Voyager Bulletin

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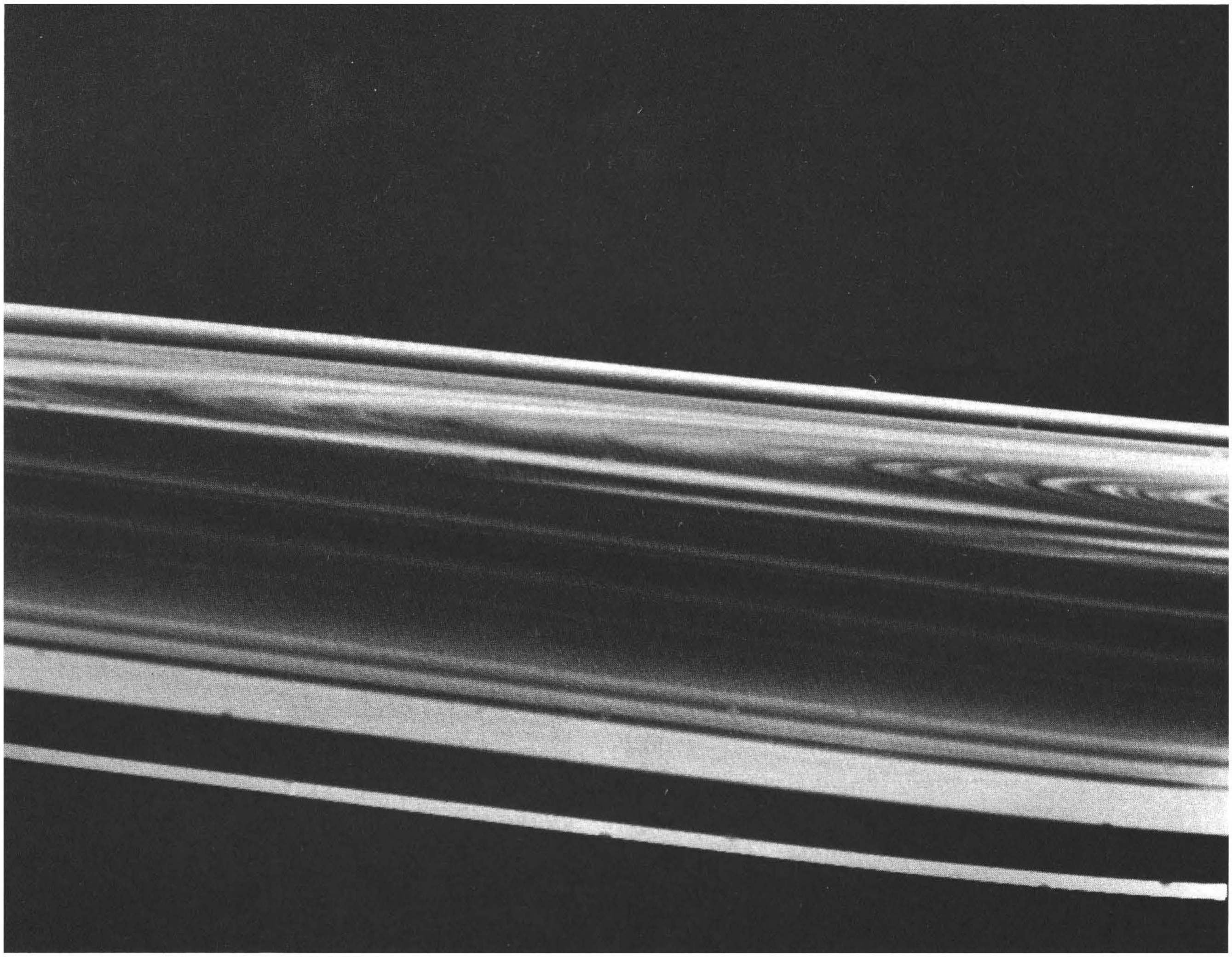
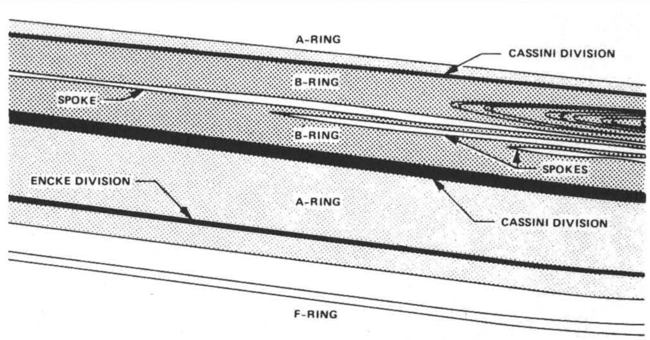


