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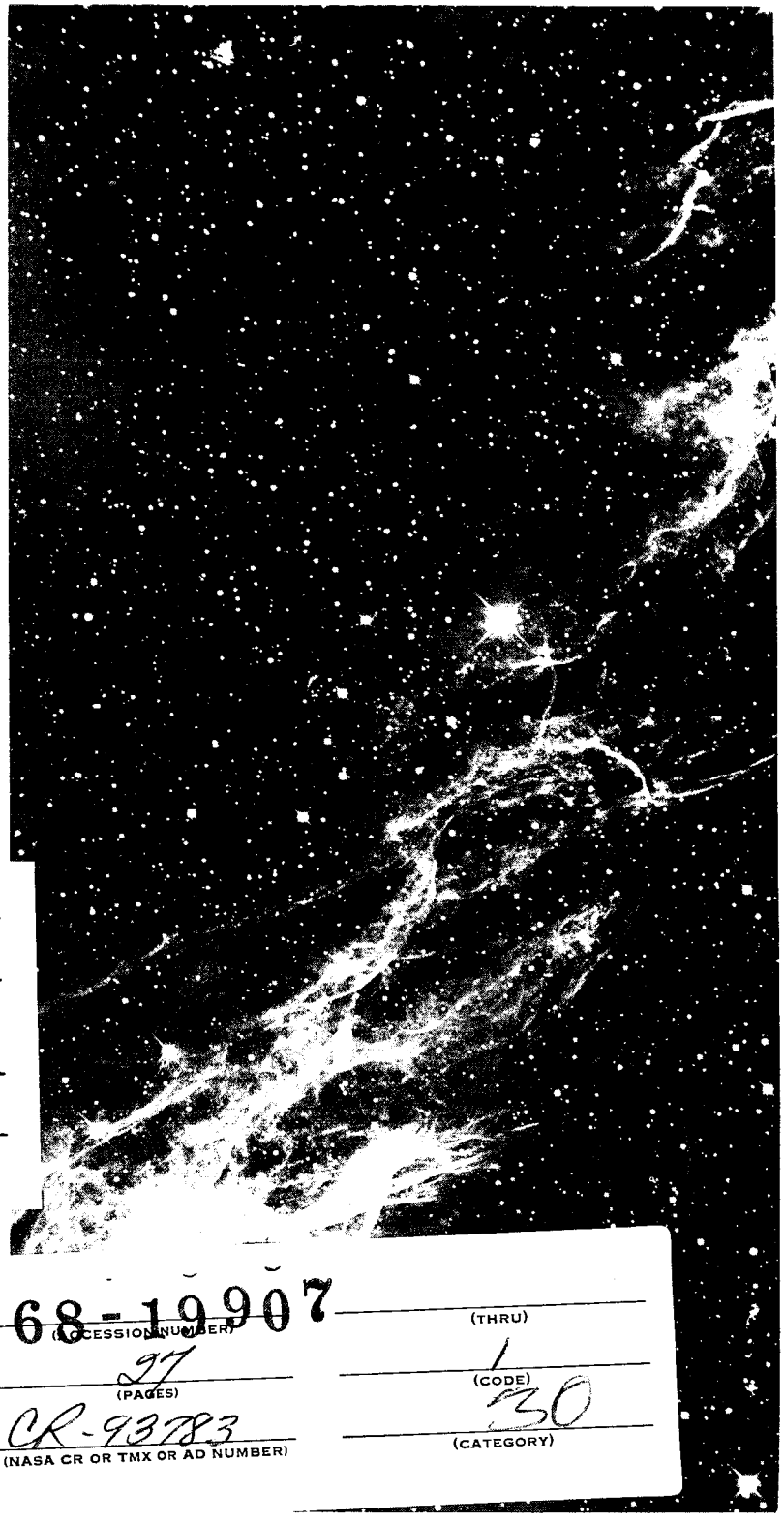

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Report No. T-20

TRAJECTORY OPPORTUNITIES TO THE OUTER PLANETS FOR THE PERIOD 1975-2000

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Abstract

Minimum energy trajectory data to the planets Jupiter, Saturn, Uranus, Neptune and Pluto are presented for each launch opportunity in the period 1975-2000. Data for launch windows of 10, 20, and 30 day are tabulated in most cases. The data consists of the launch date, characteristic and vis viva energy, hyperbolic approach velocity, communications distance and time of flight associated with each opportunity. It was found that energy requirements tend to increase rapidly as launch windows are increased and thus it is suggested that wherever possible windows to the outer planets be restricted to 20 days or less. The trajectory data presented provides an adequate advanced mission planning guide to the outer planets launch opportunities between 1975 and 2000.

Report No. T-20

TRAJECTORY OPPORTUNITIES TO THE OUTER PLANETS FOR THE PERIOD 1975-2000

by

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Report No. T-20

TRAJECTORY OPPORTUNITIES TO THE OUTER PLANETS FOR THE PERIOD 1975-2000

1. INTRODUCTION

The five outer planets, Jupiter, Saturn, Uranus, Neptune, and Pluto will, with the possible exception of Pluto, be targets for space missions between 1975 and the end of the century. It is thus important in the context of advanced mission planning that a definitive set of trajectory data be available. Initial studies by Richard (1966) and Ross (1966) have provided launch energy data for the minimum energy trajectories to the outer planets up to the year 2000. The minimum energy trajectory usually requires an impractically long flight time (e.g., Uranus 13 years) and thus the available data is of limited use.

This report considers trajectories having selected constant flight times, in addition to the minimum energy ones, for the approximately annual opportunities to each of the outer planets between 1975 and 2000. The constant times of flight have been selected for each planet to represent the trade-off between launch energy and flight time. Also four launch windows

between 0 and 30 days are represented so that allowance may be made for anticipated reductions in launch operation times in the future.

2. METHOD

The JPL Space Research Conic (SPARC) program has been used exclusively in calculating the following trajectory data as a function of launch date. The minimum energy opportunity data given by Richard (1966) for each calendar year was used to determine a starting date.

The minimum energy opportunities were located by obtaining launch dates in 5 day increments from the starting date for an interval of 30 days. From this data 0, 10, 20, and 30 day windows could be delineated. Each end of the launch window was required to have approximately the same launch energy requirements.

The constant flight time trajectories used the same starting date information but the SPARC program searched for the minimum energy trajectory for the selected flight time. Additional trajectories were then calculated at 5 day intervals each side of this minimum until the 10, 20, and 30 day launch windows could be defined.

3. RESULTS

The following data has been tabulated for all the launch opportunities in this study:

a) Launch date (at beginning of the window)

b) Characteristic velocity, V_c* (ft/sec)

c) Vis viva energy, C_3 (km^2/sec^2)

d) Planet hyperbolic approach velocity, VHP (km/sec)

e) Intercept communication distance, RC (AU)

f) Time of flight, TF.

Each of the following tables gives the trajectory data for one opportunity for one planet. Launch windows of 0, 10, 20, and 30 days are included. For C_3, VHP, and RC the maximum values across the launch window are given. Hence, with the exception of the 0-day launch window, the trajectory data shown has been accumulated from several trajectories flown during the launch period and are not necessarily the properties of any one trajectory. The constant flight times were selected to be less than ten years, to provide tractable mission durations and, except for Jupiter, to give minimum communications distance at intercept. The values selected for Jupiter are those that are of general interest and do not necessarily yield minimum communication distance.

Some comment should be made on the process of selecting the launch window. When comparing the C_3 energy values at either end of the window, it was found that in general the difference between the two was less than 5 km^2/sec^2. Since the launch date was only being varied in five day increments, differences of this amount or less were considered reasonable and

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*$V_c = 3280.8333 \sqrt{C_3 + 121.5964}$

the larger of the two values was recorded. There were only three cases where this close a match in C_3 was not achieved. All three of these cases occurred with constant flight time trajectories to Saturn. In two cases*, the differences in C_3 were in the range of 15-20 km^2/sec^2 and the higher values of C_3 was again recorded. These particular launch windows therefore tend to be conservative. For the third case**, the difference in C_3 exceeded 50 km^2/sec^2 and thus no data were shown.

More precise launch window energy requirements could be determined for all three of these cases by computing trajectory data for smaller intervals of launch date. But it was noted that the energy values for these windows would still tend to rise rapidly as the window length is increased.

For minimum energy trajectories to Jupiter, both Type I and Type II were obtained, but for Saturn, Uranus, and Neptune only Type I trajectories have been presented. This is due to the longer flight times associated with Type II trajectories to these furthermost planets.

Because of Pluto's highly inclined orbit, the truly minimum energy trajectories tend to intercept Pluto when it crosses the ecliptic plane around the year 2020. The times of flight associated with minimum energy windows (composed of segments of both Type I and Type II trajectories) range between 41 and 47 years for the 1975-76 opportunity to between 17 and

*1250 day flight to Saturn (30 day launch window).
1625 day flight to Saturn (20 day launch window).
**1625 day flight to Saturn (30 day launch window).

29 years for the 2000 opportunity. Since these two cases indicate the trend of Pluto's trajectories and because the flight times involved are long, no additional minimum energy data to Pluto were generated. Instead, the more practical constant flight time trajectories of 5 and 10 years were run for every fifth year between 1975 and 2000. These again were sufficient to indicate the nature of the trajectories to Pluto. In view of the uncharacteristic nature of the Pluto data it has been presented graphically in Figures 1 through 6 rather than in tabular form.

4. CONCLUSIONS

The trajectory data presented provides an adequate advanced mission planning guide to the outer planets launch opportunities between 1975 and 2000. The quoted launch dates are correct to within 2 or 3 days and the C_3 energies with the exception of the three cases involving Saturn are within 5 km^2/sec^2. Since the energy requirements tend to rise rapidly as launch windows are increased, it is suggested that, wherever possible, windows for the outer planets be restricted to 20 days or less. The constant flight times selected for each planet correspond to those that minimize communications distance at intercept. This is true for all planets considered except Jupiter where times of flight of general interest were run and do not necessarily minimize communications distance. Due to Pluto's inclined orbit, a minimum amount of data was obtained,

but enough to indicate the trend of trajectories to this planet. Data for Jupiter, Saturn, Uranus, and Neptune are presented in tabular form while data for Pluto is in graphical form.

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Richard, R. J., "Minimum Energies for Launches to the Outer Planets for the Time Period 1975-2000," JPL Interoffice Memorandum, July 20, 1966.

Ross, S. (Ed.), Space Flight Handbooks - Vol. III, "Planetary Flight Handbook, Part 5 - Trajectories to Jupiter, Ceres, and Vesta," NASA SP-35, Part 5, 1966.

OPPORTUNITIES TO JUPITER 1972-2000

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target Jupiter Opportunity Feb-Mar 1972

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	3/14/72	3/7/72	3/4/72	3/5/72	3/30/72
	V_c (ft/sec)	53830	49490	47550	46720	47240
	C_3 (km^2/sec^2)	147.6	106.0	88.4	81.2	85.7
	VHP (km/sec)	17.66	12.84	9.69	7.10	7.48
	Rc (AU)	5.23	4.10	4.94	5.92	5.07
	TF (years)				2.03	3.81
10	1st launch date	3/8/72	3/1/72	2/27/72	2/29/72	3/25/72
	V_c (ft/sec)	54110	49750	47740	46890	47250
	C_3 (km^2/sec^2)	150.4	108.3	90.2	82.6	85.8
	VHP (km/sec)	17.91	13.01	9.80	7.63	7.48
	Rc (AU)	5.32	4.12	5.00	6.0	5.8
	TF (years)				1.93-2.15	3.66-3.95
20	1st launch date	3/3/72	2/25/72	2/22/72	2/24/72	3/25/72
	V_c (ft/sec)	54830	50370	48290	47410	47280
	C_3 (km^2/sec^2)	157.8	114.1	95.1	87.3	86.1
	VHP (km/sec)	18.12	13.16	9.90	8.15	8.13
	Rc (AU)	5.39	4.15	5.08	6.0	6.0
	TF (years)				1.86-2.29	3.66-4.25
30	1st launch date	2/27/72	2/20.72	2/17/72	2/24/72	3/20/72
	V_c (ft/sec)	55950	51320	49200	48260	47310
	C_3 (km^2/sec^2)	169.3	123.1	103.3	94.7	86.4
	VHP (km/sec)	18.33	13.29	10.00	8.14	8.33
	Rc (AU)	5.47	4.18	5.16	6.0	6.0
	TF (years)				1.86-2.62	3.51-4.39

JUPITER 1972

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target Jupiter Opportunity Mar-May 1973

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	4/17/73	4/11/73	4/9/73	4/10/73	5/10/73
	V_c (ft/sec)	53320	49310	47610	47050	47030
	C_3 (km^2/sec^2)	142.6	104.3	89.0	84.1	83.9
	VHP (km/sec)	16.90	12.23	9.22	7.20	7.45
	Rc (AU)	5.14	4.00	4.85	5.95	5.35
	TF (years)				1.95	3.83
10	1st launch date	4/12/73	4/6/73	4/3/73	4/5/73	5/5/73
	V_c (ft/sec)	53590	49520	47840	47290	47040
	C_3 (km^2/sec^2)	145.2	106.2	91.1	86.2	84.0
	VHP (km/sec)	17.13	12.37	9.33	7.74	7.64
	Rc (AU)	5.22	4.02	4.91	6.0	6.0
	TF (years)				1.86-2.07	3.69-3.97
20	1st launch date	4/7/73	4/1/73	3/29/73	4/5/73	4/30/73
	V_c (ft/sec)	54270	50080	48460	47820	47090
	C_3 (km^2/sec^2)	152.0	111.4	96.6	90.9	84.4
	VHP (km/sec)	17.34	12.51	9.42	7.74	7.81
	Rc (AU)	5.29	4.05	4.99	6.0	6.0
	TF (years)				1.86-2.40	3.55-4.11
30	1st launch date	4/2/72	3/27/73	3/24/73	3/31/73	4/25/73
	V_c (ft/sec)	55330	51020	49540	48280	47160
	C_3 (km^2/sec^2)	162.9	120.3	106.5	95.0	85.1
	VHP (km/sec)	17.55	12.65	9.53	8.31	7.99
	Rc (AU)	5.37	4.08	5.07	6.0	6.1
	TF (years)				1.78-2.58	3.42-4.26

JUPITER 1973

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target Jupiter Opportunity May-June 1974

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	5/25/74	5/19/74	5/17/74	5/20/74	6/9/74
	V_c (ft/sec)	53240	49400	47750	47090	46730
	C_3 (km^2/sec^2)	141.8	105.1	90.3	84.4	81.3
	VHP (km/sec)	16.31	11.78	8.88	6.57	6.71
	Rc (AU)	5.11	3.97	4.86	5.84	4.22
	TF (years)				2.05	3.48
10	1st launch date	5/19/74	5/13/74	5/12/74	5/15/74	6/4/74
	V_c (ft/sec)	53520	49650	47960	47230	46780
	C_3 (km^2/sec^2)	144.6	107.4	92.1	85.7	81.7
	VHP (km/sec)	16.55	11.94	8.97	7.08	6.88
	Rc (AU)	5.19	4.00	4.94	6.0	4.8
	TF (years)				1.93-2.22	3.35-3.62
20	1st launch date	5/14/74	5/8/74	5/7/74	5/15/74	5/30/74
	V_c (ft/sec)	54210	50240	48520	47670	46880
	C_3 (km^2/sec^2)	151.4	112.9	97.1	89.6	82.6
	VHP (km/sec)	16.76	12.07	9.06	7.08	7.07
	Rc (AU)	5.26	4.03	5.02	6.0	5.6
	TF (years)				1.93-2.61	3.22-3.77
30	1st launch date	5/9/74	5/3/74	5/2/74	5/10/74	5/25/74
	V_c (ft/sec)	55260	51170	49430	47940	47030
	C_3 (km^2/sec^2)	162.1	121.7	105.4	92.0	83.9
	VHP (km/sec)	16.95	12.20	9.15	7.68	7.28
	Rc (AU)	5.33	4.06	5.10	6.0	6.1
	TF (years)				1.83-2.81	3.09-3.95

