 Day 62 (Cont.)

START PST	STOP	EVENT	COMMENTS	DSS
10:21p	10:31p	Six photos of Io	Narrow angle Range = 2,176,000 km (1,352,000 mi)	
10:34p	10:44p	Nine photos of Jupiter	Range = 1,939,000 km (1,205,000 mi)	
10:45p	10:55p	Six photos of Europa	Narrow angle (color) Range 2,213,000 km (1,375,000 mi)	
10:45p	10:55p	Photometry of Europa	Brightness measurement	
11:00p	11:04p	Radio astronomy, plasma wave scan		
11:04p	11:46p	Infrared observation of Jupiter west limb	Measure cloud opacity	
11:46p	12.25a	Mosaic of Great Red Spot	36 frames 3 x 4, 2-color	

SUNDAY, MARCH 4, 1979

Voyager 1 is 676,153,000 kilometers (420,142,000 miles) from Earth at noon today. One-way light time is 37 minutes 34 seconds.

Distance from the spacecraft to Jupiter at this time is 1,392,000 kilometers (865,000 miles).

The near-encounter phase begins early today. The first attempt at imaging of Amalthea will occur.

Mar 4, 1979 Day 63

START PST	STOP	EVENT	COMMENTS	DSS
11:46p	12:25a	Mosaic of Great Red Spot	36 frames 3 x 4, 2-color Range = 1,833,000 km (1,139,000 mi)	AUS

March 4, 1979 Day 63 (Cont.)

START (PST)	STOP	EVENT	COMMENTS	DSS
12:25a	12:45a	Mosaic of Great Red Spot	36 frames 3 x 4 2 color Range = 1,825,000 km (1,134,000 mi)	
12:47a	12:57a	Six photos of Io	Narrow angle (color) Range = 1,945,000 km (1,209,000 mi)	
12:47a	12:57a	Photometry of Io		
12:57a	1:27a	Infrared North-South scan of Jupiter	Scan along Jupiter local time = 8 A.M.	
12:57a	1:27a	Camera scans Jupiter North-South	To support simultaneous IR scan Range = 1,782,000 km (1,107,000 mi)	
1:27a	1:37a	Nine photos of Jupiter	Range = 1,779,000 km (1,105,000 mi)	
1:38a	2:05a	Ultraviolet North-South Jupiter scan	Scan Jupiter for UV emission variability (only time UV slit is parallel to N-S pole)	
2:05a	2:35a	Ultraviolet South-North Jupiter scan	Scan Jupiter for UV emission variability (only time UV slit is parallel to N-S pole)	
2:39a	2:49a	Two photos of Ganymede	Spin axis measurement Range = 2,596,000 km (1,613,000 mi)	
2:39a	2:49a	Six photos of Ganymede	Narrow angle (color) Surface comparison studies	
2:39a	2:49a	Photometry of Ganymede		
2:50a	3:00a	Three photos of Europa	Spin axis measurement of Europa and Ganymede Range = 2,135,000 km (1,327,000 mi)	
2:50a	3:00a	Six photos of Europa	Narrow angle (color) Surface comparison studies	
2:50a	3:00a	Photometry of Europa		
3:00a	3:04a	Radio astronomy, plasma wave scan		
3:06a	3:09a	Single photo of Io	Narrow angle for surface comparison studies Range = 1,648,000 km (1,024,000 mi)	
3:10a	3:20a	Nine photos of Jupiter	Track pattern of evolving features Range = 1,070,000 km (1,038,000 mi)	

March 4, 1979 Day 63 (Cont.)

START (PST)	STOP	EVENT	COMMENTS	DSS
3:20a	3:23a	Three photos of Jupiter	Track pattern of evolving features Range = 1,669,000 km (1,037,000 mi)	
3:23a	4:41a	Infrared observations of Jupiter	Atmospheric composition and temperature profile	
BEGIN NEAR ENCOUNTER				
4:37a	5:06a	18 photos of Jupiter	Evolution of atmospheric features Range = 1,583,000 km (984,000 mi)	
5:08a	5:27a	18 photos of Jupiter	Range = 1,579,000 km (981,000 mi)	
5:32a	5:42a	Six photos of Europa	Chemical composition (color) Range = 9,966,000 km (6,193,000 mi)	
5:42a	5:46a	Radio astronomy, plasma wave scan		
5:46a	5:56a	Six photos of Io	Chemical composition, surface (color) history Range = 1,433,000 km (890,000 mi)	
6:03a	6:22a	18 photos of Jupiter	Range = 1,507,000 km (936,000 mi)	
6:24a	7:27a	Infrared observations of Jupiter	Composition and opacity in daylight zones and belts (with support of imaging)	
7:28a	7:47a	18 photos of Jupiter	Range = 1,449,000 km (900,000 mi)	MAD I
7:51a	7:57a	Photometry of Jupiter	Microstructure of clouds (low phase angle measurement)	
7:59a	8:46a	Infrared observations of Jupiter	Composition and opacity in daylight zones and belts	
8:53a	9:09a	Infrared observations of Jupiter	"Five-micron hot spots" (IRIS mosaic with support imaging)	
9:11a	9:17a	12 photos of Jupiter	Range = 1,335,000 km (830,000 mi)	
9:18a	9:34a	Photometry of Jupiter	Microstructure of clouds	

March 4, 1979 Day 63 (Cont.)