Moments before diving below Saturn's ring plane, Voyager 2 captured this extremely oblique view of the bright (northern) side of the complex rings. This angle highly magnifies features near the bottom of the picture and compresses features across to the other side of the west ansa (the western edge of the loop in the rings). The bright streaks in the B-Ring are the spokes in forward-scattered light. From this angle, one cannot ascertain any levitation of fine dust particles to form the spokes. 8/25/81, 103,000 km (64,000 mi)



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Voyager 2: Saturn Plus 7 Days

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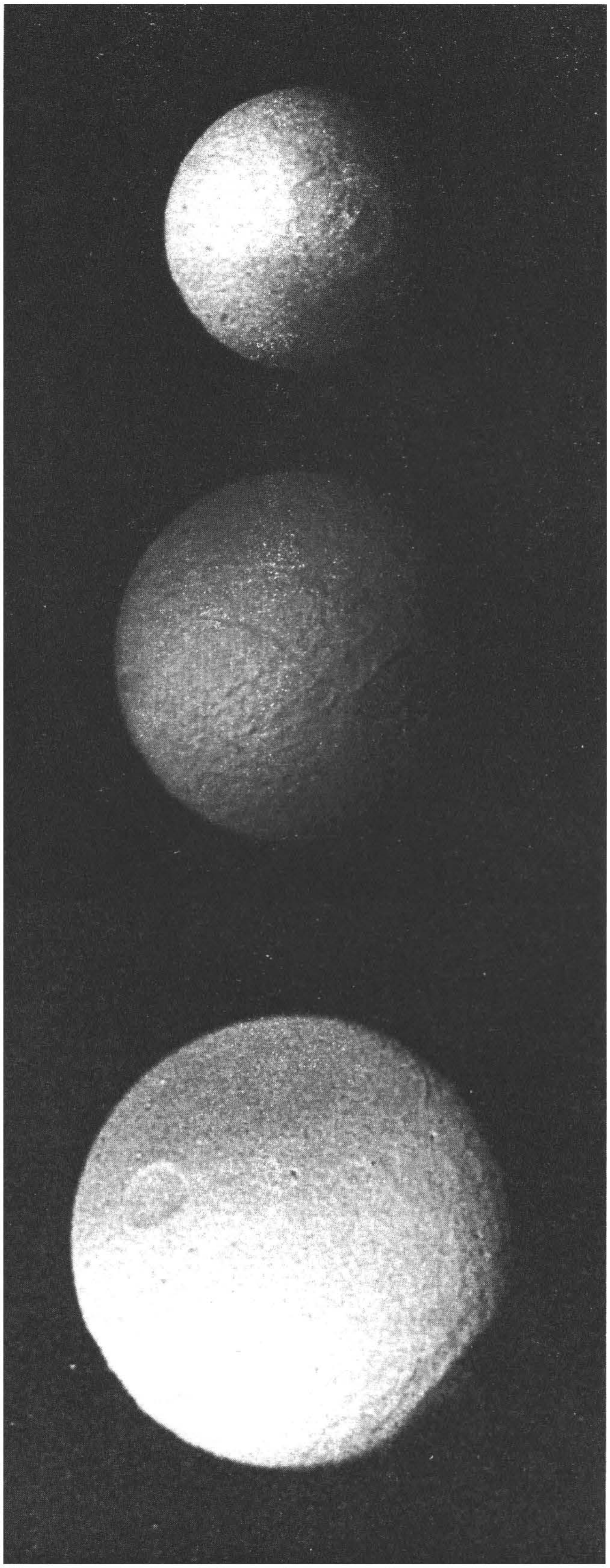
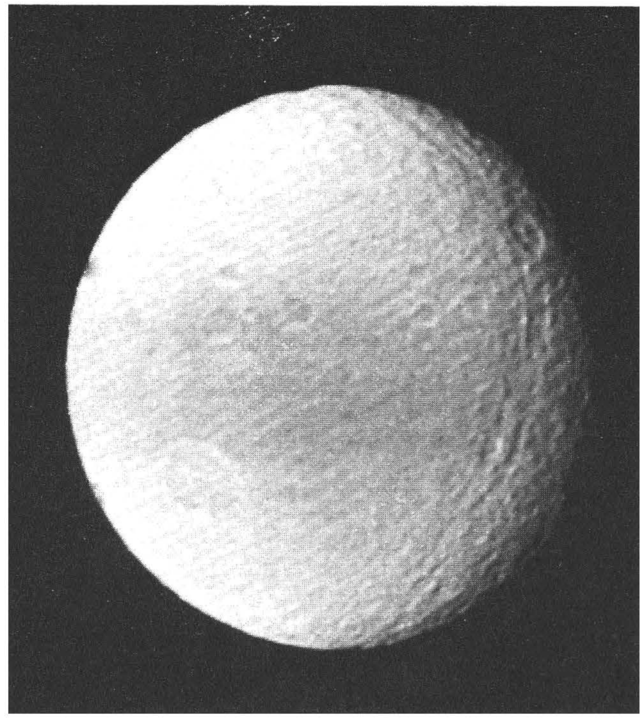
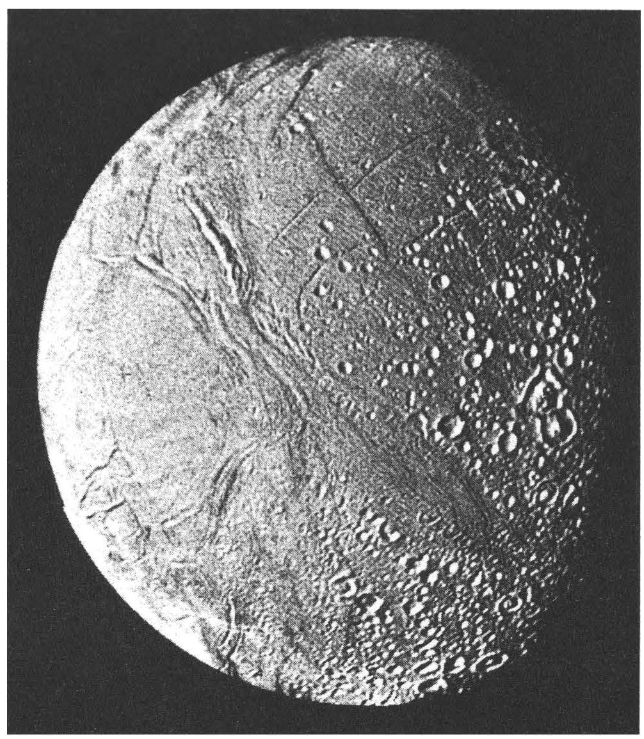