JUPITER 1974

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity June-July 1975

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	7/2/75	6/26/75	6/23/75	7/6/75	7/1/75
	V_c (ft/sec)	53580	49690	47920	46610	46510
	C_3 (km^2/sec^2)	145.2	107.8	91.8	80.2	79.4
	VHP (km/sec)	16.16	11.68	8.82	5.70	5.68
	Rc (AU)	5.15	4.04	4.96	5.55	5.36
	TF (years)				2.78	2.76
10	1st launch date	6/27/75	6/21/75	6/18/75	6/26/75	6/26/75
	V_c (ft/sec)	53810	49870	48110	46710	46770
	C_3 (km^2/sec^2)	147.4	109.5	93.4	81.1	81.6
	VHP (km/sec)	16.37	11.82	8.91	5.84	5.91
	Rc (AU)	5.22	4.05	5.04	5.6	6.2
	TF (years)				2.32-2.78	2.72-3.08
20	1st launch date	6/22/75	6/16/75	6/13/75	6/21/75	6/21/75
	V_c (ft/sec)	54480	50440	48630	46950	46960
	C_3 (km^2/sec^2)	154.1	114.7	98.1	83.2	83.3
	VHP (km/sec)	16.56	11.92	9.0	6.23	6.12
	Rc (AU)	5.29	4.08	5.12	6.0	6.2
	TF (years)				2.14-2.89	2.63-3.33
30	1st launch date	6/17/75	6/11/75	6/8/75	6/16/75	6/21/75
	V_c (ft/sec)	55630	51590	49510	47470	47290
	C_3 (km^2/sec^2)	165.9	123.8	106.1	87.7	86.2
	VHP (km/sec)	16.76	12.07	9.08	6.78	6.68
	Rc (AU)	5.36	4.11	5.20	6.2	6.2
	TF (years)				1.99-2.97	2.63-3.78

JUPITER 1975

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity July-August 1976

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	8/8/76	8/2/76	7/29/76	7/30/76	8/9/76
	V_c (ft/sec)	54250	50140	48220	46950	47670
	C_3 (km^2/sec^2)	151.8	112.0	94.4	83.2	89.5
	VHP (km/sec)	16.48	11.96	9.06	6.08	5.95
	Rc (AU)	5.24	4.16	5.13	5.41	4.68
	TF (years)				2.21	3.43
10	1st launch date	8/3/76	7/27/76	7/24/76	7/25/76	8/4/76
	V_c (ft/sec)	54500	50360	48390	47110	47680
	C_3 (km^2/sec^2)	154.4	114.0	95.9	84.6	89.6
	VHP (km/sec)	16.68	12.11	9.14	6.37	6.12
	Rc (AU)	5.32	4.17	5.20	5.9	5.8
	TF (years)				2.12-2.33	3.23-3.62
20	1st launch date	7/29/76	7/22/76	7/19/76	7/20/76	7/30/76
	V_c (ft/sec)	55240	50930	48900	47550	47740
	C_3 (km^2/sec^2)	161.9	119.4	100.5	88.4	90.1
	VHP (km/sec)	16.88	12.24	9.23	6.70	6.40
	Rc (AU)	5.39	4.20	5.28	6.2	6.4
	TF (years)				2.04-2.46	3.03-3.83
30	1st launch date	7/24/76	7/17/76	7/14/76	7/15/76	7/30/76
	V_c (ft/sec)	56470	51810	49770	48280	47790
	C_3 (km^2/sec^2)	174.6	127.8	108.5	94.9	90.6
	VHP (km/sec)	17.07	12.36	9.31	7.07	6.83
	Rc (AU)	5.46	4.23	5.36	6.2	6.4
	TF (years)				1.97-2.61	3.03-4.23

JUPITER 1976

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Aug.-Sept. 1977

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	9/13/77	9/6/77	9/2/77	9/3/77	10/13/77
	V_c (ft/sec)	55050	50670	48630	47570	47620
	C_3 (km^2/sec^2)	160.0	116.9	98.1	88.7	89.0
	VHP (km/sec)	17.15	12.52	9.49	6.65	7.32
	Rc (AU)	5.36	4.30	5.30	6.05	5.44
	TF (years)				2.09	4.80
10	1st launch date	9/7/77	9/1/77	8/28/77	8/29/77	10/8/77
	V_c (ft/sec)	55340	50870	48840	47800	47620
	C_3 (km^2/sec^2)	162.9	118.8	100.0	90.7	89.1
	VHP (km/sec)	17.39	12.66	9.59	7.17	7.53
	Rc (AU)	5.45	4.31	5.37	6.3	6.3
	TF (years)				1.99-2.21	4.61-4.99
20	1st launch date	9/2/77	8/27/77	8/23/77	8/24/77	10/3/77
	V_c (ft/sec)	56060	51490	49390	48400	47630
	C_3 (km^2/sec^2)	170.4	124.7	105.0	96.0	89.2
	VHP (km/sec)	17.58	12.78	9.68	7.68	7.74
	Rc (AU)	5.52	4.33	5.45	6.3	6.3
	TF (years)				1.83-2.37	4.42-5.17
30	1st launch date	9/28/77	8/22/77	8/18/77	8/24/77	9/23/77
	V_c (ft/sec)	57170	52550	50270	49130	47690
	C_3 (km^2/sec^2)	182.1	134.9	113.2	102.7	89.7
	VHP (km/sec)	17.77	12.81	9.77	7.68	7.74
	Rc (AU)	5.59	4.35	5.52	6.3	6.4
	TF (years)				1.83-2.75	4.04-5.17

JUPITER 1977

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Sept.-Oct. 1978

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	10/16/78	10/10/78	10/6/78	10/8/78	11/7/78
	V_c (ft/sec)	55730	51080	48940	47900	47190
	C_3 (km^2/sec^2)	166.9	120.8	101.0	91.5	85.3
	VHP (km/sec)	17.90	13.12	9.96	6.75	7.06
	Rc (AU)	5.46	4.41	5.41	5.93	4.35
	TF (years)				2.13	4.53
10	1st launch date	10/11/78	10/4/78	9/30/78	10/3/78	11/2/78
	V_c (ft/sec)	55980	51320	49190	48110	47200
	C_3 (km^2/sec^2)	169.6	123.0	103.2	93.4	85.4
	VHP (km/sec)	18.12	13.27	10.07	7.34	7.30
	Rc (AU)	5.54	4.42	5.48	6.4	5.1
	TF (years)				2.01-3.63	4.35-4.71
20	1st launch date	10/6/78	9/29/78	9/25/78	9/28/78	10/28/78
	V_c (ft/sec)	56780	51940	49830	48560	47230
	C_3 (km^2/sec^2)	177.9	129.0	109.0	97.5	85.7
	VHP (km/sec)	18.33	13.41	10.17	7.94	7.54
	Rc (AU)	5.62	4.43	5.56	6.4	6.2
	TF (years)				1.92-2.48	4.17-4.90
30	1st launch date	10/1/78	9/24/78	9/20/78	9/23/78	10/18/78
	V_c (ft/sec)	58120	52990	50880	49590	47390
	C_3 (km^2/sec^2)	192.2	139.3	118.9	106.8	87.1
	VHP (km/sec)	18.52	13.54	10.27	8.63	7.54
	Rc (AU)	5.69	4.46	5.63	6.4	6.4
	TF (years)				1.83-2.70	3.81-4.90

JUPITER 1978

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Oct. - Nov. 1979

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	11/17/79	11/10/79	11/6/79	11/7/79	11/27/79
	V_c (ft/sec)	56040	51200	48960	47750	46720
	C_3 (km^2/sec^2)	170.1	122.0	101.1	90.3	81.2
	VHP (km/sec)	18.51	13.59	10.33	6.84	6.56
	Rc (AU)	5.51	4.46	5.44	5.77	6.27
	TF (years)				2.16	4.03
10	1st launch date	11/11/79	11/4/79	10/31/79	11/2/79	11/22/79
	V_c (ft/sec)	56340	51470	49240	47990	46740
	C_3 (km^2/sec^2)	173.3	124.5	103.6	92.3	81.4
	VHP (km/sec)	18.75	13.76	10.45	7.50	6.82
	Rc (AU)	5.60	4.47	5.51	6.3	6.3
	TF (years)				2.03-2.33	3.86-4.20
20	1st launch date	11/6/79	10/30/79	10/26/79	11/2/79	11/17/79
	V_c (ft/sec)	57120	52150	49920	48640	46810
	C_3 (km^2/sec^2)	181.6	131.1	109.9	98.2	82.0
	VHP (km/sec)	18.96	13.91	10.55	7.50	7.09
	Rc (AU)	5.68	4.48	5.59	6.3	6.3
	TF (years)				2.03-2.78	3.69-4.38
30	1st launch date	11/1/79	10/25/79	10/21/79	10/28/79	11/12/79
	V_c (ft/sec)	58370	53200	51060	49060	46940
	C_3 (km^2/sec^2)	195.0	141.4	120.6	102.0	83.1
	VHP (km/sec)	19.16	14.03	10.65	8.21	7.37
	Rc (AU)	5.75	4.51	5.66	6.4	6.3
	TF (years)				1.92-3.02	3.52-4.57

JUPITER 1979

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Nov.-Dec. 1980

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	12/16/80	12/9/80	12/5/80	12/6/80	12/16/80
	V_c (ft/sec)	55590	50970	48660	47120	46270
	C_3 (km^2/sec^2)	165.5	119.7	98.4	84.7	77.3
	VHP (km/sec)	18.80	13.81	10.49	6.40	5.99
	Rc (AU)	5.51	4.43	5.38	4.9	4.40
	TF (years)				2.29	3.43
10	1st launch date	12/10/80	12/3/80	11/29/80	12/6/80	12/11/80
	V_c (ft/sec)	56310	51250	48910	47320	46330
	C_3 (km^2/sec^2)	172.0	122.4	100.7	86.5	77.8
	VHP (km/sec)	19.06	13.99	10.61	6.40	6.22
	Rc (AU)	5.60	4.44	5.45	5.6	5.2
	TF (years)				2.29-2.76	3.29-3.60
20	1st launch date	12/5/80	11/28/80	11/24/80	12/1/80	12/6/80
	V_c (ft/sec)	57030	51930	49560	47490	46460
	C_3 (km^2/sec^2)	180.5	129.0	106.6	87.9	78.9
	VHP (km/sec)	19.28	14.13	10.71	7.12	6.54
	Rc (AU)	5.67	4.46	5.52	6.3	6.0
	TF (years)				2.12-3.01	3.16-3.82
30	1st launch date	11/30/80	11/23/80	11/19/80	12/1/80	12/1/80
	V_c (ft/sec)	58270	53000	50650	47520	46720
	C_3 (km^2/sec^2)	193.8	139.3	116.8	88.2	81.2
	VHP (km/sec)	19.48	14.27	10.81	7.12	6.94
	Rc (AU)	5.75	4.49	5.60	6.3	6.3
	TF (years)				2.12-3.47	3.01-4.06

JUPITER 1980

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Dec.1981-Jan.1982

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	1/15/82	1/8/82	1/3/82	1/5/82	12/31/81
	V_c (ft/sec)	55300	50460	48160	46050	46040
	C_3 (km^2/sec^2)	162.6	114.9	93.9	75.4	75.3
	VHP (km/sec)	18.71	13.72	10.41	5.82	5.67
	Rc (AU)	5.44	4.34	5.24	4.41	4.31
	TF (years)				2.59	2.57
10	1st launch date	1/9/82	1/2/82	12/29/81	12/31/81	12/31/81
	V_c (ft/sec)	55630	50720	48370	46240	46360
	C_3 (km^2/sec^2)	165.9	117.4	95.8	77.0	78.1
	VHP (km/sec)	18.97	13.89	10.52	6.03	5.95
	Rc (AU)	5.53	4.36	5.31	4.9	6.1
	TF (years)				2.45-2.68	2.57-3.17
20	1st launch date	1/4/82	12/28/81	12/24/81	12/26/81	12/26/81
	V_c (ft/sec)	56430	51380	48940	46840	46480
	C_3 (km^2/sec^2)	174.2	123.6	100.9	82.3	79.1
	VHP (km/sec)	19.19	14.04	10.62	6.84	6.25
	Rc (AU)	5.61	4.38	5.39	5.6	6.1
	TF (years)				2.19-2.79	2.53-3.40
30	1st launch date	12/30/81	12/23/81	12/19/81	12/26/81	12/26/81
	V_c (ft/sec)	57650	52400	49870	47560	46740
	C_3 (km^2/sec^2)	187.2	133.5	109.5	88.5	81.4
	VHP (km/sec)	19.40	14.17	10.71	6.84	6.92
	Rc (AU)	5.68	4.41	5.46	6.1	6.1
	TF (years)				2.19-3.04	2.53-3.81

JUPITER 1981-1982

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Jan.-Feb. 1983

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	2/15/83	2/8/83	2/3/83	2/4/83	2/14/83
	V_c (ft/sec)	54500	49870	47710	46370	47040
	C_3 (km^2/sec^2)	154.3	109.5	89.9	78.1	84.0
	VHP (km/sec)	18.26	13.34	10.09	6.70	6.56
	Rc (AU)	5.33	4.21	5.06	5.42	4.62
	TF (years)				2.18	3.37
10	1st launch date	2/9/83	2/2/83	1/29/83	1/30/83	2/9/83
	V_c (ft/sec)	54790	50110	47910	46520	47070
	C_3 (km^2/sec^2)	157.3	111.7	91.7	79.5	84.2
	VHP (km/sec)	18.51	12.50	10.20	7.11	6.84
	Rc (AU)	5.42	4.23	5.14	5.9	5.6
	TF (years)				2.09-2.29	3.20-3.55
20	1st launch date	2/4/83	1/28/83	1/24/83	1/25/83	2/4/83
	V_c (ft/sec)	55550	50740	48450	47000	47110
	C_3 (km^2/sec^2)	165.0	117.5	96.4	83.9	84.6
	VHP (km/sec)	18.73	13.65	10.30	7.56	7.12
	Rc (AU)	5.50	4.26	5.21	6.1	6.0
	TF (years)				2.00-2.43	3.03-3.71
30	1st launch date	1/30/83	1/23/83	1/19/83	1/20/83	2/4/83
	V_c (ft/sec)	56710	51700	49310	47850	47210
	C_3 (km^2/sec^2)	177.2	126.7	104.3	91.1	85.5
	VHP (km/sec)	18.94	13.79	10.39	8.07	7.68
	Rc (AU)	5.57	4.29	5.29	6.1	6.0
	TF (years)				1.93-2.58	3.03-4.04

