Pioneer Venus Mission Support

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A summary of the history of the Pioneer Venus missions is presented. The characteristics of the 1976/77 probe missions are given. The Pioneer Project investigates a preliminary plan to develop a cooperative agreement on the Venus Orbiter mission with the European Space Research Organization.

A brief history of the Pioneer Venus project is given in Fig. 1. (See also Refs. 1–9). As reported previously, prior to 1972, Goddard Space Flight Center was involved in the study of missions, called Planetary Explorers, which would probe the Venusian atmosphere. The initial study began during the first quarter of 1968. The Phase A study was completed during the beginning of 1971. During the latter part of the same year the program was transferred to Ames Research Center and is now called Pioneer Venus. After the selection of contractors for a Phase B study for the duration of nine months, the execution phase of Pioneer Venus will start during the second quarter of 1973.

Four Pioneer Venus missions are on the planning board. Two probe missions will be launched, in December 1976 and January 1977. The universal bus of this mission will weigh 150 kg, the large landing probe 170 kg, and the three small probes a total of 70 kg, thus comprising a total spacecraft weight of 390 kg. The flight time will be 325 days, and the probes will be separated 10 to 20 days before entering the Venusian atmosphere. The bus will also enter the Venusian atmosphere at a shallow entry angle and will transmit data until burn. The bus science package will weigh 10 kg, and the telemetry bit rate is estimated at 300 bps. The large probe will have a descent time of 90 min, the small probe a descent time of 60 min. The expected bit rate of the large probe will be 80 bps up to 52 km altitude. The 40-bps rate will be used from 52 km until at the surface of the planet. The small probes will have a bit rate of 1 bps.

The Pioneer orbiter mission will be flown during 1978 and a follow-on probe mission, which is the fourth of this series, will be flying towards Venus in 1980.

The European Space Research Organization (ESRO) is also involved in a study of a Venus orbiter mission. Recommendations were made for NASA/ESRO cooperation. ESRO is currently involved in a preliminary feasibility study of a 1978 Venus orbiter. A request for a proposal on this study was coordinated with Ames Research Center. The study of a preliminary plan on the NASA/ESRO interface with the Pioneer Project has started. This plan assumes that ESRO would be responsible for integration of the experiments into a NASA-furnished bus. NASA would support the launch, mission operations, and tracking and data acquisition.

References

1. Siegmeth, A. J., "Pioneer Mission Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. II, pp. 6–17. Jet Propulsion Laboratory, Pasadena, Calif., Apr. 15, 1971.
2. Siegmeth, A.J., "Pioneer Mission Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. III, pp. 7–19. Jet Propulsion Laboratory, Pasadena, Calif., June 15, 1971.
3. Siegmeth, A. J., "Pioneer Mission Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. IV, pp. 13–21. Jet Propulsion Laboratory, Pasadena, Calif., Aug. 15, 1971.
4. Siegmeth, A. J., "Pioneer Mission Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. V, pp. 4–16. Jet Propulsion Laboratory, Pasadena, Calif., Oct. 15, 1971.
5. Siegmeth, A. J., "Pioneer Mission Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. VI, pp. 13–24. Jet Propulsion Laboratory, Pasadena, Calif., Dec. 15, 1971.
6. Siegmeth, A. J., "Pioneer Mission Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. VII, pp. 5–16. Jet Propulsion Laboratory, Pasadena, Calif., Feb. 15, 1972.
7. Siegmeth, A. J., "Pioneer Mission Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. VIII, pp. 8–19. Jet Propulsion Laboratory, Pasadena, Calif. Apr. 15, 1972.
8. Siegmeth, A. J., "Pioneer Mission Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. IX, pp. 18–32. Jet Propulsion Laboratory, Pasadena, Calif., June 15, 1972.
9. Siegmeth, A. J., "Pioneer 6-9 Mission Support," in *The Deep Space Network Progress Report*, Technical Report 32-1526, Vol. X, pp. 10–13. Jet Propulsion Laboratory, Pasadena, Calif., Aug. 15, 1972.

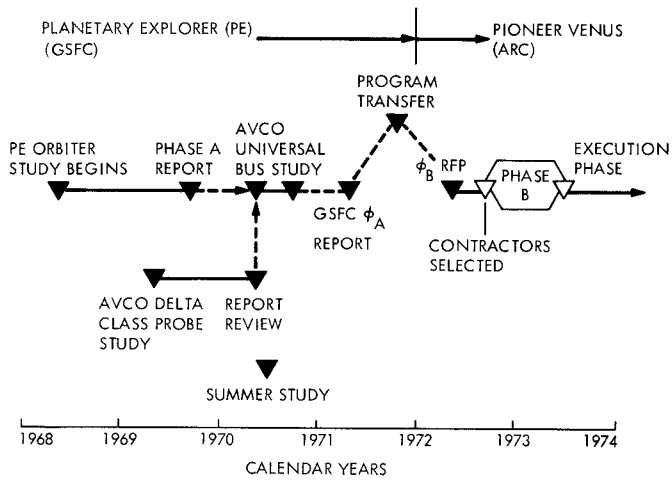

Fig. 1. History of Pioneer Venus