START PST	STOP	EVENT	COMMENTS	DSS
9:36a	9:45a	Photos and IRIS observations of Jupiter Radio occultation entry point	Vertical temperature profile and imaging of clouds	
9:49a	10:02a	Small region mosaic of part of Great Red Spot	12 frames 2 color Range = 1,289,000 km (801,000 mi)	
10:02a	10:15a	Mosaic of small region of Great Red Spot	12 frames 2 color Range = 1,286,000 km (799,000 mi)	
10:14a	10:24a	Photos and infrared observations of Sun occultation entry point on Jupiter	Vertical temperature profile	
10:24a	10:40a	Horizontal strip scan of Great Red Spot	Range = 1,279,000 km (795,000 mi)	
10:40a	10:56a	Vertical strip scan of Great Red Spot	Range = 1,278,000 km (794,000 mi)	
10:56a	11:02a	Horizontal strip scan of Great Red Spot	Range = 1,270,000 km (789,000 mi)	
11:02a	11:25a	Mosaic of small region of Great Red Spot	Range = 1,230,000 km (764,000 mi)	
11:25a	11:38a	Mosaic of small region of Great Red Spot	Range = 1,222,000 km (759,000 mi)	
11:38a	11:50a	Photometry and long exposures photos of dark space near Jupiter	Search for "rings" of dust in Jupiter equatorial plane Range = 1,200,000 km (746,000 mi)	
11:50a	11:53a	Radio astronomy, plasma wave scan		
11:56a	12:18p	14 photos of Io	Chemical composition and mineralogy, (color) bracketed exposures and calibration	
12:23p	12:32p	Six photos of Europa	Chemical composition and mineralogy (color) Range = 1,783,000 km (1,108,000 mi)	
12:33p	12:36p	Three photos of Amalthea	Surface characteristics and shape clear only	

March 4, 1979 Day 63 (Cont.)

START PST	STOP	EVENT	COMMENTS	DSS
12:36p	12:39p	Radio astronomy, plasma wave scan		
12:40p	12:48p	Photometry of Jupiter	Microstructure of clouds	
12:48p	12:55p	12 photos of Jupiter	Range = 1,168,000 km (726,000 mi)	
12:55p	1:08p	12 photos of Jupiter	High-resolution feature morphology Range = 1,160,000 km (721,000 mi)	
1:08p	1:14p	12 photos of Jupiter	Range = 1,140,000 km (708,000 mi)	
1:14p	1:20p	12 photos of Jupiter	Range = 1,120,000 km (696,000 mi)	
1:20p	1:30p	18 photos of Jupiter	Range = 1,105,000 km (687,000 mi)	
1:30p	1:52p	Infrared observations of Jupiter	Atmospheric temperatures	
1:52p	2:36p	Infrared observations of Jupiter	Atmospheric composition and opacity	
2:37p	2:47p	18 photos of Jupiter	Range = 1,048,000 km (651,000 mi)	
2:46p	3:02p	Photometry of Jupiter	Microstructure of clouds	
3:09p	3:14p	Radio astronomy, plasma wave scan		
3:14p	3:28p	12 photos of Io (first clear mosaic of Io)	High resolution studies of surface	GDS
3:32p	3:41p	18 photos of Jupiter	Range = 989,000 km (615,000 mi)	
3:41p	4:00p	18 photos of Jupiter	Range = 965,000 km (600,000 mi)	
4:06p	4:25p	Infrared observations of a Jupiter 5 micron Hot Spot	Abundance of constituents in deep atmosphere	
4:26	4:45p	18 photos of Jupiter	Evolution of atmospheric features Range = 930,000 km (578,000 mi)	

March 4, 1979 Day 63 (Cont.)

START (PST)	STOP	EVENT	COMMENTS	DSS
4:46p	4:51p	Nine photos of Jupiter	High resolution feature morphology Range = 920,000 km (572,000 mi)	
4:54p	4:58p	Polarimetry of Jupiter	Microstructure of clouds	
5:00	5:29p	Ultraviolet observations of Jupiter limb	Altitude profile of airglow emissions	
5:29p	5:32p	Radio astronomy, plasma wave scan		
5:33p	5:48p	12 photos of Io	High-resolution studies of surface Range = 496,000 km (308,000 mi) 2 x 2 mosaic, clear, and 5 colors on center of Io	
6:03p	6:12p	Infrared and imaging observations of Earth occultation exiting point on Jupiter	Vertical temperature profile and cloud deck	
6:13p	6:23p	Infrared observations of Jupiter 5 micron hot spot	Day-night comparison of "Hot Spots"	
6:24p	6:46p	Photometry of Jupiter	Microstructure of clouds	
6:51p	7:11p	18 photos of Jupiter	Range = 811,000 km (504,000 mi)	
7:13p	7:20p	Four photos of Amalthea	Chemical composition, surface history, mineralogy	
7:26p	7:32p	Eight photos of Io	Range = 445,000 km (276,000 mi)	
7:32p	7:36p	Radio astronomy, plasma wave scan		
7:36p	7:55p	Infrared observations of Jupiter		
7:56p	8:02p	Photometry of Jupiter	Microstructure of clouds	
8:03p	8:47p	Ultraviolet observations of Jupiter		
8:51p	9:34p	Mosaic of Great Red Spot	81 frames Range = 668,000 km (415,000 mi)	

March 4, 1979 Day 63 (Cont.)