JUPITER 1983

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Feb.-March 1984

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	3/18/84	3/12/84	3/8/84	3/10/84	4/9/84
	V_c (ft/sec)	53740	49450	47540	46770	47220
	C_3 (km^2/sec^2)	146.7	105.6	88.4	81.7	85.6
	VHP (km/sec)	17.55	12.76	9.63	7.14	7.69
	Rc (AU)	5.22	4.08	4.91	5.94	5.76
	TF (years)				2.01	3.94
10	1st launch date	3/13/84	3/6/84	3/3/84	3/5/84	4/4/84
	V_c (ft/sec)	53990	49690	47740	46950	47230
	C_3 (km^2/sec^2)	149.2	107.8	90.1	83.2	85.7
	VHP (km/sec)	17.99	12.92	9.73	7.14	7.90
	Rc (AU)	5.30	4.10	4.99	6.0	6.0
	TF (years)				1.92-2.13	3.79-4.08
20	1st launch date	3/8/84	3/1/84	2/27/84	2/29/84	3/30/84
	V_c (ft/sec)	54690	50290	48280	47480	47250
	C_3 (km^2/sec^2)	156.2	113.4	95.0	87.8	85.9
	VHP (km/sec)	18.00	13.06	9.83	8.17	8.10
	Rc (AU)	5.37	4.13	5.07	6.0	6.0
	TF (years)				1.85-2.28	3.65-4.23
30	1st launch date	3/3/84	2/25/84	2/22/84	2/29/84	3/25/84
	V_c (ft/sec)	55880	51230	49210	48290	47290
	C_3 (km^2/sec^2)	168.5	122.2	103.3	95.1	86.2
	VHP (km/sec)	18.21	13.20	9.93	8.17	8.30
	Rc (AU)	5.45	4.16	5.14	6.0	6.0
	TF (years)				1.85-2.61	3.50-4.38

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity March-May 1985

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	4/23/85	4/17/85	4/14/85	4/19/85	5/14/85
	V_c (ft/sec)	53280	49310	47630	47100	46990
	C_3 (km^2/sec^2)	142.2	104.3	89.1	84.5	83.5
	VHP (km/sec)	16.79	12.15	9.16	6.77	7.35
	Rc (AU)	5.13	3.99	4.84	5.83	5.07
	TF (years)				2.03	3.78
10	1st launch date	4/17/85	4/11/85	4/8/85	4/14/85	5/9/85
	V_c (ft/sec)	53560	49530	47890	47340	47000
	C_3 (km^2/sec^2)	144.9	106.3	91.4	86.6	83.7
	VHP (km/sec)	17.04	12.30	9.27	7.30	7.54
	Rc (AU)	5.21	4.01	4.90	5.9	5.8
	TF (years)				1.92-2.19	3.64-3.92
20	1st launch date	4/12/85	4/6/85	4/3/85	4/9/85	5/4/85
	V_c (ft/sec)	54240	50100	48530	47710	47050
	C_3 (km^2/sec^2)	151.8	111.6	97.2	89.9	84.1
	VHP (km/sec)	17.25	12.44	9.37	7.85	7.71
	Rc (AU)	5.29	4.04	4.98	6.0	6.1
	TF (years)				1.83-2.36	3.50-4.06
30	1st launch date	4/7/85	4/1/85	3/29/85	4/4/85	4/29/85
	V_c (ft/sec)	55310	51010	49650	48160	47140
	C_3 (km^2/sec^2)	162.6	120.2	107.4	93.9	84.9
	VHP (km/sec)	17.45	12.57	9.48	8.44	7.89
	Rc (AU)	5.36	4.08	5.06	6.0	6.1
	TF (years)				1.76-2.52	3.37-4.21

JUPITER 1985

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity May-June 1986

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	5/30/86	5/24/86	5/22/86	5/24/86	6/13/86
	V_c (ft/sec)	53260	49430	47770	47070	46690
	C_3 (km^2/sec^2)	142.0	105.4	90.4	84.3	81.0
	VHP (km/sec)	16.26	11.74	8.86	6.61	6.58
	Rc (AU)	5.11	3.98	4.86	5.9	5.14
	TF (years)				2.03	3.41
10	1st launch date	5/25/86	5/19/86	5/16/86	5/24/86	6/8/86
	V_c (ft/sec)	53490	49620	48020	47280	46760
	C_3 (km^2/sec^2)	144.2	107.2	92.6	86.0	81.5
	VHP (km/sec)	16.48	11.88	8.96	6.61	6.75
	Rc (AU)	5.18	4.00	4.93	5.9	5.2
	TF (years)				2.03-2.40	3.29-3.55
20	1st launch date	5/20/86	5/14/86	5/11/86	5/19/86	6/3/86
	V_c (ft/sec)	54160	50170	48640	47510	46880
	C_3 (km^2/sec^2)	150.9	112.3	98.2	88.1	82.6
	VHP (km/sec)	16.68	12.01	9.05	7.16	6.95
	Rc (AU)	5.25	4.03	5.01	6.0	5.9
	TF (years)				1.91-2.60	3.16-3.71
30	1st launch date	5/15/86	5/9/86	5/6/86	5/14/86	5/29/86
	V_c (ft/sec)	55300	51110	49720	47870	47040
	C_3 (km^2/sec^2)	162.5	121.1	108.0	91.3	84.0
	VHP (km/sec)	16.87	12.14	9.15	7.74	7.18
	Rc (AU)	5.32	4.06	5.09	6.0	6.1
	TF (years)				1.82-2.80	3.04-3.92

JUPITER 1986

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity June-July 1987

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	7/8/87	7/1/87	6/29/87	7/3/87	7/3/87
	V_c (ft/sec)	53660	49740	47950	46510	46660
	C_3 (km^2/sec^2)	145.9	108.2	92.0	79.4	80.7
	VHP (km/sec)	16.17	11.70	8.84	5.62	5.63
	Rc (AU)	5.16	4.05	4.98	4.54	5.19
	TF (years)				2.62	2.74
10	1st launch date	7/2/87	6/26/87	6/23/87	6/28/87	6/28/87
	V_c (ft/sec)	53910	49950	48150	46750	46850
	C_3 (km^2/sec^2)	148.5	110.2	93.8	81.5	82.3
	VHP (km/sec)	16.40	11.84	8.93	5.92	5.81
	Rc (AU)	5.24	4.07	5.05	6.1	6.2
	TF (years)				2.26-2.66	2.61-3.02
20	1st launch date	6/27/87	6/21/87	6/18/87	6/23/87	6/23/87
	V_c (ft/sec)	54570	50500	48680	47150	47050
	C_3 (km^2/sec^2)	155.1	115.4	98.6	85.0	84.1
	VHP (km/sec)	16.59	11.97	9.01	6.42	6.04
	Rc (AU)	5.31	4.09	5.13	6.1	6.2
	TF (years)				2.08-2.76	2.53-3.25
30	1st launch date	6/22/87	7/16/87	6/13/87	6/23/87	6/23/87
	V_c (ft/sec)	55620	51380	49550	47690	47300
	C_3 (km^2/sec^2)	165.8	123.7	106.5	89.7	86.3
	VHP (km/sec)	16.78	12.09	9.10	6.42	6.53
	Rc (AU)	5.38	4.13	5.21	6.2	6.2
	TF (years)				2.08-2.98	2.53-3.70

JUPITER 1987

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity July-August 1988

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	8/14/88	8/7/88	8/4/88	8/6/88	8/16/88
	V_c (ft/sec)	54360	50210	48280	47050	47730
	C_3 (km^2/sec^2)	152.9	112.6	94.9	84.1	90.0
	VHP (km/sec)	16.54	12.03	9.10	6.03	6.04
	Rc (AU)	5.25	4.18	5.16	5.29	4.42
	TF (years)				2.23	3.54
10	1st launch date	8/8/88	8/1/88	7/29/88	8/1/88	8/11/88
	V_c (ft/sec)	54600	50440	48450	47230	47750
	C_3 (km^2/sec^2)	155.4	114.8	96.5	85.7	90.2
	VHP (km/sec)	16.77	12.18	9.20	6.28	6.27
	Rc (AU)	5.34	4.19	5.23	5.8	5.3
	TF (years)				2.15-2.35	3.35-3.75
20	1st launch date	8/3/88	7/27/88	7/24/88	7/27/88	8/11/88
	V_c (ft/sec)	55320	51020	48950	47590	47780
	C_3 (km^2/sec^2)	162.8	120.2	101.0	88.9	90.5
	VHP (km/sec)	16.96	12.31	9.28	6.66	6.70
	Rc (AU)	5.41	4.22	5.31	6.1	6.5
	TF (years)				2.06-2.50	3.34-4.14
30	1st launch date	7/29/88	7/22/88	7/19/88	7/22/88	8/6/88
	V_c (ft/sec)	56550	51910	49820	48100	47810
	C_3 (km^2/sec^2)	175.5	128.8	109.0	93.3	90.7
	VHP (km/sec)	17.15	12.43	9.36	7.12	6.92
	Rc (AU)	5.48	4.25	5.39	6.2	6.5
	TF (years)				1.96-2.66	3.15-4.34

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Aug.-Oct. 1989

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	9/18/89	9/13/89	9/8/89	9/10/89	10/15/89
	V_c (ft/sec)	55160	50760	48690	47650	47560
	C_3 (km^2/sec^2)	161.0	117.8	98.7	89.3	88.6
	VHP (km/sec)	17.26	12.56	9.55	6.50	7.21
	Rc (AU)	5.38	4.31	5.32	5.84	4.89
	TF (years)				2.14	4.71
10	1st launch date	9/12/89	9/7/89	9/2/89	9/5/89	10/15/89
	V_c (ft/sec)	55430	51050	48880	47870	47570
	C_3 (km^2/sec^2)	163.9	120.5	100.40	91.3	88.6
	VHP (km/sec)	17.48	12.71	9.65	6.99	7.64
	Rc (AU)	5.46	4.32	5.39	6.3	6.4
	TF (years)				2.03-2.28	4.71-5.08
20	1st launch date	9/7/89	9/2/89	9/28/89	8/31/89	10/10/89
	V_c (ft/sec)	56150	51780	49430	48310	47580
	C_3 (km^2/sec^2)	171.3	127.5	105.4	95.2	88.7
	VHP (km/sec)	17.68	12.84	9.74	7.54	7.86
	Rc (AU)	5.54	4.34	5.47	6.4	6.4
	TF (years)				1.94-2.44	4.52-5.26
30	1st launch date	9/2/89	8/28/89	9/23/89	8/26/89	10/5/89
	V_c (ft/sec)	57330	52950	50330	49020	47600
	C_3 (km^2/sec^2)	183.8	138.9	113.7	101.70	88.9
	VHP (km/sec)	17.87	12.97	9.83	8.11	8.06
	Rc (AU)	5.61	4.36	5.55	6.4	6.4
	TF (years)				1.85-2.64	4.33-5.45

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Sept.-Oct. 1990

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	10/21/90	10/14/90	10/10/90	10/10/90	11/9/90
	V_c (ft/sec)	55790	51120	48970	47920	47120
	C_3 (km^2/sec^2)	167.6	121.2	101.2	91.8	84.7
	VHP (km/sec)	18.01	13.20	10.03	7.06	6.95
	Rc (AU)	5.47	4.42	5.42	6.20	4.63
	TF (years)				2.07	4.43
10	1st launch date	10/16/90	10/9/90	10/5/90	10/5/90	11/4/90
	V_c (ft/sec)	56110	51350	49170	48250	47140
	C_3 (km^2/sec^2)	170.9	123.4	103.0	94.7	84.9
	VHP (km/sec)	18.20	13.34	10.13	7.66	7.20
	Rc (AU)	5.54	4.42	5.50	6.4	5.7
	TF (years)				1.97-2.17	4.25-4.62
20	1st launch date	10/11/90	10/4/90	9/30/90	10/5/90	10/30/90
	V_c (ft/sec)	56960	52040	49770	48820	47180
	C_3 (km^2/sec^2)	179.8	130.0	108.6	99.8	85.2
	VHP (km/sec)	18.41	13.47	10.22	7.66	7.45
	Rc (AU)	5.62	4.44	5.58	6.4	6.4
	TF (years)				1.97-2.59	4.07-4.80
30	1st launch date	10/6/90	9/29/90	9/25/90	9/30/90	10/25/90
	V_c (ft/sec)	58360	53170	50790	49380	47260
	C_3 (km^2/sec^2)	194.9	141.1	118.1	104.9	85.9
	VHP (km/sec)	18.60	13.60	10.32	8.31	7.69
	Rc (AU)	5.69	4.46	5.65	6.4	6.4
	TF (years)				1.88-2.83	3.90-4.98

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Oct.-Nov. 1991

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	11/22/91	11/14/91	11/10/91	11/14/91	11/29/91
	V_c (ft/sec)	56050	51190	48940	47720	46660
	C_3 (km^2/sec^2)	170.3	121.8	100.9	90.0	80.7
	VHP (km/sec)	18.54	13.64	10.37	6.43	6.44
	Rc (AU)	5.50	4.46	5.44	5.12	6.04
	TF (years)				2.26	3.92
10	1st launch date	11/16/91	11/9/91	11/5/91	11/9/91	11/24/91
	V_c (ft/sec)	56340	51420	49150	47970	46690
	C_3 (km^2/sec^2)	173.3	124.1	102.8	92.2	80.9
	VHP (km/sec)	18.78	13.79	10.47	7.10	6.70
	Rc (AU)	5.59	4.46	5.52	6.0	6.2
	TF (years)				2.11-2.47	3.76-4.10
20	1st launch date	11/11/91	11/4/91	10/31/91	11/4/91	11/19/91
	V_c (ft/sec)	57200	52120	49770	48350	46780
	C_3 (km^2/sec^2)	182.4	130.8	108.5	95.6	81.7
	VHP (km/sec)	18.99	13.93	10.57	7.79	6.97
	Rc (AU)	5.67	4.48	5.59	6.4	6.2
	TF (years)				1.99-2.71	3.59-4.28
30	1st launch date	11/6/91	10/30/91	10/26/91	10/30/91	11/19/91
	V_c (ft/sec)	58620	53290	50830	49110	46900
	C_3 (km^2/sec^2)	197.7	142.2	118.5	102.5	82.8
	VHP (km/sec)	17.86	14.06	10.67	8.54	7.55
	Rc (AU)	5.75	4.50	5.67	6.4	6.2
	TF (years)				1.88-2.94	3.59-4.66

