Appendix A. Earth shadow seasons.

Shad. season	Starting date	Deepest day					Ending date
		Date	Duration (minutes)	Starting Time (UT)	DOD#1 (%)	#2 (%)	
1	May 25, 1978	April 5, 1978	69	02:01	71	72	April 18, 1978
2	Sept. 26, 1978	Oct. 7, 1978	71	05:41	77	80	Oct. 18, 1978
3	March 20, 1979	April 2, 1979	68	02:25	68	68	April 13, 1979
4	Sept. 21,1979	Oct. 2,1979	72	05:37	69	75	Oct. 14, 1979
5	March 15, 1980	March 27, 1980	67	02:05	54	58	April 8, 1980
6	Sept. 18, 1980	Sept. 26, 1980	72	05:05	60	64	Oct. 8, 1980
7	March 10, 1981	March 23, 1981	66	02:00	57	60	April 4,1981
8	Sept. 12, 1981	Sept. 23, 1981	74	05:32	67	69	Oct. 4,1981
9	March 6, 1982	March 19, 1982	66	02:01	61	61	March 30, 1982
10	Sept. 7, 1982	Sept. 17, 1982	71	05:17	61	61	Sept. 29, 1982
11	March 1, 1983	March 14, 1983	62	02:07	56	55	March 26, 1983
12	Sept. 3, 1983	Sept. 14, 1983	77	04:46	64	62	Sept. 25, 1983
13	Feb. 25, 1984	March 10, 1984	65	02:24	52	51	March 21, 1984
14	Aug. 28, 1984	Sept. 10, 1984	73	04:34	63	61	Sept. 21, 1984
15	Feb. 20, 1985	March 5, 1985	64	02:03	52	51	March 17, 1985
16	Aug. 25, 1985	Sept. 6, 1985	76	04:48	62	59	Sept. 15, 1985
17	Feb. 16, 1986	Feb. 28, 1986	64	02:21	53	52	March 13, 1986
18	Aug. 20, 1986	Aug. 30, 1986	79	04:32	62	60	Sept. 11, 1986
19	Feb. 11, 1987	Feb. 24, 1987	64	02:13	50	49	March 9, 1987
20	Aug. 16, 1987	Aug. 28, 1987	80	04:31	51	49	Sept. 6, 1987
21	Feb. 7, 1988	Feb. 20, 1988	64	02:39	50	49	March 4, 1988
22	Aug. 11, 1988	Aug. 21, 1988	80	04:21	64	60	Sept. 1, 1988
23	Feb. 2, 1989	Feb. 15, 1989	64	02:36	49	50	Feb. 28, 1989
24	Aug. 7, 1989	Aug. 17, 1989	81	04:06	62	59	Aug. 28, 1989
25	Jan. 29, 1990	Feb. 11, 1990	64	02:36	48	49	Feb. 24, 1990

26	Aug. 2, 1990	Aug. 12, 1990	81	03:53	55	54	Aug. 24, 1990
27	Jan. 25, 1991	Feb. 7, 1991	63	03:05	37	43	Feb. 20, 1991
28	July 29, 1991	Aug. 9, 1991	82	03:29	52	52	Aug. 20, 1991
29	Jan. 21, 1992	Feb. 3, 1992	63	02:57	45	49	Feb. 17, 1992
30	July 23, 1992	Aug. 3, 1992	82	04:19	49	53	Aug. 15, 1992
31	Jan. 15, 1993	Jan. 29, 1993	63	03:16	44	48	Feb. 2, 1993
32	July 19, 1993	July 30, 1993	82	03:20	49	53	Aug. 11, 1993
33	Jan. 11, 1994	Jan. 25, 1994	63	03:28	40	46	Feb. 8, 1994
34	July 14, 1994	July 26, 1994	82	03:06	49	53	Aug. 7, 1994
35	Jan. 16, 1995	Jan. 22, 1995	63	03:20	49	53	Feb. 5, 1995
36	July 9, 1995	July 23, 1995	82	02:38	47	53	Aug. 2, 1995
37	Jan. 2, 1996	Jan. 17, 1996	63	02:21	39	45	Feb. 1, 1996
38	July 3, 1996	July 15, 1996	82	02:23	45	52	July 28, 1996

Appendix B. Delta-Vs.