START (PST)	STOP (PST)	EVENT	COMMENTS	DSS
9:34p	9:57p	Photometry of Jupiter	Microstructure of clouds, color data	
10:01p	10:20p	Infrared observations of Jupiter at a 5 micron hot spot	Constituents in deep atmosphere	
10:23p	10:38p	Photos and infrared observations of Amalthea	Surface composition and temperature spectrum	
10:40p	10:50p	Photometry of Jupiter	Microstructure of clouds	
10:50p	10:53p	Radio astronomy, plasma wave scan		
10:54p	11:20p	12 photos of Io (color) 2 x 2 mosaic	High-resolution surface studies Range = 359,000 km (223,000 mi)	AUSI
11:20p	11:42p	Photos of Io sodium cloud (long exposures)	Range to Io = 357,000 km (221,000 mi)	
11:46p	12:07a	Photometry of Jupiter	Microstructure of clouds	

MONDAY, MARCH 5, 1979

Voyager 1 is 679,675,000 kilometers (422,330,000 miles) from Earth at noon today. One-way light time is 37 minutes 46 seconds.

Distance from the spacecraft to Jupiter is changing rapidly today. Closest approach to Jupiter at 280,000 kilometers (174,000 miles) occurs at a spacecraft time of 7:05 a.m. EST. Also, close flybys of Io and Ganymede take place today. The post-encounter phase begins late in the day.

March 5, 1979 Day 64

START (PST)	STOP	EVENT	COMMENTS	DSS
12:08a	12:24a	Photometry of Jupiter	Altitude distribution of cloud particles	A v s |
12:25a	12:33a	15 photos of Jupiter	Range = 470,000 km (292,000 mi) Small region image	
12:34a	12:51a	Photometry of Jupiter	Altitude measurement of clouds	
12:52a	1:00a	15 photos of Jupiter	Range = 446,000 km (277,000)	▼
1:00a	1:30a	Ultraviolet observations of Jupiter	Best UV resolution of Jupiter limb	
1:36a	1:48a	Seven photos and infrared measurements of Amalthea eclipse	Measure entrance of eclipse and cooling area curve	
1:50a	2:04a	Photometry of Jupiter	Altitude distribution of cloud particles	
2:05a	2:22a	Photometry of Jupiter	Altitude distribution of cloud particles	
2:22a	2:25a	Radio astronomy, plasma wave scan		
2:25a	2:33a	Single photo of Amalthea eclipse	IR temperature measurements for surface characteristics	
2:36a	2:52a	Photometry of Jupiter	Altitude distribution of cloud particles	
2:54a	3:02a	15 photos of Jupiter	Range = 377,000 km (234,000 mi)	
3:07a	3:20a	Photometry of Jupiter	Altitude studies of cloud layers	
3:22a	3:30a	15 photos of Jupiter		
3:31a	3:50a	Infrared observations of a 5 micron region on Jupiter	Constituents in deep atmosphere, thermal sounding	
4:00a		BEGIN INTENSIVE Io ENCOUNTER		
4:01a	4:04a	Radio astronomy, plasma wave scan	Special measurement timed for possible flux tube arc discharge in Jovian atmosphere	
4:05a	4:15a	Ultraviolet observations of Io	Scan over north pole of Io for auroral activity	

M: :h 5, 1979 Day 64

START (PST)	STOP (PST)	EVENT	COMMENTS	DSS
4:12a	4:15a	Radio astronomy, plasma wave scan	Search for discharge between Jupiter and Io	
4:15a	5:27a	45 photos of Io	Migrates North to South Range = 286,000 km (178,000 mi)	
4:15a	5:27a	Infrared observations of Io	Coordinated surface mapping in UV, visual and IR domains	
4:15a	5:27a	Photometry of Io		
4:42a		CLOSEST APPROACH TO JUPITER	Range = 280,000 km (174,000 mi) Time at spacecraft = 4:05 a.m. (PST)	
5:27a	5:30a	Radio astronomy, plasma wave scan		
5:30a	6:24a	35 Photos of Io	Clear mosaic of equatorial and southern latitudes Range = 113,000 km (70,000 mi)	
5:30a	6:24a	Infrared observations of Io	Coordinated mapping	
5:30a	6:24a	Photometry of Io		
6:25a	6:29a	Photometry of Io		
6:30a	6:44a	Infrared observations of Io	Surface composition in south polar region	
6:44a		Imaging data to tape recorder	No real-time imaging science until tape playback, beginning 1:37 p.m.	
6:44a	6:58a	Radio astronomy, plasma wave scan		
6:45a	6:58a	Ultraviolet observations of Io	Search for auroras and emission sources	M A D
6:48	6:58a	Ultraviolet observations of Io	Same as above --	
7:00a	7:14a	12 Photos and IR, visible photometry of Io	Sampling at constant longitude Range = 23,400 km (14,500 mi)	

March 5, 1979 Day 64 (Cont.)