JUPITER 1991

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Nov.-Dec. 1992

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	12/21/92	12/13/92	12/9/92	12/13/92	12/18/92
	V_c (ft/sec)	55830	50910	48600	46980	46220
	C_3 (km^2/sec^2)	168.0	119.2	97.8	83.5	76.9
	VHP (km/sec)	18.78	13.82	10.50	5.99	5.88
	Rc (AU)	5.49	4.42	5.36	4.33	5.01
	TF (years)				2.45	3.32
10	1st launch date	12/15/92	12/8/92	12/3/92	12/8/92	12/13/92
	V_c (ft/sec)	56110	51150	48860	47080	46280
	C_3 (km^2/sec^2)	170.9	121.4	100.2	84.3	77.4
	VHP (km/sec)	19.03	13.97	10.62	6.61	6.08
	Rc (AU)	5.56	4.43	5.43	5.3	6.0
	TF (years)				2.24-2.69	3.19-3.47
20	1st launch date	12/10/92	12/3/92	11/28/92	12/8/92	12/8/92
	V_c (ft/sec)	56960	51850	49520	47250	46460
	C_3 (km^2/sec^2)	179.8	128.1	106.2	85.8	78.9
	VHP (km/sec)	19.25	14.11	10.72	6.61	6.41
	Rc (AU)	5.66	4.45	5.51	6.3	6.2
	TF (years)				2.24-3.21	3.06-3.70
30	1st launch date	12/5/92	11/28/92	11/23/92	12/3/92	12/3/92
	V_c (ft/sec)	58370	53010	50600	47460	46770
	C_3 (km^2/sec^2)	194.9	139.5	116.3	87.7	81.6
	VHP (km/sec)	19.46	14.25	10.81	7.34	6.79
	Rc (AU)	5.73	4.48	5.51	6.3	6.2
	TF (years)				2.08-3.45	2.92-3.94

JUPITER 1992

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Dec.1993-Jan.1994

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	1/18/94	1/13/94	1/8/94	1/10/94	12/31/93
	V_c (ft/sec)	55220	50380	48090	46100	46090
	C_3 (km^2/sec^2)	161.7	114.2	93.3	75.8	75.8
	VHP (km/sec)	18.74	13.66	10.38	5.92	5.55
	Rc (AU)	5.45	4.33	5.22	4.20	4.30
	TF (years)				2.52	2.43
10	1st launch date	1/14/94	1/7/94	1/2/94	1/5/94	12/31/93
	V_c (ft/sec)	55480	50610	48310	46300	46400
	C_3 (km^2/sec^2)	164.4	116.4	95.3	77.6	78.4
	VHP (km/sec)	18.90	13.83	10.49	6.05	5.83
	Rc (AU)	5.51	4.34	5.29	4.6	6.1
	TF (years)				2.44-2.63	2.43-3.01
20	1st launch date	1/9/94	1/2/94	12/28/93	12/31/93	12/31/93
	V_c (ft/sec)	56300	51290	48890	46670	46580
	C_3 (km^2/sec^2)	172.9	122.8	100.5	80.7	80.0
	VHP (km/sec)	19.12	13.98	10.59	6.34	6.36
	Rc (AU)	5.58	4.36	5.36	5.3	6.1
	TF (years)				2.33-2.75	2.43-3.44
30	1st launch date	1/4/94	12/28/93	12/23/93	12/26/93	12/31/93
	V_c (ft/sec)	57670	52430	49820	47450	46820
	C_3 (km^2/sec^2)	187.4	133.8	109.0	87.6	82.0
	VHP (km/sec)	19.33	14.12	10.68	7.33	7.02
	Rc (AU)	5.66	4.39	5.44	6.0	6.1
	TF (years)				2.08-2.88	2.43-3.84

JUPITER 1993-1994

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity Jan.-Feb. 1995

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	2/18/95	2/13/95	2/8/95	2/10/95	2/20/95
	V_c (ft/sec)	54420	49800	47670	46430	47110
	C_3 (km^2/sec^2)	153.3	108.8	89.5	78.7	84.6
	VHP (km/sec)	18.24	13.25	10.04	6.69	6.67
	Rc (AU)	5.34	4.19	5.04	5.41	4.37
	TF (years)				2.17	3.42
10	1st launch date	2/13/95	2/7/95	2/2/95	2/5/95	2/15/95
	V_c (ft/sec)	54720	50010	47910	46620	47130
	C_3 (km^2/sec^2)	156.6	110.8	91.7	80.3	84.7
	VHP (km/sec)	18.45	13.42	10.15	7.10	6.94
	Rc (AU)	5.41	4.21	5.10	5.9	5.4
	TF (years)				2.08-2.29	3.25-3.58
20	1st launch date	2/8/95	2/2/95	1/28/95	1/31/95	2/10/95
	V_c (ft/sec)	55510	50650	48480	47010	47170
	C_3 (km^2/sec^2)	164.7	116.7	96.8	83.7	85.2
	VHP (km/sec)	18.66	13.56	10.25	7.55	7.23
	Rc (AU)	5.49	4.23	5.18	6.1	6.0
	TF (years)				2.00-2.42	3.08-3.75
30	1st launch date	2/3/95	1/28/95	1/23/95	1/26/95	2/10/95
	V_c (ft/sec)	56710	51720	49350	47690	47240
	C_3 (km^2/sec^2)	177.2	126.9	104.7	89.7	85.7
	VHP (km/sec)	18.87	13.70	10.34	8.09	7.76
	Rc (AU)	5.56	4.27	5.26	6.1	6.0
	TF (years)				1.91-2.59	3.08-4.06

JUPITER 1995

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity March-April 1996

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	3/23/96	3/17/96	3/15/96	3/17/96	4/16/96
	V_c (ft/sec)	53650	49410	47550	46840	47200
	C_3 (km^2/sec^2)	145.8	105.2	88.5	82.3	85.4
	VHP (km/sec)	17.45	12.67	9.53	6.97	7.75
	Rc (AU)	5.20	4.06	4.92	5.85	5.90
	TF (years)				2.04	3.98
10	1st launch date	3/18/96	3/11/96	3/9/96	3/12/96	4/11/96
	V_c (ft/sec)	53890	49640	47780	47070	47210
	C_3 (km^2/sec^2)	148.2	107.3	90.5	84.2	85.5
	VHP (km/sec)	17.67	12.83	9.64	7.47	7.95
	Rc (AU)	5.28	4.08	4.99	6.0	6.0
	TF (years)				1.94-2.17	3.84-4.12
20	1st launch date	3/13/96	3/6/96	3/4/96	3/7/96	4/6/96
	V_c (ft/sec)	54620	50220	48380	47480	47240
	C_3 (km^2/sec^2)	155.5	112.8	95.8	87.9	85.7
	VHP (km/sec)	17.89	12.97	9.74	8.03	8.14
	Rc (AU)	5.35	4.11	5.07	6.0	6.0
	TF (years)				1.86-2.32	3.69-4.27
30	1st launch date	3/8/96	3/1/96	2/28/96	3/2/96	4/1/96
	V_c (ft/sec)	55840	51150	49330	48080	47280
	C_3 (km^2/sec^2)	168.1	121.5	104.5	93.1	86.0
	VHP (km/sec)	18.10	13.11	9.84	8.57	8.33
	Rc (AU)	5.43	4.15	5.14	6.0	6.0
	TF (years)				1.79-2.50	3.55-4.42

JUPITER 1996

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity April-May 1997

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	4/28/97	4/22/97	4/19/97	4/24/97	5/19/97
	V_c (ft/sec)	53250	49310	47650	47120	46940
	C_3 (km^2/sec^2)	141.9	104.3	89.3	84.6	83.1
	VHP (km/sec)	16.70	12.08	9.10	6.76	7.29
	Rc (AU)	5.12	3.98	4.84	5.84	4.95
	TF (years)				2.03	3.76
10	1st launch date	4/23/97	4/16/97	4/14/97	4/19/97	5/14/97
	V_c (ft/sec)	53510	49540	47850	47330	46960
	C_3 (km^2/sec^2)	144.5	106.4	91.1	86.5	83.3
	VHP (km/sec)	16.91	12.23	9.20	7.29	7.47
	Rc (AU)	5.19	4.01	4.91	6.0	5.8
	TF (years)				1.92-2.18	3.62-3.90
20	1st launch date	4/18/97	4/11/97	4/9/97	4/14/97	5/9/97
	V_c (ft/sec)	54240	50130	48430	47680	47010
	C_3 (km^2/sec^2)	151.7	111.9	96.3	89.6	83.7
	VHP (km/sec)	17.12	12.37	9.30	7.84	7.65
	Rc (AU)	5.26	4.03	4.99	6.0	6.1
	TF (years)				1.83-2.36	3.48-4.04
30	1st launch date	4/13/97	4/6/97	4/4/97	4/9/97	5/4/97
	V_c (ft/sec)	55440	51050	49480	48240	47100
	C_3 (km^2/sec^2)	164.0	120.6	105.8	94.6	84.5
	VHP (km/sec)	17.32	12.50	9.40	8.43	7.82
	Rc (AU)	5.34	4.07	5.07	6.0	6.1
	TF (years)				1.75-2.55	3.35-4.19

JUPITER 1997

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity May-June 1998

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	6/5/98	5/30/98	5/29/98	5/31/98	6/15/98
	V_c (ft/sec)	53300	49460	47810	47020	46650
	C_3 (km^2/sec^2)	142.3	105.7	90.7	83.8	80.5
	VHP (km/sec)	16.22	11.71	8.81	6.34	6.40
	Rc (AU)	5.11	3.98	4.90	5.66	5.13
	TF (years)				2.11	3.30
10	1st launch date	5/31/98	5/24/98	5/23/98	5/26/98	6/10/98
	V_c (ft/sec)	53570	49680	48030	47160	46690
	C_3 (km^2/sec^2)	145.1	107.7	92.7	85.0	81.0
	VHP (km/sec)	16.41	11.86	8.91	6.86	6.55
	Rc (AU)	5.17	4.00	4.97	6.0	5.8
	TF (years)				1.99-2.28	3.18-3.43
20	1st launch date	5/26/98	5/19/98	5/18/98	5/26/98	6/5/98
	V_c (ft/sec)	54310	50250	48610	47470	46820
	C_3 (km^2/sec^2)	152.4	113.0	97.9	87.8	82.0
	VHP (km/sec)	16.61	11.99	9.00	6.86	6.74
	Rc (AU)	5.25	4.03	5.05	6.0	6.1
	TF (years)				1.97-2.71	3.06-3.58
30	1st launch date	5/21/98	5/14/98	5/13/98	5/21/98	5/31/98
	V_c (ft/sec)	55510	51160	49540	47650	46990
	C_3 (km^2/sec^2)	164.7	121.5	106.4	89.4	83.6
	VHP (km/sec)	16.80	12.12	9.09	7.43	7.00
	Rc (AU)	5.32	4.07	5.13	6.1	6.1
	TF (years)				1.86-2.92	2.94-3.80

JUPITER 1998

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity June-July 1999

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	7/13/99	7/7/99	7/4/99	7/9/99	7/4/99
	V_c (ft/sec)	53740	49790	47990	46540	46830
	C_3 (km^2/sec^2)	146.7	108.8	92.3	79.7	82.2
	VHP (km/sec)	16.20	11.72	8.86	5.62	5.59
	Rc (AU)	5.17	4.06	5.00	4.23	4.61
	TF (years)				2.52	2.64
10	1st launch date	7/7/99	7/1/99	6/28/99	7/4/99	6/29/99
	V_c (ft/sec)	54030	50030	48200	46700	46940
	C_3 (km^2/sec^2)	149.6	110.9	94.2	81.1	83.1
	VHP (km/sec)	16.44	11.87	8.96	5.65	5.69
	Rc (AU)	5.25	4.08	5.07	4.6	6.1
	TF (years)				2.48-2.60	2.48-2.91
20	1st launch date	7/2/99	6/26/99	6/23/99	6/29/99	6/29/99
	V_c (ft/sec)	54720	50600	48730	47010	47170
	C_3 (km^2/sec^2)	156.5	116.3	99.0	83.8	85.1
	VHP (km/sec)	16.63	12.00	9.04	6.09	6.10
	Rc (AU)	5.33	4.11	5.15	5.5	6.3
	TF (years)				2.20-2.73	2.48-3.36
30	1st launch date	6/27/99	6/21/99	6/18/99	6/24/99	6/24/99
	V_c (ft/sec)	55770	51490	49590	47620	47410
	C_3 (km^2/sec^2)	167.3	124.7	106.8	89.1	87.2
	VHP (km/sec)	16.82	12.12	9.12	6.70	6.34
	Rc (AU)	5.39	4.14	5.23	6.1	6.3
	TF (years)				2.01-2.81	2.43-3.57

JUPITER 1999

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target JUPITER Opportunity July-August 2000

Launch Window (days)	Parameters	Constant Flight Times			Minimum Energy	
		400 days 1.10 years	500 days 1.37 years	600 days 1.64 years	Type I	Type II
0	1st launch date	8/18/2000	8/8/2000	8/8/2000	8/8/2000	8/28/2000
	V_c (ft/sec)	54470	50280	48330	47150	47760
	C_3 (km^2/sec^2)	154.0	113.3	95.4	85.0	90.4
	VHP (km/sec)	16.65	12.11	9.16	6.31	6.36
	Rc (AU)	5.28	4.20	5.17	5.79	5.95
	TF (years)				2.14	3.87
10	1st launch date	8/13/2000	8/7/2000	8/3/2000	8/3/2000	8/23/2000
	V_c (ft/sec)	54700	50510	48510	47390	47770
	C_3 (km^2/sec^2)	156.4	115.4	97.0	87.0	90.4
	VHP (km/sec)	16.85	12.23	9.25	6.61	6.57
	Rc (AU)	5.35	4.21	5.25	6.1	6.4
	TF (years)				2.07-2.25	3.66-4.06
20	1st launch date	8/8/2000	8/2/2000	7/29/2000	8/3/2000	8/18/2000
	V_c (ft/sec)	55420	51140	49010	47900	47790
	C_3 (km^2/sec^2)	163.8	121.3	101.5	91.5	90.6
	VHP (km/sec)	17.05	12.35	9.34	6.61	6.79
	Rc (AU)	5.43	4.23	5.33	6.1	6.4
	TF (years)				2.07-2.55	3.46-4.25
30	1st launch date	8/3/2000	7/28/2000	7/24/2000	7/29/2000	8/18/2000
	V_c (ft/sec)	56640	52180	49880	48440	42830
	C_3 (km^2/sec^2)	176.5	131.3	109.6	96.4	90.9
	VHP (km/sec)	17.24	12.48	9.42	7.08	7.22
	Rc (AU)	5.50	4.26	5.41	6.3	6.4
	TF (years)				1.97-2.72	3.46-4.65

OPPORTUNITIES TO SATURN 1975-2000

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Sept.-Oct. 1975

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	10/14/75	9/28/75	9/26/75	10/6/75	9/30/75
	V_c (ft/sec)	72510	54630	51690	52310	51690
	C_3 (km^2/sec^2)	366.8	155.7	126.6	132.6	126.6
	VHP (km/sec)	28.06	13.90	8.44	6.19	7.48
	Rc (AU)	8.22	8.22	8.32	8.43	9.78
	TF (years)					3.74
10	1st launch date	10/9/75	9/22/75	9/21/75	9/30/75	9/25/75
	V_c (ft/sec)	72880	54960	52050	53000	52060
	C_3 (km^2/sec^2)	371.9	159.1	130.1	139.3	130.2
	VHP (km/sec)	28.25	13.99	8.49	6.24	8.19
	Rc (AU)	8.27	8.23	8.32	8.44	10.4
	TF (years)					3.50-4.06
20	1st launch date	10/4/75	9/17/75	9/16/75	9/30/75	9/20/75
	V_c (ft/sec)	73950	55730	53260	55140	52670
	C_3 (km^2/sec^2)	386.5	167.0	141.9	160.8	136.1
	VHP (km/sec)	28.44	14.06	8.55	6.24	8.84
	Rc (AU)	8.31	8.25	8.34	8.45	10.4
	TF (years)					3.32-4.46
30	1st launch date	9/29/75	9/12/75	9/11/75		9/15/75
	V_c (ft/sec)	75730	56920	56360		53370
	C_3 (km^2/sec^2)	411.2	179.4	173.5		143.0
	VHP (km/sec)	28.63	14.13	8.64		9.55
	Rc (AU)	8.37	8.27	8.36		10.5
	TF (years)					3.16-4.94