Delta-V	Date
1	February 14, 1978
2	July 24, 1978
3	June 20, 1979
4	February 13, 1980
5	June 24, 1980
6	December 16, 1980
7	October 29, 1981
8	August 17, 1982
9	May 27, 1983
10	February 14, 1984 (a previous Delta-V had been tried on January 12, 1984, but the OBC failed during the burn and the spacecraft had to be stabilized using the Sunbath mode)
11	November 16, 1984
12	August 9, 1985 (a previous Delta-V had been tried on July 18, 1985, which resulted in a loss of attitude control due to OBC Worker 19 overflow)
13	March 19, 1986
14	July 29, 1986
15	December 18, 1986
16	September 9, 1987
17	March 18, 1988
18	September 8, 1988
19	March 13, 1989
20	September 8, 1989
21	June 6, 1990
22	January 12, 1991
23	October 18, 1991
24	August 19, 1992
25	November 20, 1992

26	August 19, 1993
27	February 15, 1994
28	September 20, 1994
29	May 3, 1995
30	June 6, 1995

Appendix C. OBC malfunctions.

OBC crashes	**Date**	**Remarks**
	March 11, 1978	It appeared to be related to the high OBC temperature.
	November 15, 1978	The OBC halted during a test whilst running on 40 kbps. Operations were limited to 20 kbps.
	December 3, 1978	It seemed to be related to the high OBC temperature.
	February 1, 1979	It seemed to be related to the high OBC temperature.
	July 18, 1979	The OBC crashed during a maneuver due to a data block 10 incorrect scaling.
	August 18, 1979	The OBC crashed and s/c began to drift in pitch and roll direction. The stabilization was achieved when it was commanded into sun acquisition mode.
	October 9, 1979	The OBC crashed at 20:52 UT, but the spacecraft was stabilized in 3-axis again with the 4K back-up computer at 20:57 UT.
	October 23, 1979	It was thought to be caused by a high OBC temperature.
	May 7, 1980	The OBC halted at 04:09 UT which caused the spacecraft lost attitude.
	January 21, 1981	The spacecraft attitude was lost when the OBC halted at 04:25 UT.
	February 1, 1981	The OBC halted due to an interrupt 14 anomaly.
	March 1, 1981	The OBC halted due to an interrupt 14 anomaly.
	May 2, 1981	The OBC halted due to an interrupt 14 anomaly.
	May 11, 1981	The OBC halted due to an interrupt 14 anomaly.
	June 20, 1981	The OBC halted due to an interrupt 14 anomaly.
	February 20, 1982	The OBC halted due to an interrupt 14 anomaly.
	February 21, 1982	The OBC halted due to an interrupt 14 anomaly.
	November 25, 1982	At 15:20 UT the OBC crashed during a maneuver. The spacecraft was stabilized using the 4K back-up system.

OBC crashes	December 24, 1982	An OBC crash occurred. The spacecraft had to be commanded to sunbath.
	February 14, 1985	The 4K backup OBC halted at 16:10 UT while the annual refresh of the 8K system was performed.
	March 28, 1988	The OBC crashed while unloading wheels.
	December 27, 1990	The OBC halted. The control was regained by switching to the 4K system.
	November 6, 1991	The OBC crashed during a maneuver. The control was regained by switching to the 4K system.
Worker failures	Worker 22 failed to zero the ABGs on the following dates: 7-Nov-1979, 3-May-1982, 27-Nov-1982, 15-Dec-1984 and 6-Jun-1985.	
	Worker 18 failed to turn off after a data block was loaded. This resulted in all subsequent data blocks being rejected until worker 18 was turned off by ground command. This anomaly was seen on the following dates: 14-Feb-1980, 5-Mar-1983, 6-Jun-1984, 1-May-1985, 5-Oct-1986, 16-Nov-1986, 9-Sep-1987, 14-Nov-1988, 8-Feb-1990 and 25-Jul-1992.	
	Worker 13 did not run properly, so it had to be manually turned off, on two occasions: 9-Oct-1983 and 28-Oct-1983.	
	Worker 2 did not work properly and finished the running exposure until the end of it. It happened six times: 22-Jun-1989, 6-Nov-1991, 19-May-1992, 23-Jan-1993, 2-Mar-1993 and 14-Mar-1994.	
Commands skipped	On several occasions a single command uplinked to the spacecraft was received but not executed. It happened on the following dates: • 16-Mar-1983, to turn worker 22 off. • 17-Mar-1985, to turn off power amplifier 4. • 9-Mar-1986, to start an exposure. • 27-Jul-1986, to start an exposure. • 19-Feb-1988, to start an exposure. • 15-Oct-1989, to switch telemetry formats. • 17-Apr-1990, to command the FES in save position. • 1-Aug-1990, to start an exposure. • 21-Aug-1992, to start an exposure. • 1-Feb-1994, to switch telemetry formats. • 26-Mar-1994, to switch power amplifiers. • 7-Apr-1994, to take a FES image.	
Data blocks skipped	On several occasions a data block uplinked to the spacecraft was received but not executed. It happened on the following dates: • 24-Jul-1980, DB#10 to perform an slew. • 6-Aug-1980, DB#17 to prepare a camera. • 13-Jan-1981, DB#17 to prepare a camera.	