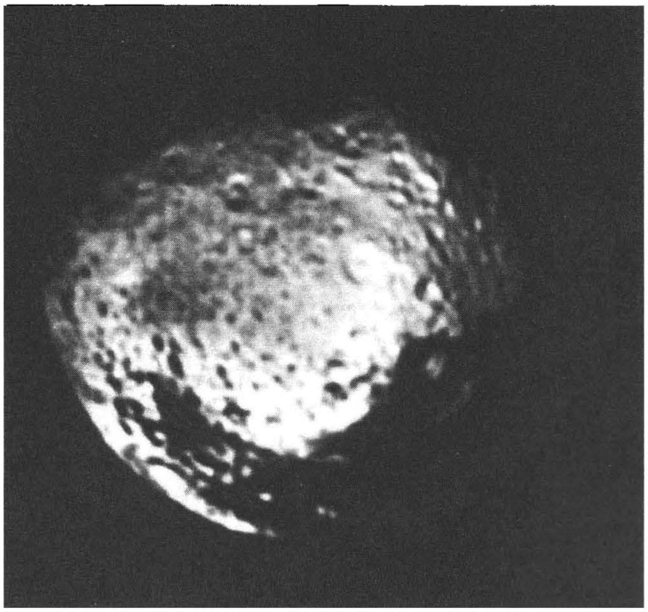
This series of Voyager 2 pictures of Tethys shows the satellite's distinctive large crater, 400 km (250 mi) in diameter, as it rotates toward the day/night terminator and limb (to the right). These images were obtained at four-hour intervals beginning late August 24 and ending early the next day. The remnant of a large impact, the crater has a central peak and several concentric rings. Some grooves radiating from the center may be formed of material thrown from the crater during the impact. The bottom frame, with the crater in profile, reveals that the crater floor has risen back to the spherical shape of the satellite, unlike the large crater seen on Tethys' sister moon Mimas.