START (PST)	STOP	EVENT	COMMENTS	DSS
7:10a	7:13a	Infrared observations of Io		
7:14a	7:28a	3 color photos of Io South Pole	Wide-angle views of South pole and terminator Range = 23,400 km (14,500 mi)	
7:23a	7:54a	Io flux tube measurements	Fields and particles scans Passage predicted to occur 7:35 a.m. to 7:44 a.m.	
7:28a	7:38a	Ultraviolet measurement of flux tube and near surface atmosphere of Io		
7:29a	7:54a	Images, plasma wave measurements	During flux tube passage (onto digital tape recorder)	
7:33a	7:34a	Infrared measurements of south polar region		
7:37a	7:40a	Photometry of Io south polar region		
7:41a	7:56a	Infrared measurements and stereo imagery of Io South Pole		
7:50a		CLOSEST APPROACH TO Io	Range = 20,523 km (12,752 mi.) Time at spacecraft · 7:12 a.m.	
8:06a	8:36a	Ultraviolet observations of Io	Observe dark side of satellite	
8:08a		Start radio science quiet time	No high-rate slewing of platform	
8:14a		Start ionospheric occultation	Voyager 1 moves behind Jupiter (as seen from earth)	
8:22a		Start atmospheric occultation		
8:22a	9:01a	Radio science maneuver (part 1)		
8:24a		Enter Earth occultation		
9:16a	9:21a	Begin Sun occultation	Probe deep atmosphere using sun as light source; determines gases, composition, temperatures	

March 5, 1979 Day 64 (Cont.)

START (PST)	STOP	EVENT	COMMENTS	DSS
9:23a	9:29a	Photos of Jupiter	From North Pole to equator along limb - stored onboard spacecraft	
9:33a	9:57a	Ultraviolet observations at Io	Scans of North and South Pole regions	
10:20a		Spacecraft exits Earth occultation		
10:00a	10:29a	Ultraviolet, polarimetry of Io		
10:42a	11:01a	Infrared observations of Jupiter	Observe "hot spot" in dark (same one seen on lit side)	
11:15a	11:19a	Infrared observations of Sunrise	Atmospheric scattering study	
11:19a	11:35a	Ultraviolet observation of Jupiter	As Sun occultation ends	
11:24a		Voyager exits Sun occultation		
12:59p	1:21p	14 photos of Callisto	Upper and lower bands of brightness	
1:37p	2:17p	Begin data playback		
2:22p	4:38p	97 photos of Ganymede	85 narrow angle, 12 wide angle	
2:22p	4:38p	Infrared observations of Ganymede	Coordinated mapping sequence UV, visual, IR	GDS
2:22p	4:38p	Photometry of Ganymede		
4:39p	4:48p	Infrared observations of Ganymede		
4:48p	4:57p	Photometry of Ganymede		
4:57p	5:00p	Radio astronomy, plasma wave scan		
5:04p	5:57p	39 photos of Ganymede	33 narrow angle, 6 wide angle	
5:57p	6:32p	Ultraviolet observations of Ganymede	Classical bright limb measurement for bound or escaping atmosphere	
6:33p	6:52p	Ultraviolet observations of Ganymede	Ganymede occults star, search for atmosphere	

March 5, 1979 Day 65

START PST	STOP	EVENT	COMMENTS	DSS
6:52p	7:00p	Infrared observations of Ganymede	Ganymede closest approach at 6:53pm; (ER); time at s/c = 6:17 p.m. Range = 115,000 km (71,500 mi)	
7:00p	7:08p	Infrared observations of Ganymede	North polar observations	
7:08p	7:11p	Radio astronomy, plasma wave scan		
7:08p	7:28p	Infrared observations of Ganymede	Temperature of dark side of satellite	
7:28p		BEGIN POST-ENCOUNTER PHASE		
8:04p	8:23p	Infrared observations of Jupiter	Roll to alternate star reference so can view Jupiter Study 5 micron hot spots (reexamine one seen twice before)	
8:23p	8:47p	Ultraviolet observations of Jupiter	Observe four regions for signs of auroras	
8:48p	9:07p	Photometry, imaging of Jupiter	Crescent-lit planet--cannot be seen from Earth Study microstructure of clouds and cloud depth	
9:07p	10:23p	Infrared observations of Jupiter	Dark side for rest of encounter	
10:23p	10:47p	Photometry of Jupiter		
10:43p	11:19p	Infrared observations of Jupiter	North-south scan for latitudinal temperature differences	
11:19p	11:38p	Photometry of Jupiter	Cloud structure studies - high phase angles	

AUS

TUESDAY, MARCH 6, 1979

Voyager 1 is 682,033,000 kilometers (423,796,000 miles) from Earth at noon today. One-way time is 37 minutes 53 seconds.

The distance of the spacecraft past Jupiter at this time is 1,825,000 kilometers (1,134,000 miles).

A close flyby of Callisto occurs today. Later, the cameras will be used to search for new satellites.

March 6, 1979 Day 65

START PST	STOP	EVENT	COMMENTS	DSS
11:39p	12:03a	Ultraviolet observations of Jupiter	Measure airglow and aurorae	A
12:03a	12:22a	Photometry of Jupiter	Cloud structure study continues	v
12:23a	1:38a	Infrared observations of Jupiter	Cloud opacity study	s
1:51a	2:28a	Infrared observations of Jupiter	Temperature at 8 a.m. local time	↓
2:29a	2:46a	Photometry of Jupiter	Microstructure of clouds	
2:47a	3:06a	Photometry of Jupiter	Microstructure of clouds	
3:06a	3:25a	Photometry of Jupiter		
3:33a	4:30a	41 photos of Callisto	36 narrow angle for four-color mosaic, (3 x 3) plus five wide angle	
4:38a	4:58a	Photometry of Jupiter	Cloud structure	
4:57a	5:17a	15 photos of Jupiter cusp	Looking for atmospheric light scattering	
5:17a	5:36a	Infrared observations of Jupiter	Another view at an earlier observed 5 micron hot spot	
5:42a	5:59a	Polarimetry of Jupiter		

March 6, 1979 Day 65 (Cont.)

