Pioneers 6 Through 12 Mission Support

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This article discusses the activities of DSN Operations in support of the Pioneers 6 through 9, Pioneer 10, Pioneer 11, and Pioneer Venus Orbiter (Pioneer 12) Missions from June 1980 through March 1981.

I. Introduction

The information contained in this report covers the continuing efforts of the Deep Space Network in support of Pioneer Mission Operations during the cruise phases of Pioneers 6 through 9, Pioneer 10, Pioneer 11, and the orbital operations of Pioneer 12 spacecrafts.

II. Mission Operations and Status

A. Pioneer 6

In June of 1980, Pioneer 6 went through superior conjunction. The first track after superior conjunction found the spacecraft on-board systems in good health and functioning nominally. In December of 1980, Pioneer 6 celebrated its fifteenth year in operation with signs of continuing for another fifteen years.

B. Pioneer 7

During this reporting period, tracking support increased due to tracking availability of the Network. The spacecraft has been and is left in the engineering format to provide an early means of establishing the spacecraft's health in the event of a problem. The on-board science experiments, which continue to function nominally, are turned on only when the spacecraft is tracked.

C. Pioneer 8

In August of 1980 as the spacecraft approached perihelion, the Sun sensor and plasma analyzer on board the spacecraft functioned for the first time in several years and produced valid data. During perihelion, tracking support was limited. Additional tracking support is scheduled for the next perihelion.

D. Pioneer 9

The spacecraft continues to function nominally. An analysis indicates that the spacecraft on-board systems continue in good health.

E. Pioneer 10

A special procedure using the imaging photopolarimeter (IPP) instrument to determine the roll pulse was developed. When the spacecraft loses its Sun pulse, which is estimated to reach threshold in approximately two years, there will be a means of determining the spacecraft roll reference for experimenter use plus the capability of determining precession maneuvers and conscans will be maintained. A signal strength test was performed to determine the spacecraft receiver threshold at low to high transmitter powers. The results are not known

at this reporting period, however; further testing will be performed in the future. The spacecraft continues to perform nominally and all on-board systems are healthy.

F. Pioneer 11

The spacecraft went through superior conjunction in October 1980 successfully. The spacecraft continues performing nominally and based on data analysis all systems on board the spacecraft are in good health.

G. Pioneer 12

The spacecraft went through a long eclipse season in August 1980 with no problems experienced. The decision to cease controlling periapsis altitude was made; thus the spacecraft will continue to rise until 1986. As a result of this decision, requirements for the radar altimeter (ORAD) instrument were completed, thus eliminating the need of daily ORAD instrument command loads. Occasional ORAD calibrations and various other procedures are still planned. Imaging will continue for some time, with radio science experiments to be performed upon request. The spacecraft started a superior conjunction phase in mid-March 1981 and will continue through April 1981. The spacecraft continues performing nominally with all on-board systems in good health.

III. Special Activities

Pioneer Project continues to utilize the Deep Space Network Compatibility Test Area (CTA-21) in concurrence with the Project's command software development and operations training.

IV. Summary

As of this reporting period, all Pioneer spacecraft appear in good health and are operating nominally. Pioneers 6, 7, 8, 9, 10, and 11 are in the cruise mode. Pioneer 12 operations continue in orbit about Venus. Tracking coverage from June 1980 through March 1981 is shown in Table 1.

Table 1. Tracking coverage, June 1980 through March 1981

Month, year	Pioneer spacecraft	Station type	Number of tracks	Tracking time, h:min
June 1980	6	64-m	10	51:15
	7	64-m	3	19:20
	9	64-m	7	49:00
	10	64-m	58	466:10
	11	26-m	47	356:35
		64-m	22	180:15
	12	26-m	100	918:30
		34-m	5	44:39
		64-m	1	10:30
July 1980	6	64-m	5	19:50
	7	64-m	1	10:45
	9	64-m	6	44:45
	10	64-m	47	379:20
	11	26-m	46	386:45
		34-m	3	25:35
		64-m	14	110:30
	12	26-m	82	754:50
		34-m	2	17:05
		64-m	2	10:55
Aug 1980	6	64-m	6	24:10
	7	64-m	1	5:05
	8	64-m	1	8:10
	9	64-m	3	16:20
	10	64-m	44	382:15
	11	26-m	30	211:20
		34-m	8	50:30
		64-m	30	227:00
	12	26-m	77	703:30
		34-m	6	26:50
		64-m	8	56:15
Sept 1980	6	64-m	3	12:55
	8	64-m	5	20:40
	9	64-m	5	28:30
	10	64-m	62	476:20
	11	26-m	46	314:10
		34-m	16	79:35
		64-m	15	116:00
	12	26-m	80	763:55
		34-m	15	139:20
		64-m	14	117:25
Oct 1980	6	64-m	1	3:50
	7	64-m	1	4:55
	9	64-m	4	15:35
	10	34-m	6	28:55
		64-m	53	353:20
	11	26-m	23	162:55
		34-m	11	56:40
		64-m	6	52:05
	12	26-m	56	508:20
		34-m	8	83:45
		64-m	11	118:20
Nov 1980	6	64-m	4	19:30
	9	64-m	4	20:30
	10	34-m	10	57:35
		64-m	38	243:00
	11	26-m	24	219:55
		64-m	7	79:15
	12	26-m	35	352:40
		34-m	2	16:00
Dec 1980	6	64-m	2	13:00
	8	64-m	2	13:30
	9	64-m	1	4:50
	10	34-m	5	29:25
		64-m	45	353:45
	11	26-m	24	222:30
		34-m	3	33:25
		64-m	18	170:20
	12	26-m	40	394:05
		34-m	3	27:45
		64-m	23	220:40
Jan 1981	6	64-m	2	15:00
	7	64-m	3	14:50
	8	64-m	2	15:25
	9	64-m	3	14:20
	10	26-m	8	28:45
		64-m	52	556:35
	11	26-m	41	280:20
		34-m	2	19:00
	12	64-m	30	235:35
		26-m	78	646:50
		34-m	3	27:35
		64-m	28	335:30
Feb 1981	6	64-m	3	18:00
	8	64-m	2	12:10
	9	64-m	3	20:15
	10	26-m	6	20:35
		34-m	4	16:15
		64-m	39	327:10
	11	26-m	32	286:05
		34-m	23	198:05
		64-m	17	146:05
	12	26-m	26	173:20
		34-m	37	302:20
		64-m	49	372:50
March 1981	6	64-m	2	11:50
	9	64-m	3	20:20
	10	26-m	3	9:00
		34-m	4	12:45
		64-m	50	378:30
	11	26-m	33	333:30
		34-m	17	186:35
		64-m	16	129:30
	12	26-m	21	134:15
		34-m	16	262:10
		64-m	82	576:00