SATURN 1975

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Sept.-Oct. 1976

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	10/27/76	10/12/76	10/10/76	10/18/76	10/9/76
	V_c (ft/sec)	73010	54920	52030	52590	52040
	C_3 (km^2/sec^2)	373.6	158.6	129.9	135.4	130.0
	VHP (km/sec)	28.29	14.05	8.54	6.22	8.29
	Rc (AU)	8.31	8.32	8.43	8.55	8.55
	TF (years)					3.50
10	1st launch date	10/22/76	10/6/76	10/5/76	10/13/76	10/4/76
	V_c (ft/sec)	73360	55230	52410	53360	52530
	C_3 (km^2/sec^2)	378.3	161.8	133.6	142.9	134.80
	VHP (km/sec)	28.50	14.13	8.58	6.27	8.97
	Rc (AU)	8.35	8.33	8.43	8.56	9.9
	TF (years)					3.32-3.75
20	1st launch date	10/17/76	10/1/76	9/30/76	10/13/76	10/4/76
	V_c (ft/sec)	74370	56000	53680	55380	53040
	C_3 (km^2/sec^2)	392.2	169.8	146.1	163.3	139.8
	VHP (km/sec)	28.69	14.21	8.64	6.27	8.97
	Rc (AU)	8.40	8.35	8.44	8.60	10.5
	TF (years)					3.32-4.57
30	1st launch date	10/12/76	9/26/76	9/25/76		9/29/76
	V_c (ft/sec)	76120	57230	56840		53720
	C_3 (km^2/sec^2)	416.7	182.7	178.5		146.5
	VHP (km/sec)	28.88	14.28	8.73		9.74
	Rc (AU)	8.45	8.38	8.46		10.5
	TF (years)					3.14-5.10

SATURN 1976

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Oct.-Nov. 1977

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	11/10/77	10/26/77	10/25/77	11/1/77	10/28/77
	V_c (ft/sec)	73630	55230	52280	52680	52260
	C_3 (km^2/sec^2)	382.1	161.8	132.3	136.2	132.1
	VHP (km/sec)	28.60	14.24	8.66	6.26	7.53
	Rc (AU)	8.41	8.43	8.54	8.66	10.26
	TF (years)					3.79
10	1st launch date	11/5/77	10/20/77	10/19/77	10/27/77	10/23/77
	V_c (ft/sec)	74010	55580	52700	53270	52620
	C_3 (km^2/sec^2)	387.3	165.4	136.4	142.1	135.6
	VHP (km/sec)	28.82	14.34	8.71	6.30	8.33
	Rc (AU)	8.45	8.44	8.55	8.67	10.6
	TF (years)					3.52-4.21
20	1st launch date	10/31/77	10/15/77	10/14/77	10/27/77	10/18/77
	V_c (ft/sec)	75020	56420	54060	55670	53180
	C_3 (km^2/sec^2)	401.2	174.1	149.9	166.3	141.1
	VHP (km/sec)	29.01	14.41	8.77	6.30	9.08
	Rc (AU)	8.50	8.46	8.56	8.72	10.6
	TF (years)					3.32-4.70
30	1st launch date	10/26/77	10/10/77	10/9/77		10/13/77
	V_c (ft/sec)	76740	57740	57320		54050
	C_3 (km^2/sec^2)	425.5	188.10	183.6		149.8
	VHP (km/sec)	29.20	14.48	8.86		9.88
	Rc (AU)	8.55	8.49	8.58		10.6
	TF (years)					3.14-5.28

SATURN 1977

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Oct.-Nov. 1978

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	11/24/78	11/9/78	11/7/78	11/14/78	11/8/78
	V_c (ft/sec)	74350	55520	52410	52580	52290
	C_3 (km^2/sec^2)	392.0	164.8	133.5	135.3	132.4
	VHP (km/sec)	28.98	14.48	8.80	6.31	7.85
	Rc (AU)	8.53	8.55	8.65	8.76	9.99
	TF (years)					3.72
10	1st launch date	11/19/78	11/3/78	11/2/78	11/8/78	11/3/78
	V_c (ft/sec)	74710	55870	52760	53370	52620
	C_3 (km^2/sec^2)	396.9	168.4	137.0	143.0	135.6
	VHP (km/sec)	29.19	14.57	8.85	6.36	8.66
	Rc (AU)	8.57	8.56	8.66	8.77	10.7
	TF (years)					3.47-4.09
20	1st launch date	11/14/78	10/29/78	10/28/78	11/8/78	11/3/78
	V_c (ft/sec)	75770	56720	53990	55320	53370
	C_3 (km^2/sec^2)	411.7	177.3	149.2	162.7	143.0
	VHP (km/sec)	29.38	14.64	8.90	6.36	8.66
	Rc (AU)	8.61	8.58	8.67	8.82	10.7
	TF (years)					3.47-5.12
30	1st launch date	11/9/78	10/24/78	10/23/78		10/29/78
	V_c (ft/sec)	77570	58070	56900		53820
	C_3 (km^2/sec^2)	437.3	191.7	179.2		147.5
	VHP (km/sec)	29.57	14.72	8.98		9.47
	Rc (AU)	8.67	8.61	8.70		10.7
	TF (years)					3.27-5.82

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Nov.-Dec. 1979

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	12/8/79	11/22/79	11/20/79	11/26/79	11/22/79
	V_c (ft/sec)	75110	55770	52420	52340	52200
	C_3 (km^2/sec^2)	402.5	167.4	133.7	132.9	131.5
	VHP (km/sec)	29.4	14.73	8.97	6.38	7.45
	Rc (AU)	8.64	8.66	8.76	8.86	10.80
	TF (years)					3.92
10	1st launch date	12/2/79	11/17/79	11/15/79	11/20/79	11/17/79
	V_c (ft/sec)	75540	56060	52750	53100	52460
	C_3 (km^2/sec^2)	408.5	170.4	136.9	140.3	134.1
	VHP (km/sec)	29.63	14.82	9.01	6.43	8.34
	Rc (AU)	8.68	8.67	8.77	8.87	10.8
	TF (years)					3.61-4.37
20	1st launch date	11/27/79	11/12/79	11/11/79	11/20/79	11/17/79
	V_c (ft/sec)	76620	56870	53790	55020	53090
	C_3 (km^2/sec^2)	423.7	178.9	147.2	159.6	140.2
	VHP (km/sec)	29.82	14.89	9.05	6.43	8.34
	Rc (AU)	8.72	8.70	8.78	8.91	10.9
	TF (years)					3.61-5.63
30	1st launch date	11/22/79	11/7/79	11/7/79		11/12/79
	V_c (ft/sec)	78260	58190	55540		53390
	C_3 (km^2/sec^2)	447.5	193.0	165.0		143.2
	VHP (km/sec)	30.01	14.97	9.10		9.14
	Rc (AU)	8.78	8.73	8.81		10.9
	TF (years)					3.39-6.22

SATURN 1979

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Nov.-Dec. 1980

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.4 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	12/20/80	12/4/80	12/1/80	12/6/80	12/7/80
	V_c (ft/sec)	75870	55970	52340	51970	51990
	C_3 (km^2/sec^2)	413.1	169.4	133.0	129.3	129.5
	VHP (km/sec)	29.84	15.00	9.13	6.46	6.48
	Rc (AU)	8.75	8.77	8.85	8.93	8.93
	TF (years)					4.44
10	1st launch date	12/14/80	11/29/80	11/26/80	12/1/80	12/2/80
	V_c (ft/sec)	76330	56270	52700	52530	52200
	C_3 (km^2/sec^2)	419.6	172.6	136.5	134.8	131.6
	VHP (km/sec)	30.07	15.08	9.18	6.50	7.42
	Rc (AU)	8.79	8.78	8.86	8.94	10.9
	TF (years)					3.98-5.10
20	1st launch date	12/9/80	11/24/80	11/22/80	12/1/80	11/27/80
	V_c (ft/sec)	77430	57090	53620	54780	52460
	C_3 (km^2/sec^2)	435.4	181.2	145.5	157.1	134.1
	VHP (km/sec)	30.27	15.16	9.22	6.50	8.31
	Rc (AU)	8.83	8.80	8.88	8.99	10.9
	TF (years)					3.67-5.77
30	1st launch date	12/4/80	11/19/80	11/18/80		11/27/80
	V_c (ft/sec)	79120	58410	55320		52610
	C_3 (km^2/sec^2)	460.0	195.4	162.7		135.5
	VHP (km/sec)	30.46	15.23	9.27		8.31
	Rc (AU)	8.89	8.83	8.90		10.9
	TF (years)					3.67-7.10

SATURN 1980

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Dec. 1981-Jan.1982

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	1/2/82	12/17/81	12/13/81	12/17/81	1/14/82
	V_c (ft/sec)	76590	56120	52200	51530	49600
	C_3 (km^2/sec^2)	423.4	171.0	131.5	125.1	107.0
	VHP (km/sec)	30.26	15.26	9.30	6.55	4.40
	Rc (AU)	8.86	8.86	8.93	8.99	9.92
	TF (years)					8.73
10	1st launch date	12/27/81	12/12/81	12/8/81	12/12/81	1/10/82
	V_c (ft/sec)	77020	56390	52510	52010	51160
	C_3 (km^2/sec^2)	429.6	173.8	134.6	129.8	121.6
	VHP (km/sec)	30.50	15.34	9.35	6.58	5.85
	Rc (AU)	8.89	8.88	8.94	9.00	11.0
	TF (years)					7.94-8.94
20	1st launch date	12/22/81	12/7/81	12/3/81	12/12/81	1/4/82
	V_c (ft/sec)	78120	57210	53580	54260	51550
	C_3 (km^2/sec^2)	445.3	182.4	145.1	151.9	125.2
	VHP (km/sec)	30.70	15.42	9.39	6.58	5.95
	Rc (AU)	8.94	8.90	8.95	9.04	11.0
	TF (years)					7.03-9.16
30	1st launch date	12/17/81	12/2/81	11/28/81		12/13/82
	V_c (ft/sec)	79800	58560	55950		51670
	C_3 (km^2/sec^2)	467.0	197.0	169.3		126.4
	VHP (km/sec)	30.89	15.49	9.45		7.25
	Rc (AU)	8.99	8.93	8.97		11.0
	TF (years)					4.10-9.16

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Dec.1982-Jan.-1983

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	1/14/83	12/30/82	12/25/82	12/27/82	1/15/83
	V_c (ft/sec)	77240	56220	52000	51040	49500
	C_3 (km^2/sec^2)	432.7	172.0	129.6	120.5	106.1
	VHP (km/sec)	30.68	15.50	9.46	6.63	4.86
	Rc (AU)	8.95	8.94	8.99	9.03	10.05
	TF (years)					7.75
10	1st launch date	1/9/83	12/24/82	12/19/82	12/22/82	1/11/83
	V_c (ft/sec)	77610	56510	52350	51560	50460
	C_3 (km^2/sec^2)	438.0	175.0	133.0	125.4	114.9
	VHP (km/sec)	30.89	15.59	9.51	6.66	5.22
	Rc (AU)	8.99	8.95	9.00	9.04	11.0
	TF (years)					6.99-7.96
20	1st launch date	1/4/83	12/19/82	12/14/82	12/22/82	1/1/83
	V_c (ft/sec)	78700	57310	53400	53500	50870
	C_3 (km^2/sec^2)	453.8	183.5	143.3	144.3	118.8
	VHP (km/sec)	31.09	15.67	9.55	6.66	5.54
	Rc (AU)	9.04	8.98	9.01	9.07	11.0
	TF (years)					5.35-7.96
30	1st launch date	12/30/82	12/14/82	12/9/82		12/27/82
	V_c (ft/sec)	80550	58590	55640		51050
	C_3 (km^2/sec^2)	481.1	197.3	166.0		120.5
	VHP (km/sec)	31.27	15.74	9.61		6.30
	Rc (AU)	9.09	9.01	9.03		11.0
	TF (years)					4.66-8.23

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Dec.1983-Jan.1984

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	1/26/84	1/19/84	1/5/84	1/6/84	1/18/84
	V_c (ft/sec)	77800	56270	51800	50570	49580
	C_3 (km^2/sec^2)	440.8	172.6	127.7	116.0	106.7
	VHP (km/sec)	31.05	15.72	9.61	6.71	5.20
	Rc (AU)	9.03	9.00	9.03	9.05	10.27
	TF (years)					6.78
10	1st launch date	1/21/84	1/5/84	12/30/83	1/1/84	1/13/84
	V_c (ft/sec)	78210	56560	52140	51000	49980
	C_3 (km^2/sec^2)	446.6	175.6	130.9	120.1	110.5
	VHP (km/sec)	31.27	15.81	9.65	6.74	5.24
	Rc (AU)	9.07	9.01	9.04	9.06	11.0
	TF (years)					6.21-7.00
20	1st launch date	1/16/84	12/31/83	12/25/83	1/1/84	1/8/84
	V_c (ft/sec)	79280	57350	53090	52830	50530
	C_3 (km^2/sec^2)	462.3	184.0	140.3	137.7	115.6
	VHP (km/sec)	31.48	15.89	9.69	6.74	5.68
	Rc (AU)	9.11	9.04	9.05	9.08	11.0
	TF (years)					5.23-7.00
30	1st launch date	1/11/84	12/26/83	12/20/83		1/3/84
	V_c (ft/sec)	80990	58610	55030		51170
	C_3 (km^2/sec^2)	487.8	197.6	159.8		121.6
	VHP (km/sec)	31.67	15.96	9.74		6.56
	Rc (AU)	9.16	9.06	9.07		11.0
	TF (years)					4.53-7.60

SATURN 1983-1984

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Jan.-Feb. 1985

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	2/6/85	1/21/85	1/15/85	1/15/85	1/18/85
	V_c (ft/sec)	78250	56290	51610	50180	49450
	C_3 (km^2/sec^2)	447.3	172.8	125.8	112.3	105.6
	VHP (km/sec)	31.36	15.91	9.73	6.79	5.37
	Rc (AU)	9.09	9.04	9.05	9.05	10.2
	TF (years)					5.76
10	1st launch date	2/1/85	1/16/85	1/9/85	1/9/85	1/13/85
	V_c (ft/sec)	78660	56560	51920	50610	49890
	C_3 (km^2/sec^2)	453.3	175.6	128.9	116.3	109.6
	VHP (km/sec)	31.59	15.99	9.77	6.81	5.66
	Rc (AU)	9.12	9.05	9.06	9.06	11.0
	TF (years)					5.30-5.84
20	1st launch date	1/27/85	1/11/85	1/4/85	1/9/85	1/13/85
	V_c (ft/sec)	79740	57340	52760	52010	50450
	C_3 (km^2/sec^2)	469.1	183.9	137.0	129.7	114.9
	VHP (km/sec)	31.79	16.07	9.81	6.81	5.66
	Rc (AU)	9.17	9.08	9.07	9.07	11.0
	TF (years)					5.30-6.53
30	1st launch date	1/22/85	1/6/85	12/30/84		1/8/85
	V_c (ft/sec)	81410	58670	54320		51060
	C_3 (km^2/sec^2)	494.2	198.2	152.6		120.6
	VHP (km/sec)	31.99	16.14	9.85		6.79
	Rc (AU)	9.22	9.10	9.09		11.0
	TF (years)					4.46-6.91