Data blocks skipped	• 28-May-1982, DB#17 to prepare a camera. • 8-Aug-1983, DB#10 to perform an slew. • 18-Aug-1983, DB#17 to prepare a camera. • 2-Oct-1983, DB#10 to perform an slew. • 30-Oct-1983, DB#10 to perform an slew. • 25-Jul-1984, DB#10 to perform an slew. • 28-Aug-1984, DB#10 to perform an slew. • 10-Dec-1984, DB#17 to unload the wheels. • 12-Jun-1985, DB#14 to perform an exposure. • 1-May-1986, DB#17 to unload the wheels. • 4-Sep-1986, DB#17 to prepare a camera. • 7-Mar-1987, DB#21 to perform an slew. • 19-Apr-1988, DB#21 to perform an slew. • 3-Aug-1988, DB#21 to perform an slew. • 11-Mar-1989, DB#17 to prepare a camera. • 10-Jul-1989, DB#17 to prepare a camera. • 24-Apr-1990, DB#21 to perform an slew. • 6-Jun-1990, DB#17 to unload the wheels. • 15-Aug-1990, DB#21 to perform an slew. • 24-Aug-1990, DB#21 to perform an slew. • 20-Oct-1990, DB#15 to uplink the spacecraft attitude . • 28-Oct-1990, DB#17 to prepare a camera. • 30-Oct-1990, DB#17 to unload the wheels. • 23-Feb-1991, DB#21 to perform an slew. • 11-Mar-1991, DB#21 to perform an slew. • 16-Aug-1991, DB#14 to perform an exposure. • 17-Aug-1991, DB#21 to perform an slew. • 26-Nov-1991, DB#21 to perform an slew. • 2-Apr-1992, DB#17 to unload the wheels. • 18-Apr-1992, DB#21 to perform an slew. • 7-Jul-1992, DB#17 to prepare a camera. • 12-Aug-1992, DB#17 to prepare a camera. • 11-Dec-1992, DB#11 to perform a maneuver. • 14-Dec-1992, DB#17 to prepare a camera. • 7-Feb-1992, DB#21 to perform an slew. • 13-Apr-1993, DB#17 to prepare a camera. • 14-Jul-1993, DB#21 to perform an slew. • 25-Jul-1991, DB#14 to perform an exposure. • 24-Aug-1993, DB#17 to prepare a camera. • 30-Sep-1993, DB#21 to perform an slew. • 23-Oct-1993, DB#17 to prepare a camera. • 19-Nov-1993, DB#17 to prepare a camera. • 27-Jan-1994, DB#17 to unload the wheels. • 9-Jul-1994, DB#17 to unload the wheels • 24-Jul-1994, DB#21 to perform a slew. • 25-Jul-1994, DB#14 to perform an exposure.

Data blocks skipped	• 26-Jul-1994, DB#17 to prepare a camera. • 31-Jul-1994, DB#17 to prepare a camera. • 7-Jul-1995, DB#17 to prepare a camera. • 8-Jan-1996, DB#17 to perform a slew.

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