START PST	STOP	EVENT	COMMENTS	DSS
6:10a	7:13a	Photos of Callisto	Clear mosaic, 21 frames and 5 wide angle color	MAD
7:21a	8:04a	Infrared observations of Jupiter	Temperature of Great Red Spot in dark to compare with daylight observations	
8:07a	8:25a	Photometry of Jupiter		
8:33a	9:34a	Photos of Callisto	38 clear narrow angle frames and wide angle in color new limb	
9:36a	9:41a	Infrared observations of Callisto		
9:41a	10:18a	Ultraviolet observations of Callisto	UV bright limb study for band or escaping atmosphere	
9:46a		Closest approach to Callisto	Time at spacecraft is 9:08 a.m. Range = 126,108 km (78,359 mi)	
10:19a	10:24a	Infrared observations of Callisto	IR measurements near limb	
10:25a	10:57a	Infrared observations of Callisto	North polar passages; images	
11:04a	11:22a	Photometry of Jupiter	Cloud structure	
11:29a	11:50a	23 photos of Callisto	Range =	
11:50a	12:10p	Infrared observations of Callisto	Temperature across morning terminator, and dark side temperature	
12:16p	1:02p	Infrared observations of Jupiter	Atmospheric opacity	
1:03p	1:13p	Photos of Jupiter region	Search for new satellites inside Amalthea's orbit continues for two full rotations of Jupiter	
1:14p	1:43p	Ultraviolet observations of Jupiter	UV auroral activity search	
1:44p	1:54p	Photos of Jupiter region	Search for new satellites inside Amalthea's orbit	

March 6, 1979 Day 65 (Cont.)

START PST	STOP	EVENT	COMMENTS	DSS
1:55p	2:13p	Photometry of Jupiter		
2:14p	2:23p	Photos of Jupiter region	Search for new satellites inside Amalthea's orbit	
2:25p	3:10p	Infrared observations of Jupiter	Atmospheric opacity	G D S
3:11p	3:21p	Photos of Jupiter region	Search for new satellites inside Amalthea's orbit	
3:22p	3:51p	Ultraviolet observations of Jupiter		
3:52p	4:02p	Photos of Jupiter region	Search for new satellites inside Amalthea's orbit	
4:03p	4:21p	Photometry of Jupiter		
4:22p	4:31p	Photos of Jupiter region	Search for new satellites inside Amalthea's orbit	
4:32p	4:53p	Infrared observations of Jupiter		
4:56p	5:10p	Infrared, imaging of Callisto	Relate temperature differences to surface features, dark side measurement	
5:19p	5:29p	Photos of Jupiter region	Search for new satellites	
5:30p	5:59p	Ultraviolet observations of Jupiter		
6:00p	6:10p	Photos of Jupiter region	Search for new satellites	
6:11p	6:29p	Photometry of Jupiter		
6:30p	6:39p	Photos of Jupiter region	Search for new satellites	
6:41p	7:26p	Infrared observations of Jupiter		
7:27p	7:37p	Photos of Jupiter region	Search for new satellites	
7:38p	8:07p	Ultraviolet observations of Jupiter		

March 6, 1979 Day 65 (Cont.)

START (PST)	STOP	EVENT	COMMENTS	DSS
8:08p	8:18p	Photos of Jupiter region	Search for new satellites	
8:19p	8:37p	Photometry of Jupiter	Cloud structure	
8:38p	8:47p	Photos of Jupiter region	Search for new satellites	
8:49p	9:34p	Infrared observations of Jupiter		
9:35p	9:45p	Photos of Jupiter region	Search for new satellites	
9:46p	10:15p	Ultraviolet observations of Jupiter		
10:16p	10:26p	Photos of Jupiter region	Search for new satellites	
10:27p	10:45p	Ultraviolet observations		
10:46p	10:55p	Photos of Jupiter region	Search for new satellites	
10:57p	11:42p	Infrared observations of Jupiter		
11:43p	11:53p	Photos of Jupiter region	Search for new satellites	AUS
11:54p	12:23a	Ultraviolet observations of Jupiter		

WEDNESDAY, MARCH 7, 1979

Voyager 1 is 684,123,000 kilometers (425,094,000 miles) from Earth at noon today. One-way light time is 38 minutes 4 seconds.

The distance of the spacecraft past Jupiter at this time is 3,057,000 kilometers (1,899,000 miles).

The first outbound mosaic-imaging of the Jupiter crescent will take place today.