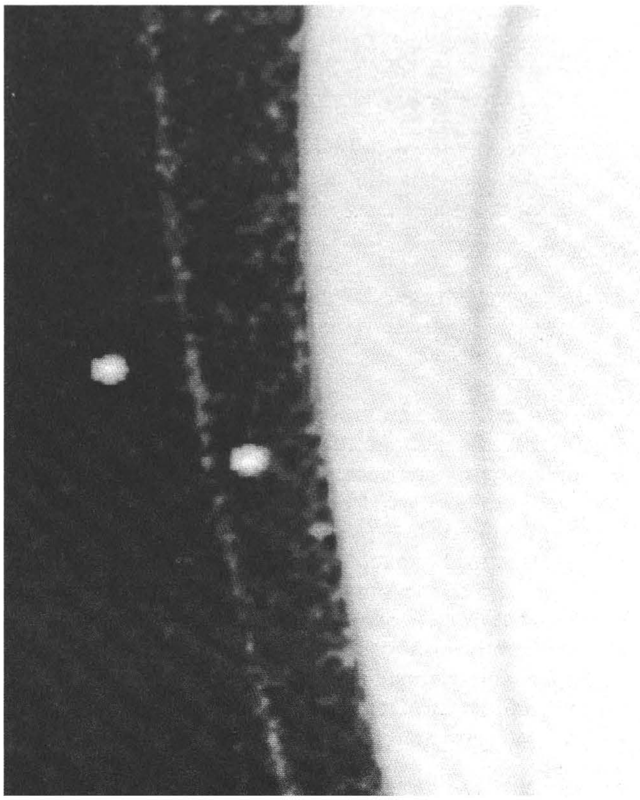
Tethys shows two distinct types of terrain — bright, densely cratered regions; and relatively dark, lightly cratered plains that extend in a broad belt across the satellite. The densely cratered terrain is believed to be part of the ancient crust of the satellite; the lightly cratered plains are thought to have been formed later by internal processes. Also clearly seen is a trough that runs parallel to the terminator (the day-night boundary, seen at right). This trough is an extension of the huge canyon system seen by Voyager 1 last fall. This system extends nearly two-thirds the distance around Tethys. 8/25/81 594,000 km (368,000 mi)



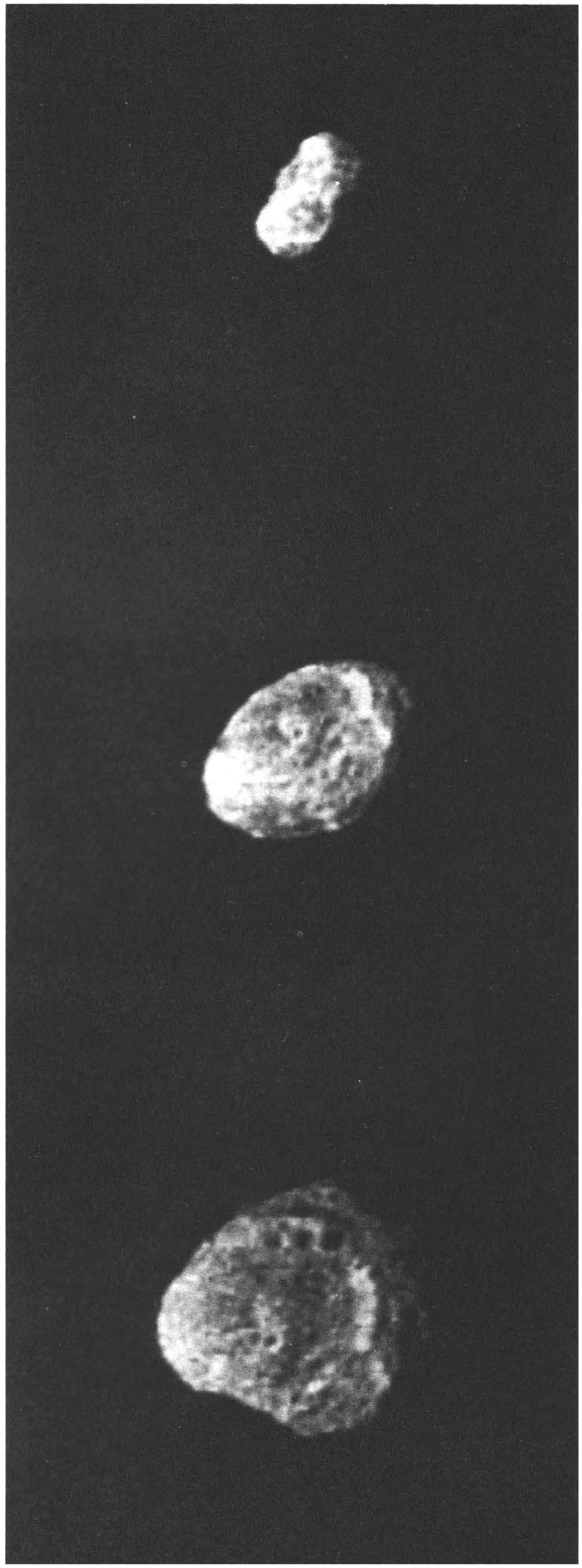
This high-resolution filtered mosaic shows surface detail on Enceladus. Enceladus resembles Jupiter's Galilean satellite Ganymede; however, Ganymede is about 10 times larger. Faintly visible here in "Saturnshine" is the hemisphere turned away from the sun. 8/25/81 119,000 km (74,000 mi)