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Jan.-Feb. 1986

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	2/18/86	2/2/86	1/26/86	1/25/86	1/25/86
	V_c (ft/sec)	78570	56290	51470	49960	49690
	C_3 (km^2/sec^2)	452.0	172.8	124.5	110.3	107.8
	VHP (km/sec)	31.61	16.05	9.92	6.85	6.02
	Rc (AU)	9.13	9.06	9.05	9.03	11.00
	TF (years)					4.99
10	1st launch date	2/13/86	1/27/86	1/20/86	1/19/86	1/25/86
	V_c (ft/sec)	78960	56620	51760	50250	49970
	C_3 (km^2/sec^2)	457.7	176.2	127.3	112.9	110.4
	VHP (km/sec)	31.83	16.15	9.86	6.87	6.02
	Rc (AU)	9.16	9.07	9.06	9.04	11.0
	TF (years)					4.99-5.55
20	1st launch date	2/8/86	1/22/86	1/15/86	1/14/86	1/20/86
	V_c (ft/sec)	80020	57430	52500	51040	50430
	C_3 (km^2/sec^2)	473.3	184.8	134.4	120.5	114.6
	VHP (km/sec)	32.04	16.22	9.90	6.89	6.26
	Rc (AU)	9.21	9.09	9.07	9.06	11.0
	TF (years)					4.82-5.91
30	1st launch date	2/3/86	1/17/86	1/10/86		1/15/86
	V_c (ft/sec)	81760	58670	53740		51010
	C_3 (km^2/sec^2)	499.5	198.2	146.7		120.2
	VHP (km/sec)	32.23	16.30	9.94		11.0
	Rc (AU)	9.26	9.12	9.10		6.26
	TF (years)					4.77-6.28

SATURN 1986

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Jan.-March 1987

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	3/2/87	2/13/87	2/6/87	2/6/87	2/9/87
	V_c (ft/sec)	78760	56270	51390	50030	49990
	C_3 (km^2/sec^2)	454.7	172.5	123.80	110.9	110.5
	VHP (km/sec)	31.78	16.15	9.87	6.88	6.32
	Rc (AU)	9.14	9.05	9.02	8.98	10.4
	TF (years)					4.78
10	1st launch date	2/24/87	2/8/87	2/1/87	2/1/87	2/4/87
	V_c (ft/sec)	79270	56550	51610	50270	50220
	C_3 (km^2/sec^2)	462.2	175.5	125.9	113.2	112.7
	VHP (km/sec)	32.03	16.23	9.91	6.91	6.75
	Rc (AU)	9.17	9.07	9.03	8.99	10.9
	TF (years)					4.53-5.10
20	1st launch date	2/19/87	2/3/87	1/27/87	1/27/87	1/30/87
	V_c (ft/sec)	80410	57300	52250	51290	50680
	C_3 (km^2/sec^2)	479.2	183.5	132.0	122.8	117.0
	VHP (km/sec)	32.24	16.31	9.95	6.95	7.17
	Rc (AU)	9.22	9.09	9.05	9.01	10.9
	TF (years)					4.32-5.48
30	1st launch date	2/14/87	1/29/87	1/22/87		1/25/87
	V_c (ft/sec)	82140	58530	53330		51320
	C_3 (km^2/sec^2)	505.3	196.6	142.6		123.1
	VHP (km/sec)	32.43	16.39	9.99		7.63
	Rc (AU)	9.27	9.11	9.07		10.9
	TF (years)					4.13-5.88

SATURN 1987

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Feb. - March 1988

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	3/13/88	2/25/88	2/18/88	2/19/88	2/17/88
	V_c (ft/sec)	78810	56230	51400	50330	50380
	C_3 (km^2/sec^2)	455.4	172.1	123.8	113.8	114.2
	VHP (km/sec)	31.87	16.19	9.89	6.90	7.18
	Rc (AU)	9.14	9.03	8.98	8.91	9.34
	TF (years)					4.31
10	1st launch date	3/7/88	2/19/88	2/12/88	2/14/88	2/17/88
	V_c (ft/sec)	79270	56570	51680	50750	50700
	C_3 (km^2/sec^2)	462.1	175.7	126.5	117.7	117.2
	VHP (km/sec)	32.11	16.29	9.94	6.93	7.18
	Rc (AU)	9.17	9.04	8.99	8.93	10.9
	TF (years)					4.31-4.95
20	1st launch date	3/2/88	2/14/88	2/7/88	2/14/88	2/12/88
	V_c (ft/sec)	80370	57370	52360	52300	51240
	C_3 (km^2/sec^2)	478.4	184.2	133.1	132.6	122.4
	VHP (km/sec)	32.31	16.37	9.98	6.93	7.70
	Rc (AU)	9.21	9.05	9.01	8.93	10.9
	TF (years)					4.10-5.33
30	1st launch date	2/26/88	2/9/88	2/2/88		2/7/88
	V_c (ft/sec)	82050	58590	53460		51920
	C_3 (km^2/sec^2)	503.9	197.3	143.9		128.8
	VHP (km/sec)	32.51	16.44	10.02		8.27
	Rc (AU)	9.26	9.08	9.03		10.9
	TF (years)					3.90-5.76

SATURN 1988

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Feb. - Mar. 1989

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	3/24/89	3/8/89	3/1/89	3/4/89	3/5/89
	V_c (ft/sec)	78720	56180	51480	50750	50750
	C_3 (km^2/sec^2)	454.1	171.6	124.6	117.7	117.6
	VHP (km/sec)	31.87	16.18	9.88	6.89	7.06
	Rc (AU)	9.11	8.98	8.91	8.83	9.01
	TF (years)					4.36
10	1st launch date	3/19/89	3/2/89	2/23/89	2/27/89	2/28/89
	V_c (ft/sec)	79130	56480	51780	51180	51080
	C_3 (km^2/sec^2)	460.1	174.7	127.5	121.7	120.8
	VHP (km/sec)	32.10	16.27	9.93	6.93	7.65
	Rc (AU)	9.14	8.99	8.93	8.84	10.4
	TF (years)					4.11-4.70
20	1st launch date	3/14/89	2/25/89	2/18/89	2/27/89	2/23/89
	V_c (ft/sec)	80180	57240	52540	53010	51650
	C_3 (km^2/sec^2)	475.7	182.8	134.9	139.5	126.3
	VHP (km/sec)	32.31	16.35	9.97	6.93	8.22
	Rc (AU)	9.19	9.01	8.94	8.85	10.9
	TF (years)					3.91-5.12
30	1st launch date	3/9/89	2/20/89	2/13/89		2/18/89
	V_c (ft/sec)	81820	58420	53870		52350
	C_3 (km^2/sec^2)	500.3	195.5	148.0		133.0
	VHP (km/sec)	32.50	16.42	10.01		8.86
	Rc (AU)	9.24	9.03	8.97		10.9
	TF (years)					3.72-5.57

SATURN 1989

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity Feb.-April 1990

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	4/5/90	3/19/90	3/13/90	3/18/90	3/17/90
	V_c (ft/sec)	78500	56120	51620	51200	51100
	C_3 (km^2/sec^2)	450.9	171.0	125.9	121.9	121.0
	VHP (km/sec)	31.78	16.11	9.82	6.86	7.42
	Rc (AU)	9.06	8.91	8.83	8.73	9.88
	TF (years)					4.18
10	1st launch date	3/31/90	3/14/90	3/8/90	3/12/90	3/12/90
	V_c (ft/sec)	78870	56390	51880	51810	51420
	C_3 (km^2/sec^2)	456.2	173.8	128.4	127.7	124.1
	VHP (km/sec)	32.00	16.20	9.87	6.91	8.07
	Rc (AU)	9.09	8.92	8.84	8.74	10.8
	TF (years)					3.93-4.49
20	1st launch date	3/26/90	3/9/90	3/3/90	3/12/90	3/7/90
	V_c (ft/sec)	79880	57130	52670	53420	52000
	C_3 (km^2/sec^2)	471.2	181.6	136.1	143.6	129.6
	VHP (km/sec)	32.21	16.28	9.91	6.91	8.67
	Rc (AU)	9.14	8.94	8.86	8.75	10.8
	TF (years)					3.75-4.94
30	1st launch date	3/21/90	3/4/90	2/26/90		3/2/90
	V_c (ft/sec)	81580	58330	54180		52810
	C_3 (km^2/sec^2)	496.7	194.5	151.1		137.5
	VHP (km/sec)	32.41	16.36	9.96		9.36
	Rc (AU)	9.19	8.96	8.88		10.8
	TF (years)					3.56-5.41

SATURN 1990

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity March-April 1991

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	4/17/91	3/31/91	3/26/91	3/31/91	3/26/91
	V_c (ft/sec)	78150	56060	51790	51620	51430
	C_3 (km^2/sec^2)	445.8	170.3	127.5	126.0	124.2
	VHP (km/sec)	31.61	16.00	9.73	6.82	8.14
	Rc (AU)	8.99	8.83	8.73	8.62	10.63
	TF (years)					3.89
10	1st launch date	4/12/91	3/26/91	3/20/91	3/26/91	3/21/91
	V_c (ft/sec)	78490	56320	52150	52170	51850
	C_3 (km^2/sec^2)	450.8	173.1	131.1	131.2	128.2
	VHP (km/sec)	31.83	16.09	9.79	6.86	8.78
	Rc (AU)	9.03	8.84	8.75	8.63	10.7
	TF (years)					3.69-4.14
20	1st launch date	4/7/91	3/21/91	3/15/91	3/26/91	3/21/91
	V_c (ft/sec)	79520	57040	53130	54070	52540
	C_3 (km^2/sec^2)	465.8	180.7	140.6	150.0	134.8
	VHP (km/sec)	32.04	16.17	9.84	6.86	8.78
	Rc (AU)	9.07	8.86	8.76	8.65	10.7
	TF (years)					3.69-4.96
30	1st launch date	4/2/91	3/16/91	3/10/91		3/16/91
	V_c (ft/sec)	81250	58270	55080		53250
	C_3 (km^2/sec^2)	491.7	193.9	160.3		141.8
	VHP (km/sec)	32.24	16.24	9.90		9.50
	Rc (AU)	9.12	8.88	8.79		10.7
	TF (years)					3.50-5.45

SATURN 1991

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity March-April 1992

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	4/28/92	4/11/92	4/7/92	4/13/92	4/7/92
	V_c (ft/sec)	77690	55980	51960	51970	51710
	C_3 (km^2/sec^2)	439.1	169.5	129.2	129.4	126.8
	VHP (km/sec)	31.40	15.84	9.61	6.76	8.24
	Rc (AU)	8.90	8.73	8.63	8.51	10.32
	TF (years)					3.82
10	1st launch date	4/23/92	4/6/92	4/1/92	4/8/92	4/2/92
	V_c (ft/sec)	78030	56250	52340	52450	52120
	C_3 (km^2/sec^2)	444.1	172.3	132.9	134.0	130.8
	VHP (km/sec)	31.59	15.93	9.67	6.80	8.95
	Rc (AU)	8.94	8.74	8.64	8.52	10.6
	TF (years)					3.61-3.82
20	1st launch date	4/18/92	4/1/92	3/27/92	4/3/92	4/2/92
	V_c (ft/sec)	79030	56990	53390	54560	52820
	C_3 (km^2/sec^2)	458.6	180.1	143.3	155.0	137.6
	VHP (km/sec)	31.79	16.01	9.72	6.88	8.95
	Rc (AU)	8.98	8.76	8.66	8.53	10.6
	TF (years)					3.61-4.92
30	1st launch date	4/13/92	3/27/92	3/22/92		3/28/92
	V_c (ft/sec)	80730	58170	55580		53500
	C_3 (km^2/sec^2)	483.9	192.7	165.3		144.3
	VHP (km/sec)	31.99	16.08	9.79		9.66
	Rc (AU)	9.03	8.78	8.68		10.6
	TF (years)					3.44-5.47

SATURN 1992

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity April-May 1993

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	5/10/93	4/24/93	4/20/93	4/27/93	4/20/93
	V_c (ft/sec)	77120	55880	52100	52220	51920
	C_3 (km^2/sec^2)	431.0	168.5	130.5	131.7	128.8
	VHP (km/sec)	31.05	15.63	9.47	6.69	8.30
	Rc (AU)	8.80	8.62	8.51	8.40	9.95
	TF (years)					3.76
10	1st launch date	5/5/93	4/18/93	4/15/93	4/21/93	4/15/93
	V_c (ft/sec)	77500	56190	52380	52860	52340
	C_3 (km^2/sec^2)	436.4	171.7	133.3	138.0	132.9
	VHP (km/sec)	31.28	15.73	9.52	6.74	9.05
	Rc (AU)	8.84	8.63	8.52	8.40	10.5
	TF (years)					3.55-4.03
20	1st launch date	4/30/93	4/13/93	4/10/93	4/21/93	4/15/93
	V_c (ft/sec)	78490	56960	53360	54710	52970
	C_3 (km^2/sec^2)	450.8	179,9	142.9	156.5	139.0
	VHP (km/sec)	31.49	15.81	9.57	6.74	9.05
	Rc (AU)	8.88	8.65	8.54	8.43	10.5
	TF (years)					3.55-4.90
30	1st launch date	4/25/93	4/8/93	4/5/93		4/10/93
	V_c (ft/sec)	80040	58180	55450		53580
	C_3 (km^2/sec^2)	473.6	192.9	164.0		145.1
	VHP (km/sec)	31.69	15.89	9.64		9.78
	Rc (AU)	8.93	8.67	8.57		10.5
	TF (years)					3.37-5.40

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity April-May 1994

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	5/23/94	5/6/94	5/3/94	5/10/94	5/4/94
	V_c (ft/sec)	76490	55750	52170	52310	52010
	C_3 (km^2/sec^2)	421.9	167.2	131.3	132.6	129.7
	VHP (km/sec)	30.68	15.40	9.31	6.62	8.15
	Rc (AU)	8.70	8.51	8.40	8.29	9.86
	TF (years)					3.76
10	1st launch date	5/17/94	5/1/94	4/28/94	5/5/94	4/29/94
	V_c (ft/sec)	76930	56030	52500	52870	52350
	C_3 (km^2/sec^2)	428.2	170.0	134.5	138.0	133.0
	VHP (km/sec)	30.93	15.49	9.36	6.66	8.93
	Rc (AU)	8.73	8.52	8.41	8.30	10.1
	TF (years)					3.54-4.06
20	1st launch date	5/12/94	4/26/94	4/23/94	5/5/94	4/29/94
	V_c (ft/sec)	77970	56770	53570	54950	53040
	C_3 (km^2/sec^2)	443.1	177.8	145.0	158.9	139.8
	VHP (km/sec)	31.14	15.57	9.41	6.66	8.93
	Rc (AU)	8.77	8.53	8.43	8.32	10.2
	TF (years)					3.54-5.01
30	1st launch date	5/7/94	4/21/94	4/18/94		5/24/94
	V_c (ft/sec)	79550	57970	55890		53560
	C_3 (km^2/sec^2)	466.3	190.6	168.7		144.9
	VHP (km/sec)	31.33	15.64	9.49		9.67
	Rc (AU)	8.82	8.56	8.46		10.2
	TF (years)					3.35-5.51