March 7, 1979 Day 66

START (PST)	STOP	EVENT	COMMENTS	DSS
12:24a	12:34a	Photos of Jupiter region	Search for new satellites	A V S
12:35a	12:53a	Photometry of Jupiter		
12:54a	1:03a	Photos of Jupiter region	Search for new satellites	
1:05a	1:50a	Infrared observations of Jupiter		
1:51a	2:01a	Photos of Jupiter region	Search for new satellites	
2:02a	2:31a	Ultraviolet observations of Jupiter		
2:32a	2:42a	Photos of Jupiter region	Search for new satellites	
2:43a	3:01a	Photometry of Jupiter		
3:02a	3:11a	Photos of Jupiter region	Search for new satellites	
3:11	3:15a	Radio astronomy, plasma wave scan		
3:27	3:36a	12 photos of Jupiter	Atmospheric studies, look for specular reflection from upper atmosphere	
3:38a	3:43a	Photometry of Io		
3:43a	4:31a	Infrared observations of Io eclipse	Look for temperature and brightness variations at entry	
3:47	3:52a	Photometry of Io	To cover eclipse	
3:52a	3:57a	Photometry of Io	To cover eclipse	
3:57a	4:02a	Photometry of Io	To cover eclipse	
4:32a	5:20a	Infrared observations of Jupiter		
5:23	5:27a	Photometry of Ganymede		
5:23a	5:55a	Infrared observations of Ganymede		
5:57a	6:17a	Photometry of Io	Exit from eclipse	

March 7, 1979 Day 66 (Cont.)

START (PST)	STOP	EVENT	COMMENTS	DSS
6:24a	6:43a	Photometry of Ganymede	Cloud structure studies	M A D
6:44a	8:03a	Infrared observations of Jupiter		
8:05a	8:35a	Infrared observations of Europa		
8:43a	7:23p	Infrared observations of Jupiter	Map planet's temperature for one full rotation in dark, to compare with lighted side data	G D S
7:24p	7:29p	Photometry of Ganymede		
7:32p	8:12p	Infrared observations of Callisto		
8:15p	8:19p	Radio astronomy, plasma wave scan		
8:35p	8:48p	photos of Jupiter	Mosaic of Great Red Spot	
8:49p	8:59p	photos of Jupiter region	Search for new satellites	
8:59p	9:12p	photos of Jupiter	Mosaic of Great Red Spot	
9:13p	9:23p	photos of Jupiter region	Search for new stellites	
9:23p	9:36p	photos of Jupiter	Mosaic of Great Red Spot	
9:37p	9:47p	photos of Jupiter region	Search for new satellites	
9:47p	10:00p	photos of Jupiter	Mosaic of Great Red Spot	
10:01p	10:11p	photos of Jupiter	Search for new satellites	
10:11p	10:24p	photos of Jupiter	Mosaic of Great Red Spot	
10:25p	10:35p	photos of Jupiter region	Search for new satellites	
10:35p	10:48p	photos of Jupiter	Mosaic of Great Red Spot	
10:49p	10:59p	photos of Jupiter region	Search for new satellites	
10:59p	11:12p	photos of Jupiter	Mosaic of Great Red Spot	A U S

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START (PST)	STOP (PST)	EVENT	COMMENTS	DSS
11:13p	11:23p	Photos of Jupiter region	Search for new satellites	
11:23p	11:36p	Photos of Jupiter region	Mosaic of Great Red Spot	
11:37p	11:47p	Photos of Jupiter region	Search for new satellites	
11:47p	12:00p	Photos of Jupiter region	Mosaic of Great Red Spot	

SPACECRAFT STATUS

Voyager 1, second of the two Jupiter and Saturn-bound spacecraft launched during the 1977 opportunity, lifted off Complex 14 at Cape Canaveral, Florida, aboard a Titan Centaur launch vehicle at 8:46 a.m. EST on September 5. Voyager 1 was boosted onto a faster, shorter trajectory which would carry it past Jupiter 4 months earlier and past Saturn 9 months earlier than its twin, Voyager 2, which had been launched 16 days earlier.

On December 15, 1977, Voyager 1 caught up with and passed Voyager 2 at a distance of about 170 million kilometers (105 million miles) from Earth. Both spacecraft had begun passage through the asteroid belt just a few days earlier--on December 10. Voyager 1 exited the asteroid belt on September 8, 1978.

The debris-strewn asteroid belt, which circles the Sun between the orbits of Mars and Jupiter, is about 360 million kilometers (223 million miles) wide and, at one time, was believed to present a hazard to intruding spacecraft. The Voyagers were the third and fourth spacecraft to make such a crossing, following the early Jupiter reconnaissance flights of Pioneer 10 and 11 in 1973 and 1974.

First of a series of as many as eight trajectory correction maneuvers (for each spacecraft), to refine the flight paths and assure the precise arrival times and encounter distances required by the mission, was executed by Voyager 1 on September 11, 1977. Later maneuvers were performed on October 29, 1977, and January 29, 1979. Additional maneuvers are planned for February 20 and March 16, 1979. The trajectory correction maneuver after Jupiter in March will be a large one, to adjust the spacecraft's arrival time at Saturn for a close flyby of Titan.

Two major engineering problems--one with each spacecraft--arose during the long cruise phase of the mission.

During a calibration of Voyager 1's scan platform on February 23, 1978, the platform's azimuth gears slowed and stalled to a standstill. During the next 3 months, engineers determined that a small amount of soft, pliable debris--apparently retained in the unit during its assembly--had found its way into the gears. By maneuvering the platform through the problem area, the bits of debris were crushed by the gears freeing the platform. Voyager's scan platform, upon which are mounted the planet tracking instruments including the two television cameras, can be rotated on two axes for precision pointing.

Voyager 2's primary radio receiver failed on April 5, 1978, and the spacecraft's computer command subsystem automatically switched in the backup receiver. Unlike the Voyager 1 scan platform problem which has been resolved, Voyager 2's radio emergency remains a concern. Only a single receiver is available to the spacecraft which may be expected to operate through Uranus encounter (January, 1986) and it is functioning with a faulty tracking-loop capacitor.