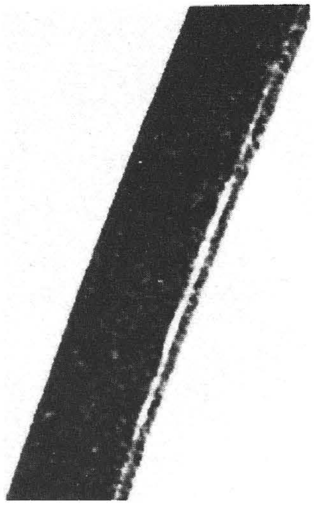
Iapetus, the outermost of Saturn's large satellites, shows features as small as 21 km (13 mi) across. This image has been processed to reveal as much detail as possible in the bright, icy regions of the northern trailing hemisphere. The number and forms of impact craters here appear similar to those of the heavily cratered surfaces of the inner icy satellites (such as Rhea and Mimas) photographed by Voyager 1. This similarity suggests an ancient crust dating back to the early history of the solar system. Iapetus is noteworthy for the very dark material (seen here in the lower and right-hand parts of the picture) that apparently covers the satellite's ice crust primarily on its leading hemisphere. Iapetus has a diameter of 1,450 km (900 mi). Voyager 2 passed about four times closer to the satellite than did Voyager 1 last fall. 8/22/81 1.1 million km (680,000 mi)



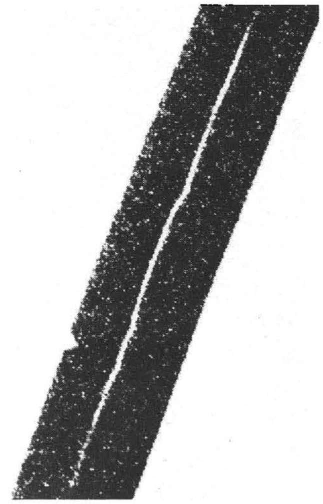
Herding the thin F-Ring between them, satellites 1980S27 (inner) and 1980S26 (outer) are about 1800 km (1100 mi) apart in this Voyager 2 image. Travelling slightly faster, the inside moon overtook the outer one about two hours later. This "lapping" occurs every 25 days. The A-Ring and Encke Division are to the right in this image, which was over-exposed to capture the faint F-Ring and its two shepherds. 8/15/81 10.5 million km (6.6 million mi)



These views of Hyperion show the changing aspect of the satellite as Voyager 2 closed in. Roughly 360 km by 210 km (220 mi by 130 mi) and shaped like a hamburger. Hyperion probably is not in a gravitationally stable position. Its surface is pock-marked with many meteorite-impact craters. It is possible that one of these impacts jostled Hyperion out of position and that the satellite will swing back gradually. 8/23/81 1.2 million km (740,000 mi), 8/24/81 700,000 km (430,000 mi), 8/24/81 500,000 km (310,000 mi).