SATURN 1994

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity May-June 1995

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	850 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	6/5/95	5/19/95	5/17/95	5/24/95	5/18/95
	V_c (ft/sec)	75790	55590	52160	52230	51980
	C_3 (km^2/sec^2)	412.1	165.5	131.1	131.8	129.5
	VHP (km/sec)	30.27	15.13	9.14	6.54	7.93
	Rc (AU)	8.58	8.40	8.29	8.20	9.89
	TF (years)					3.79
10	1st launch date	5/30/95	5/14/95	5/11/95	5/18/95	5/13/95
	V_c (ft/sec)	76200	55860	52550	52940	52280
	C_3 (km^2/sec^2)	417.8	168.3	134.9	138.7	132.3
	VHP (km/sec)	30.51	15.22	9.19	6.59	8.72
	Rc (AU)	8.61	8.41	8.31	8.20	10.3
	TF (years)					3.55-4.13
20	1st launch date	5/25/95	5/9/95	5/6/95	5/18/95	5/13/95
	V_c (ft/sec)	77200	56600	53730	54700	52890
	C_3 (km^2/sec^2)	432.1	176.0	146.6	156.4	138.2
	VHP (km/sec)	30.71	15.31	9.25	6.59	8.72
	Rc (AU)	8.66	8.42	8.33	8.22	10.3
	TF (years)					3.55-5.14
30	1st launch date	5/20/95	5/4/95	5/1/95		5/8/95
	V_c (ft/sec)	78740	57800	56320		53270
	C_3 (km^2/sec^2)	454.4	188.7	173.1		142.1
	VHP (km/sec)	30.91	15.38	9.32		9.49
	Rc (AU)	8.70	8.44	8.35		10.3
	TF (years)					3.35-5.64

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity May-June 1996

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	850 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	6/17/96	5/31/96	5/29/96	6/5/96	5/30/96
	V_c (ft/sec)	75070	55390	52030	51950	51840
	C_3 (km^2/sec^2)	402.0	163.5	129.9	129.2	128.1
	VHP (km/sec)	29.83	14.87	8.97	6.46	7.78
	Rc (AU)	8.47	8.29	8.20	8.12	9.82
	TF (years)					3.79
10	1st launch date	6/11/96	5/26/96	5/24/96	5/31/96	5/30/96
	V_c (ft/sec)	75490	55680	52350	52510	52120
	C_3 (km^2/sec^2)	407.8	166.4	133.0	134.6	130.8
	VHP (km/sec)	30.07	14.96	9.01	6.50	7.78
	Rc (AU)	8.50	8.30	8.21	8.12	10.2
	TF (years)					3.79-4.68
20	1st launch date	6/6/96	5/21/96	5/19/96	5/31/96	5/25/96
	V_c (ft/sec)	76490	56440	53440	54590	52410
	C_3 (km^2/sec^2)	421.9	174.3	143.7	155.3	133.6
	VHP (km/sec)	30.28	15.04	9.07	6.50	8.58
	Rc (AU)	8.54	8.31	8.23	8.15	10.2
	TF (years)					3.54-5.20
30	1st launch date	6/1/96	5/16/96	5/14/96		5/25/96
	V_c (ft/sec)	78030	57650	55890		52650
	C_3 (km^2/sec^2)	444.0	187.2	168.7		135.9
	VHP (km/sec)	30.47	15.11	9.14		8.58
	Rc (AU)	8.59	8.33	8.26		10.2
	TF (years)					3.54-5.72

SATURN 1996

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity May-July 1997

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	7/1/97	6/14/97	6/12/97	6/18/97	7/17/97
	V_c (ft/sec)	74350	55160	51800	51500	49800
	C_3 (km^2/sec^2)	392.0	161.1	127.7	124.8	108.8
	VHP (km/sec)	29.38	14.60	8.80	6.39	4.95
	Rc (AU)	8.36	8.20	8.12	8.06	8.31
	TF (years)					7.60
10	1st launch date	6/25/97	6/8/97	6/6/97	6/13/97	7/13/97
	V_c (ft/sec)	74690	55500	52170	52080	51410
	C_3 (km^2/sec^2)	396.6	164.5	131.3	130.4	124.0
	VHP (km/sec)	29.61	14.70	8.85	6.42	6.55
	Rc (AU)	8.40	8.20	8.14	8.07	9.8
	TF (years)					7.10-7.78
20	1st launch date	6/20/97	6/3/97	6/1/97	6/13/97	7/5/97
	V_c (ft/sec)	75620	56290	53340	54030	51720
	C_3 (km^2/sec^2)	409.6	172.7	142.7	149.6	126.9
	VHP (km/sec)	29.81	14.78	8.90	6.38	6.60
	Rc (AU)	8.44	8.21	8.16	8.09	9.8
	TF (years)					6.18-7.86
30	1st launch date	6/15/97	5/29/97	5/27/97		6/10/97
	V_c (ft/sec)	77230	57540	56040		51720
	C_3 (km^2/sec^2)	432.6	186.0	170.1		126.9
	VHP (km/sec)	30.01	14.85	8.98		7.85
	Rc (AU)	8.49	8.23	8.18		10.1
	TF (years)					3.73-7.86

SATURN 1997

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity June-July 1998

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	7/14/98	6/28/98	6/25/98	7/1/98	7/18/98
	V_c (ft/sec)	73660	54900	51480	50890	50000
	C_3 (km^2/sec^2)	382.5	158.4	124.6	119.0	110.6
	VHP (km/sec)	28.97	14.35	8.66	6.33	5.98
	Rc (AU)	8.27	8.12	8.01	8.03	8.29
	TF (years)					6.60
10	1st launch date	7/8/98	6/22/98	6/19/98	6/25/98	7/13/98
	V_c (ft/sec)	74100	55200	51890	51660	50540
	C_3 (km^2/sec^2)	388.6	161.5	128.5	126.3	115.7
	VHP (km/sec)	29.22	14.44	8.70	6.36	5.78
	Rc (AU)	8.30	8.12	8.08	8.05	10.0
	TF (years)					5.98-6.74
20	1st launch date	7/3/98	6/17/98	6/14/98	6/25/98	7/3/98
	V_c (ft/sec)	75110	55960	53070	53100	50850
	C_3 (km^2/sec^2)	402.5	169.3	140.1	140.4	118.6
	VHP (km/sec)	29.42	14.52	8.75	6.36	6.02
	Rc (AU)	8.34	8.14	8.10	8.05	10.0
	TF (years)					4.75-6.74
30	1st launch date	6/28/98	6/12/98	6/9/98		6/28/98
	V_c (ft/sec)	76640	57160	55960		51170
	C_3 (km^2/sec^2)	424.1	181.9	169.3		121.6
	VHP (km/sec)	29.61	14.59	8.83		6.64
	Rc (AU)	8.39	8.16	8.13		10.0
	TF (years)					4.23-6.94

SATURN 1998

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity June-July 1999

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	875 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	7/28/99	7/12/99	7/8/99	7/13/99	7/20/99
	V_c (ft/sec)	73060	54640	51120	50220	49630
	C_3 (km^2/sec^2)	374.2	155.8	121.2	112.7	107.3
	VHP (km/sec)	28.59	14.13	8.53	6.27	5.72
	Rc (AU)	8.19	8.06	8.04	8.03	8.36
	TF (years)					5.61
10	1st launch date	7/22/99	7/6/99	7/3/99	7/7/99	7/15/99
	V_c (ft/sec)	73500	54940	51400	50900	49970
	C_3 (km^2/sec^2)	380.3	158.8	123.9	119.1	110.4
	VHP (km/sec)	28.84	14.22	8.57	6.29	5.80
	Rc (AU)	8.22	8.07	8.05	8.05	10.0
	TF (years)					5.08-5.76
20	1st launch date	7/17/99	7/1/99	6/28/99	7/7/99	7/10/99
	V_c (ft/sec)	74510	55670	52330	52210	50460
	C_3 (km^2/sec^2)	394.1	166.3	132.9	131.7	115.0
	VHP (km/sec)	29.04	14.30	8.61	6.29	6.33
	Rc (AU)	8.26	8.08	8.07	8.05	10.1
	TF (years)					4.40-5.97
30	1st launch date	7/12/99	6/26/99	6/23/99		7/5/99
	V_c (ft/sec)	76030	56830	54640		51060
	C_3 (km^2/sec^2)	415.5	178.5	155.7		120.6
	VHP (km/sec)	29.23	14.37	8.67		7.18
	Rc (AU)	8.31	8.10	8.10		10.1
	TF (years)					3.92-6.21

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target SATURN Opportunity July-August 2000

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		500 days 1.37 years	825 days 2.40 years	1250 days 3.42 years	1625 days 4.45 years	Type I
0	1st launch date	8/10/2000	7/25/2000	7/21/2000	7/23/2000	7/23/2000
	V_c (ft/sec)	72560	54420	50810	49740	49670
	C_3 (km^2/sec^2)	367.5	153.5	118.2	108.3	107.6
	VHP (km/sec)	28.28	13.96	8.44	6.23	6.04
	Rc (AU)	8.14	8.03	8.04	8.07	8.62
	TF (years)					4.65
10	1st launch date	8/5/2000	7/19/2000	7/15/2000	7/17/2000	7/18/2000
	V_c (ft/sec)	72910	54730	51080	50010	49870
	C_3 (km^2/sec^2)	372.2	156.7	120.8	110.7	109.4
	VHP (km/sec)	28.50	14.05	8.48	6.25	6.13
	Rc (AU)	8.17	8.04	8.05	8.09	9.7
	TF (years)					4.56-4.83
20	1st launch date	7/31/2000	7/14/2000	7/10/2000	7/12/2000	7/18/2000
	V_c (ft/sec)	73840	55460	51860	50960	50500
	C_3 (km^2/sec^2)	384.9	164.2	128.3	119.6	115.3
	VHP (km/sec)	28.69	14.12	8.52	6.30	6.13
	Rc (AU)	8.21	8.05	8.08	8.12	10.1
	TF (years)					4.56-5.31
30	1st launch date	7/26/2000	7/9/2000	7/5/2000	7/7/2000	7/13/2000
	V_c (ft/sec)	75410	56590	53690	51390	51080
	C_3 (km^2/sec^2)	406.8	175.9	146.2	123.7	120.8
	VHP (km/sec)	28.88	14.19	8.56	6.29	7.03
	Rc (AU)	8.26	8.07	8.11	8.15	10.1
	TF (years)					3.96-5.59

OPPORTUNITIES TO URANUS 1975-2000

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Dec. 1975-Jan. 1976

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	1/5/76	12/29/75	12/24/75	12/21/75	12/29/75
	V_c (ft/sec)	67610	59730	56080	54180	51690
	C_3 (km^2/sec^2)	303.0	209.9	170.6	151.1	126.7
	VHP (km/sec)	23.78	17.34	13.33	10.64	4.92
	Rc (AU)	17.66	17.72	17.78	17.85	19.19
	TF (years)					12.71
10	1st launch date	12/31/75	12/23/75	12/18/75	12/16/75	12/24/75
	V_c (ft/sec)	67930	60090	56440	54440	51820
	C_3 (km^2/sec^2)	307.1	213.8	174.3	153.7	127.9
	VHP (km/sec)	23.86	17.39	13.37	10.66	5.23
	Rc (AU)	17.68	17.73	17.79	17.86	20.4
	TF (years)					11.66-13.82
20	1st launch date	12/26/75	12/18/75	12/13/75	12/11/75	12/19/75
	V_c (ft/sec)	68890	60950	57250	55150	52030
	C_3 (km^2/sec^2)	319.3	223.5	182.9	161.0	129.9
	VHP (km/sec)	23.92	17.43	13.39	10.68	5.61
	Rc (AU)	17.69	17.74	17.80	17.88	20.4
	TF (years)					10.79-15.07
30	1st launch date	12/21/75	12/13/75	12/8/75	12/6/75	12/14/75
	V_c (ft/sec)	70530	62280	58490	56300	52420
	C_3 (km^2/sec^2)	340.5	238.7	196.3	172.9	133.7
	VHP (km/sec)	23.98	17.47	13.42	10.70	6.09
	Rc (AU)	17.72	17.76	17.82	17.90	20.5
	TF (years)					9.99-16.25

URANUS 1975-1976

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Dec. 1976-Jan. 1977

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	1/9/77	1/2/77	12/28/76	12/25/76	12/31/76
	V_c (ft/sec)	67740	59810	56140	54220	51730
	C_3 (km^2/sec^2)	304.8	210.8	171.2	151.5	127.0
	VHP (km/sec)	23.86	17.40	13.38	10.69	5.04
	Rc (AU)	17.72	17.78	17.85	17.91	19.20
	TF (years)					12.24
10	1st launch date	1/4/77	12/27/76	12/22/76	12/20/76	12/26/76
	V_c (ft/sec)	68070	60160	56480	54460	51830
	C_3 (km^2/sec^2)	308.8	214.7	174.8	154.0	128.0
	VHP (km/sec)	23.93	17.45	13.42	10.71	5.45
	Rc (AU)	17.73	17.79	17.85	17.92	20.4
	TF (years)					11.14-13.37
20	1st launch date	12/30/76	12/22/76	12/17/76	12/15/76	12/21/76
	V_c (ft/sec)	69040	61020	57290	55170	52110
	C_3 (km^2/sec^2)	321.2	224.4	183.3	161.2	130.7
	VHP (km/sec)	24.00	17.49	13.45	10.73	5.88
	Rc (AU)	17.75	17.80	17.87	17.94	20.5
	TF (years)					10.34-14.60
30	1st launch date	12/25/76	12/17/76	12/12/76	12/10/76	12/21/76
	V_c (ft/sec)	70680	62350	58530	56370	52560
	C_3 (km^2/sec^2)	342.6	239.6	196.7	173.6	135.1
	VHP (km/sec)	24.06	17.53	13.50	10.74	5.88
	Rc (AU)	17.78	17.82	17.89	17.97	20.6
	TF (years)					10.34-17.01

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Dec. 1977-Jan. 1978

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	1/14/78	1/7/78	1/2/78	12/30/77	1/2/78
	V_c (ft/sec)	67890	59900	56190	54260	51800
	C_3 (km^2/sec^2)	306.6	211.8	171.8	151.9	127.6
	VHP (km/sec)	23.94	17.47	13.44	10.73	5.29
	Rc (AU)	17.78	17.85	17.91	17.98	18.38
	TF (years)					11.53
10	1st launch date	1/9/78	1/1/78	12/27/77	12/25/77	1/2/78
	V_c (ft/sec)	68220	60240	56530	54500	51970
	C_3 (km^2/sec^2)	310.7	215.6	175.3	154.3	129.3
	VHP (km/sec)	24.01	17.51	13.47	10.75	5.29
	Rc (AU)	17.80	17.85	17.92	17.99	20.5
	TF (years)					11.53-13.86
20	1st launch date	1/4/78	12/27/78	12/22/77	12/20/77	12/28/77
	V_c (ft/sec)	69200	61100	57330	55230	52200
	C_3 (km^2/sec^2)	323.3	225.2	183.8	161.8	131.6
	VHP (km/sec)	24.08	17.55	13.50	10.77	5.69
	Rc (AU)	17.81	17.87	17.93	18.01	20.6
	TF (years)					10.69-15.11
30	1st launch date	12/30/77	12/22/77	12/17/77	12/15/77	12/23/77
	V_c (ft/sec)	70860	62420	58570	56450	52480
	C_3 (km^2/sec^2)	344.8	240.4	197.1	174.4	134.3
	VHP (km/sec)	24.14	17.59	13.52	10.79	6.27
	Rc (AU)	17.84	17.89	17.95	18.04	20.6
	TF (years)					9.80-15.11