The existing receiver can no longer normally follow a changing signal frequency. Telecommunications engineers, however, have developed a technique of determining the frequency at which the receiver is listening, then computing the frequency at which the Deep Space Network station must transmit commands. This procedure has worked successfully since mid-April.

Because of the loss of the redundant receiver capability, a backup mission sequence was transmitted to Voyager 2 on June 23 and stored in the on-board computer. The backup sequence would assure a minimum science activity at both planets in the event ground command capability is lost. The sequence can be updated periodically.

Overall performance of the Voyager 1 spacecraft remains very good. The three RTG's are now delivering a total of 450 watts of electrical power, giving a minimum power margin of 59 watts. Hydrazine consumption for attitude control and trajectory correction maneuvers has been within allocations. Voyager 1 now has 90.3 ± 0.5 kg of hydrazine remaining out of an initial load of 104.3 kg. The amount of tape across the tape recorder heads is another controlled expendable which is within allocation. It now appears that Voyager 1 can be operated out far beyond Saturn, perhaps to 20 or 30 AU.

Status of the science instruments on both Voyager spacecraft is shown in Table 6. All of the instruments on Voyager 1 are performing well with the exception of the photopolarimeter. On this instrument, the potentiometer which controls the stepping of the polarizing analyzer wheel became erratic during cruise. Also, a similar potentiometer which controls the stepping of the filter wheel did not always operate well during cruise. Consequently, the decision has been made to not use the analyzer wheel during encounter and to limit the filter wheel use to 50 hours. The photopolarimeter will, therefore, function as a filter-photometer but it is expected to produce valuable scientific information.

Table 6 indicates there may be some degradation in the results of the radio science investigation. This is due to the fact that the non-gravitational forces on the spacecraft are higher than expected. Most of this effect is caused by the impingement on spacecraft structure of exhaust from the small thrusters used for attitude control. The ultra-stable oscillator and other radio equipment used by the radio science investigation are performing well.

TABLE 6
VOYAGER 1
SCIENCE INSTRUMENT STATUS

INVESTIGATION	INSTRUMENT PERFORMANCE	PROBLEMS
IMAGING	VERY GOOD	
INFRARED INTERFEROMETER SPECTROMETER	VGR-1 VERY GOOD VGR-2 GOOD (?)	POLYMER PHASE SEPARATION/FREEZING FLASH-OFF HEATER WARM-UP CORRECTS PROBLEM TEMPORARILY
ULTRAVIOLET SPECTROMETER	VERY GOOD	
PHOTOPOLARIMETER	FAIR	VGR-1 - NO ANALYZER WHEEL OPERATION 50 hours FILTER WHEEL OPERATION VGR-2 - DECISIONS PENDING
PLASMA	VERY GOOD	NO RECURRENCE OF INTERMITTENT SENSOR (LECP STEPPING MICROPHONICS INTERACTION)
MAGNETOMETER	VERY GOOD	
PLASMA WAVE	VERY GOOD	VGR-1 FDS TELEMETRY FAILURE
PLANETARY RADIO ASTRONOMY	VERY GOOD	
LOW ENERGY CHARGED PARTICLE	VERY GOOD	
COSMIC RAY	VERY GOOD	
RADIO SCIENCE	VERY GOOD/FAIR	SPACECRAFT NON-GRAV FORCES ARE HIGH

VOYAGER TEAMS

MANAGEMENT

NASA Office of Space Science

Noel W. Hinners	Associate Administrator for Space Science
Andrew J. Stofan	Deputy Associate Administrator
Adrienne F. Timothy	Assistant Associate Administrator
Geoffrey A. Briggs	Acting Director, Planetary Division
Rodney A. Mills	Program Manager
Milton A. Mitz	Program Scientist

NASA Office of Tracking & Data Systems

William C. Schneider	Associate Administrator for Tracking & Data Systems
Charles A. Taylor	Director, Network Operations & Communication Programs
Arnold C. Belcher	Program Manager for DSN Operations
Frederick B. Bryant	Director, Network System Development Programs
Maurice E. Binkley	Director, DSN Systems

Jet Propulsion Laboratory, Pasadena, CA

Bruce C. Murray	Laboratory Director
Charles H. Terhune, Jr.	Deputy Laboratory Director
Robert J. Parks	Project Manager
Raymond L. Heacock	Deputy Project Manager
Peter T. Lyman	Deputy Project Manager

Richard P. Laeser	Mission Director
George P. Textor	Deputy Mission Director
Charles E. Kohlhase	Manager, Mission Planning Office
Esker K. Davis	Tracking & Data System Manager
Michael R. Plesset	Mission Computing System Manager
Michael J. Sander	Director, Development Integration & Test
James E. Long	Director, Science
Francis M. Sturms	Director, Sequence Design & Integration
Michael Devirian	Director, Space Flight Operations

California Institute of Technology, Pasadena, California

Edward C. Stone	Project Scientist

SCIENCE TEAMS

Imaging Science

Bradford A. Smith, University of Arizona, Team Leader
Geoffrey A. Briggs, National Aeronautics and Space Administration
Allan F. Cook II, Smithsonian Institution
G. Edward Danielson, Jr., California Institute of Technology
Merton E. Davies, Rand Corp
Garry E. Hunt, University College, London
Tobias Owen, State University of New York at Stony Brook
Carl Sagan, Cornell University
Laurence A. Soderblom, U.S. Geological Survey
Verner E. Suomi, University of Wisconsin
Harold Masursky, U.S. Geological Survey
Torrence V. Johnson, Jet Propulsion Laboratory