Voyager 2's cameras discovered a new "kinky" ringlet inside the Encke gap in Saturn's A-Ring. Photopolarimeter data indicates additional structure within the gap. These pictures show the thin ringlet at two different positions, photographed near the time the spacecraft crossed the planet's ring-plane. Resolution is about 15 km (9 mi) in both frames. Here, the ringlet appears in two different positions: about midway in the gap in the right-hand image and near the inner edge of the gap at left. Scientists do not know if the kinky ring is eccentric, or off-center, or if perhaps there are several inner rings, with different components visible at different longitudes. The kinks, clearly visible on the right, appear to be more closely spaced than those seen in Saturn's outer F-Ring. (The fine white dots or "snow" in these pictures are artifacts of processing and are not individual moonlets. 8/25/81 700,000 km (435,000 mi)



Update

On September 4, ten days and 9.7 million kilometers (6 million miles) beyond Saturn, Voyager 2 will photograph tiny Phoebe, Saturn's outermost satellite. Although the images will be only a few pixels (picture elements) across in the narrow-angle camera's field-of-view, they should provide valuable information since Phoebe has never been photographed from such close range (2.08 million kilometers). Neither Pioneer 11 nor Voyager 1 passed close enough to photograph Phoebe, which may be a captured asteroid. Only 160 kilometers (100 miles) in diameter, it orbits nearly 13 million kilometers (8.1 million miles) from Saturn in a plane highly inclined to that of the rest of the Saturn system. It also orbits in the opposite direction from the rest of the satellites, and rotates asynchronously. All of the other Saturn satellites rotate synchronously; i.e., the same side always faces the planet. Phoebe pictures taken over a 24-hour period may be assembled into a time-lapse movie to learn more about its rotation rate, shape, and other characteristics. The photopolarimeter will also observe Phoebe.

Engineers continue to investigate the problem which caused the spacecraft's scan platform to stick on August 25 shortly after closest approach to the planet. The spacecraft was in the planet's shadow and out of communications with Earth when the platform stuck. The problem was discovered as the spacecraft emerged from behind the planet and resumed communications. Commands were immediately sent to point the instruments away from the Sun to avoid damage which could result from direct pointing at the Sun.

Four instruments — the wide- and narrow-angle cameras, the infrared and ultraviolet spectrometers, and the photopolarimeter — are mounted on the scan platform at the tip of a 7.5-foot boom which extends from the main body of the spacecraft. The platform moves in two directions: azimuth (side to side) and elevation (up and down). The problem affects movement in azimuth.

The cause of the problem is not yet understood. The scan platform stopped about 45 minutes after Voyager 2 crossed the ring plane, but this has not been directly related to the platform problem. The plasma wave instrument recorded an increase in the intensity of its data at the time of ring plane crossing, leading to speculation that the spacecraft was bombarded with dust particles which vaporized as they hit the spacecraft.

On August 28 the platform was successfully moved by ground command to point the instruments at Saturn once again. Early tests of the platform's movement showed that it could be moved, although its response was at times hesitant and slow. Its response has steadily improved.

The platform motion has been controlled entirely from the ground since the problem began. The Phoebe observations on September 4 will be the first platform motions commanded by the on-board computer sequence rather than by ground control since the problem occurred. As an engineering precaution, the range of azimuth positions required for the Phoebe observations has been satisfactorily explored by the platform in a diagnostic test. The platform's current position is favorable for Saturn and Phoebe observations, and is also a good position for the Uranus encounter in 1986, should the platform stick once more. With the successful flyby of Saturn, Uranus is now Voyager 2's prime target.

The computer sequence which would automatically operate the spacecraft for the month of September has been redesigned to include only "safe" activity. After assessing the problem, mission planners have been able to restore several important observations to the sequence, including Phoebe, imaging studies of the southern hemisphere, and ultraviolet studies of the south pole as well as several vital engineering calibrations.

On its inbound journey to Saturn, Voyager 2 could see as far south as about 40°S latitude. Now the entire southern hemisphere from equator to pole is visible to the spacecraft while views of the northern hemisphere are blocked by the rings (Voyager 2 is now below the ring plane). Due to the shadow of the rings and the tilt of the planet relative to the Sun, atmospheric dynamics in the southern hemisphere may be vastly different from those in the northern hemisphere. Observations of the southern hemisphere are planned with the imaging cameras, and the infrared and ultraviolet spectrometers. The ultraviolet spectrometer will scan the south pole to look for auroral emissions.

Although some valuable observations of the planet's dark side and southern hemisphere, the underside of the rings, and several satellites were lost, as well as one fields and particles maneuver, project scientists pronounce the encounter entirely successful due to the wealth of data received before the platform stuck.