Radio Science

Von R. Eshleman, Stanford University, Team Leader
John D. Anderson, Jet Propulsion Laboratory
Tom A. Croft, SRI International
Gunnar Lindal, Jet Propulsion Laboratory
Gerald S. Levy, Jet Propulsion Laboratory
G. Len Tyler, Stanford University
Gordon E. Wood, Jet Propulsion Laboratory

Plasma Wave

Frederick L. Scarf, TRW Systems, Principal Investigator
Donald A. Gurnett, University of Iowa

Infrared Radiometry and Spectroscopy

Rudolph A. Hanel, Goddard Space Flight Center, Principal Investigator
Barney J. Conrath, Goddard Space Flight Center
Dan Gautier, Meudon, France
Peter J. Gierasch, Cornell University
Shailendra Kumar, Jet Propulsion Laboratory
Virgil G. Kunde, Goddard Space Flight Center
P. D. Lowman, Goddard Space Flight Center
William C. Maguire, Goddard Space Flight Center
John C. Pearl, Goddard Space Flight Center
Joseph A. Pirraglia, Goddard Space Flight Center
Cyril Ponnamperuma, University of Maryland
Robert F. Samuelson, Goddard Space Flight Center

Ultraviolet Spectroscopy

A. Lyle Broadfoot, Kitt Peak National Observatory, Principal Investigator
Jean L. Bertaux, Service d'Aeronomie du CNRS
Jacques Blamont, Service d'Aeronomie due CNRS
Thomas M. Donahue, University of Michigan
Richard M. Goody, Harvard University
Alexander Dalgarno, Center for Astrophysics
Michael B. McElroy, Harvard University
John C. McConnell, York University
H. Warren Moos, Johns Hopkins University
Michael J. S. Belton, Kitt Peak National Observatory
Darrell F. Strobel, Naval Research Laboratory
Sushil K. Atreya, University of Michigan
Bill Sandel, University of Arizona
Donald E. Shemansky, University of Arizona

Photopolarimetry

Charles F. Lillie, University of Colorado, Principal Investigator (Cruise)
Charles W. Hord, University of Colorado, Principal Investigator (Encounter)
David L. Coffeen, Goddard Institute for Space Studies
James E. Hansen, Goddard Institute for Space Studies
Kevin Pang, Science Applications, Inc.

Planetary Radio Astronomy

James W. Warwick, University of Colorado and Science Applications, Inc., Principal Investigator
Joseph K. Alexander, Goddard Space Flight Center
Andre Boischot, Observatoire de Paris
Walter E. Brown, Jr., Jet Propulsion Laboratory
Thomas D. Carr, University of Florida
Samuel Gulkis, Jet Propulsion Laboratory
Fred T. Haddock, University of Michigan
Christopher C. Harvey, Observatoire de Paris
Yolande LeBlanc, Observatoire de Paris
Robert G. Peltzer, University of Colorado
Roger J. Phillips, Jet Propulsion Laboratory
David H. Staelin, Massachusetts Institute of Technology
Anthony Riddle, University of Colorado
Jeffrey Pearce, University of Colorado

Magnetic Fields

Norman F. Ness, Goddard Space Flight Center, Principal Investigator
Mario H. Acuna, Goddard Space Flight Center
Len F. Burlaga, Goddard Space Flight Center
Ron P. Lepping, Goddard Space Flight Center
Fritz M. Neubauer, der Technischen Universitat Braunschweig
Ken Behannon, Goddard Space Flight Center

Low-Energy Charged Particles

S. M. Krimigis, Johns Hopkins University, Principal Investigator
Thomas P. Armstrong, University of Kansas
W. Ian Axford, Max Planck Institut fur Aeronomie
Chang-yun Fan, University of Arizona
George Gloeckler, University of Maryland
Louis J. Lanzerotti, Bell Telephone Laboratories
Carl O. Bostrom, Johns Hopkins University

Plasma Science

Herbert S. Bridge, Massachusetts Institute of Technology, Principal Investigator
John W. Belcher, Massachusetts Institute of Technology
Joseph H. Binsack, Massachusetts Institute of Technology
Alan J. Lazarus, Massachusetts Institute of Technology
Stanislaw Olbert, Massachusetts Institute of Technology
Vytenis M. Vasyliunas, Max Planck Institut fur Aeronomie
Len F. Burlaga, Goddard Space Flight Center
Richard E. Hartle, Goddard Space Flight Center
Keith W. Ogilvie, Goddard Space Flight Center
George L. Siscoe, University of California, Los Angeles
Art J. Hundhausen, High-Altitude Observatory
Jim Sullivan, Massachusetts Institute of Technology
Clayne M. Yeats, Jet Propulsion Laboratory

Cosmic Ray

Rochus E. Vogt, California Institute of Technology, Principal Investigator
J. Randy Jokipii, University of Arizona
Edward C. Stone, California Institute of Technology
Frank B. McDonald, Goddard Space Flight Center
Bonnard J. Teegarden, Goddard Space Flight Center
William R. Webber, University of New Hampshire