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Dec. 1978-Jan. 1979

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	1/19/79	1/11/79	1/7/79	1/4/79	1/7/79
	V_c (ft/sec)	68050	60000	56260	54300	51850
	C_3 (km^2/sec^2)	308.6	212.8	172.4	152.3	128.1
	VHP (km/sec)	24.03	17.54	13.50	10.78	5.24
	Rc (AU)	17.85	17.91	17.98	18.05	18.41
	TF (years)					11.43
10	1st launch date	1/13/79	1/6/79	1/1/79	12/29/78	1/2/79
	V_c (ft/sec)	68490	60330	56580	54630	52020
	C_3 (km^2/sec^2)	314.2	216.5	175.8	155.6	129.8
	VHP (km/sec)	24.11	17.58	13.53	10.80	5.84
	Rc (AU)	17.86	17.92	17.98	18.06	20.5
	TF (years)					10.46-12.68
20	1st launch date	1/8/79	1/1/79	12/27/78	12/24/78	1/2/79
	V_c (ft/sec)	69510	61180	57370	55400	52290
	C_3 (km^2/sec^2)	327.2	226.1	184.2	163.5	132.4
	VHP (km/sec)	24.18	17.62	13.56	10.82	5.84
	Rc (AU)	17.87	17.93	18.00	18.07	20.6
	TF (years)					10.46-15.11
30	1st launch date	1/3/79	12/27/78	12/22/78	12/19/78	12/28/78
	V_c (ft/sec)	71040	62490	58600	56580	52560
	C_3 (km^2/sec^2)	347.3	241.2	197.4	175.8	135.1
	VHP (km/sec)	24.24	17.66	13.58	10.84	6.39
	Rc (AU)	17.90	17.95	18.02	18.10	20.7
	TF (years)					9.67-16.41

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Dec. 1979-Jan. 1980

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	1/24/80	1/16/80	1/12/80	1/9/80	1/12/80
	V_c (ft/sec)	68210	60100	56320	54350	51900
	C_3 (km^2/sec^2)	310.7	213.9	173.1	152.8	128.6
	VHP (km/sec)	24.12	17.61	13.56	10.83	5.33
	Rc (AU)	17.91	17.98	18.04	18.12	18.45
	TF (years)					11.49
10	1st launch date	1/18/80	1/11/80	1/6/80	1/3/80	1/7/80
	V_c (ft/sec)	68640	60420	56630	54660	52060
	C_3 (km^2/sec^2)	316.1	217.5	176.4	156.0	130.2
	VHP (km/sec)	24.20	17.65	13.59	10.85	5.86
	Rc (AU)	17.92	17.98	18.05	18.13	20.5
	TF (years)					10.45-12.68
20	1st launch date	1/13/80	1/6/80	1/1/80	12/29/79	1/7/80
	V_c (ft/sec)	69640	61250	57410	55420	52370
	C_3 (km^2/sec^2)	329.0	227.0	184.6	163.7	133.2
	VHP (km/sec)	24.27	17.70	13.62	10.87	5.86
	Rc (AU)	17.94	18.00	18.07	18.14	20.7
	TF (years)					10.45-15.21
30	1st launch date	1/8/80	1/1/80	12/27/79	12/24/79	1/2/80
	V_c (ft/sec)	71170	62560	58630	56590	52650
	C_3 (km^2/sec^2)	349.0	242.0	197.8	175.9	135.9
	VHP (km/sec)	24.33	17.73	13.64	10.89	6.45
	Rc (AU)	17.96	18.02	18.09	18.17	20.7
	TF (years)					9.63-16.51

URANUS 1979-1980

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Dec. 1980-Jan. 1981

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	1/28/81	1/20/81	1/15/81	1/13/81	1/16/81
	V_c (ft/sec)	68390	60200	56400	54400	51950
	C_3 (km^2/sec^2)	312.9	215.1	173.9	153.4	129.1
	VHP (km/sec)	24.22	17.68	13.62	10.88	5.34
	Rc (AU)	17.98	18.04	18.11	18.18	18.54
	TF (years)					11.51
10	1st launch date	1/22/81	1/15/81	1/10/81	1/7/81	1/11/81
	V_c (ft/sec)	68790	60510	56690	54690	52100
	C_3 (km^2/sec^2)	318.1	218.5	176.9	156.3	130.6
	VHP (km/sec)	24.30	17.73	13.65	10.91	5.91
	Rc (AU)	17.99	18.05	18.12	18.19	20.6
	TF (years)					10.41-12.74
20	1st launch date	1/17/81	1/10/81	1/5/81	1/2/81	1/11/81
	V_c (ft/sec)	69780	61330	57450	55430	52450
	C_3 (km^2/sec^2)	330.8	227.8	185.1	163.9	134.0
	VHP (km/sec)	24.36	17.77	13.68	10.92	5.91
	Rc (AU)	18.01	18.07	18.14	18.21	20.7
	TF (years)					10.41-15.31
30	1st launch date	1/12/81	1/5/81	12/31/80	12/28/80	1/6/81
	V_c (ft/sec)	71300	62710	58660	56600	52730
	C_3 (km^2/sec^2)	350.7	243.7	198.1	176.0	136.8
	VHP (km/sec)	24.43	17.81	13.70	10.94	6.50
	Rc (AU)	18.03	18.09	18.16	18.24	20.08
	TF (years)					9.59-16.54

URANUS 1980-1981

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Jan.-Feb. 1982

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	2/2/82	1/25/82	1/20/82	1/17/81	1/20/82
	V_c (ft/sec)	68570	60310	56470	54460	52010
	C_3 (km^2/sec^2)	315.2	216.4	174.7	153.9	129.7
	VHP (km/sec)	24.32	17.76	13.68	10.94	5.46
	Rc (AU)	18.04	18.11	18.18	18.25	19.33
	TF (years)					11.26
10	1st launch date	1/27/82	1/20/82	1/15/82	1/12/82	1/15/82
	V_c (ft/sec)	68950	60600	56740	54730	52200
	C_3 (km^2/sec^2)	320.1	219.5	177.5	156.6	131.6
	VHP (km/sec)	24.40	17.81	13.71	10.96	6.05
	Rc (AU)	18.06	18.12	18.19	18.26	20.7
	TF (years)					10.23-12.76
20	1st launch date	1/22/82	1/15/82	1/10/82	1/7/82	1/15/82
	V_c (ft/sec)	69920	61450	57490	55450	52480
	C_3 (km^2/sec^2)	332.6	229.2	185.5	164.0	134.2
	VHP (km/sec)	24.46	17.85	13.74	10.98	6.05
	Rc (AU)	18.07	18.14	18.20	18.28	20.8
	TF (years)					10.23-15.17
30	1st launch date	1/17/82	1/10/82	1/5/82	1/2/82	1/10/82
	V_c (ft/sec)	71430	62880	58770	56600	52760
	C_3 (km^2/sec^2)	352.4	245.7	199.3	176.0	137.0
	VHP (km/sec)	24.52	17.89	13.77	11.00	6.67
	Rc (AU)	18.10	18.16	18.23	18.31	20.8
	TF (years)					9.43-16.44

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Jan.-Feb. 1983

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	2/6/83	1/30/83	1/25/83	1/22/83	1/24/83
	V_c (ft/sec)	68750	60430	56550	54520	52070
	C_3 (km^2/sec^2)	317.5	217.6	175.5	154.5	130.3
	VHP (km/sec)	24.42	17.84	13.82	10.99	5.57
	Rc (AU)	18.11	18.18	18.25	18.32	20.40
	TF (years)					11.07
10	1st launch date	2/1/83	1/24/83	1/19/83	1/17/83	1/24/83
	V_c (ft/sec)	69110	60810	56900	54760	52260
	C_3 (km^2/sec^2)	322.1	221.9	179.2	157.0	132.1
	VHP (km/sec)	24.49	17.89	13.78	11.01	5.57
	Rc (AU)	18.13	18.19	18.26	18.33	20.8
	TF (years)					11.07-13.68
20	1st launch date	1/27/83	1/19/83	1/14/83	1/12/83	1/19/83
	V_c (ft/sec)	70060	61690	57730	55490	52500
	C_3 (km^2/sec^2)	334.4	232.0	188.0	164.5	134.5
	VHP (km/sec)	24.56	17.93	13.81	11.03	6.18
	Rc (AU)	18.14	18.20	18.27	18.35	20.8
	TF (years)					10.08-15.02
30	1st launch date	1/22/83	1/14/83	1/9/83	1/7/83	1/14/83
	V_c (ft/sec)	71590	63050	58980	56710	52920
	C_3 (km^2/sec^2)	354.5	247.7	201.6	177.2	138.60
	VHP (km/sec)	24.62	17.97	13.84	11.05	6.82
	Rc (AU)	18.17	18.22	18.29	18.38	20.9
	TF (years)					9.29-16.34

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Jan.-Feb. 1984

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	2/11/84	2/4/84	1/30/84	1/27/84	1/29/84
	V_c (ft/sec)	68940	60540	56630	54580	52120
	C_3 (km^2/sec^2)	319.9	218.9	176.3	155.1	130.8
	VHP (km/sec)	24.52	17.92	13.82	11.05	5.52
	Rc (AU)	18.18	18.25	18.32	18.38	19.75
	TF (years)					11.21
10	1st launch date	2/6/84	1/29/84	1/24/84	1/21/84	1/24/84
	V_c (ft/sec)	69270	60890	56960	54890	52330
	C_3 (km^2/sec^2)	324.2	222.9	179.8	158.40	132.8
	VHP (km/sec)	24.60	17.97	13.85	11.07	6.14
	Rc (AU)	18.19	18.26	18.32	18.40	20.8
	TF (years)					10.16-12.39
20	1st launch date	2/1/84	1/24/84	1/19/84	1/16/84	1/24/84
	V_c (ft/sec)	70220	61760	57760	55660	52580
	C_3 (km^2/sec^2)	336.5	232.8	188.3	166.3	135.2
	VHP (km/sec)	24.66	18.01	13.88	11.09	6.14
	Rc (AU)	18.21	18.27	18.34	18.41	20.9
	TF (years)					10.16-15.16
30	1st launch date	1/27/84	1/19/84	1/14/84	1/11/84	1/19/84
	V_c (ft/sec)	71860	63100	58990	56870	52930
	C_3 (km^2/sec^2)	358.1	248.3	201.7	178.8	138.7
	VHP (km/sec)	24.72	18.05	13.90	11.11	6.84
	Rc (AU)	18.24	18.29	18.36	18.44	20.9
	TF (years)					9.31-16.49

URANUS 1984

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Jan.-Feb. 1985

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	2/15/85	2/7/85	2/2/85	1/30/85	2/2/85
	V_c (ft/sec)	69130	60660	56710	54640	52170
	C_3 (km^2/sec^2)	322.4	220.3	177.2	155.8	131.2
	VHP (km/sec)	24.63	18.01	13.89	11.10	5.50
	Rc (AU)	18.25	18.32	18.38	18.45	19.33
	TF (years)					11.29
10	1st launch date	2/9/85	2/2/85	1/28/85	1/25/85	1/28/85
	V_c (ft/sec)	69560	60980	57010	54920	52360
	C_3 (km^2/sec^2)	327.9	223.9	180.3	158.7	133.1
	VHP (km/sec)	24.71	18.05	13.92	11.13	6.13
	Rc (AU)	18.26	18.32	18.39	18.46	20.8
	TF (years)					10.22-12.49
20	1st launch date	2/4/85	1/28/85	1/23/85	1/20/85	1/28/85
	V_c (ft/sec)	70570	61820	57780	55670	52650
	C_3 (km^2/sec^2)	341.1	233.50	188.6	166.3	135.9
	VHP (km/sec)	24.78	18.10	13.94	11.15	6.13
	Rc (AU)	18.28	18.34	18.41	18.48	20.9
	TF (years)					10.22-15.30
30	1st launch date	1/30/85	1/23/85	1/18/85	1/15/85	1/23/85
	V_c (ft/sec)	72110	63140	59000	56850	52930
	C_3 (km^2/sec^2)	361.5	248.7	201.8	178.7	138.7
	VHP (km/sec)	24.84	18.13	13.97	11.16	6.84
	Rc (AU)	18.30	18.36	18.43	18.51	21.0
	TF (years)					9.34-16.65

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Jan.-Feb. 1986

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	2/20/86	2/12/86	2/7/86	2/4/86	2/7/86
	V_c (ft/sec)	69320	60780	56800	54700	52210
	C_3 (km^2/sec^2)	324.8	221.6	178.1	156.4	131.70
	VHP (km/sec)	24.73	18.09	13.95	11.16	5.47
	Rc (AU)	18.32	18.38	18.44	18.51	18.92
	TF (years)					11.39
10	1st launch date	2/14/86	2/7/86	2/2/86	1/30/86	2/2/86
	V_c (ft/sec)	69710	61070	57060	54950	52380
	C_3 (km^2/sec^2)	329.9	224.9	180.8	159.0	133.3
	VHP (km/sec)	24.81	18.14	13.98	11.18	6.10
	Rc (AU)	18.33	18.39	18.46	18.53	20.9
	TF (years)					10.29-12.68
20	1st launch date	2/9/86	2/2/86	1/28/86	1/25/86	2/2/86
	V_c (ft/sec)	70700	61910	57820	55670	52720
	C_3 (km^2/sec^2)	342.7	234.5	189.0	166.3	136.6
	VHP (km/sec)	24.88	18.18	14.01	11.20	6.10
	Rc (AU)	18.35	18.41	18.47	18.55	21.0
	TF (years)					10.29-15.47
30	1st launch date	2/4/86	1/28/86	1/23/86	1/20/86	1/28/86
	V_c (ft/sec)	72210	63340	59120	56880	53000
	C_3 (km^2/sec^2)	362.8	251.1	203.1	179.0	139.3
	VHP (km/sec)	24.94	18.22	14.04	11.22	6.78
	Rc (AU)	18.37	18.43	18.50	18.57	21.0
	TF (years)					9.44-16.84

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Jan.-Feb. 1987

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	2/24/87	2/17/87	2/12/87	2/9/87	2/12/87
	V_c (ft/sec)	69510	60900	56880	54770	52260
	C_3 (km^2/sec^2)	327.3	223.0	179.0	157.1	132.1
	VHP (km/sec)	24.84	18.17	14.02	11.22	5.43
	Rc (AU)	18.39	18.45	18.51	18.58	18.86
	TF (years)					11.50
10	1st launch date	2/19/87	2/11/87	2/6/87	2/3/87	2/7/87
	V_c (ft/sec)	69870	61270	57210	55080	52400
	C_3 (km^2/sec^2)	331.9	227.1	182.5	160.3	133.5
	VHP (km/sec)	24.92	18.23	14.06	11.24	6.07
	Rc (AU)	18.40	18.45	18.52	18.59	20.9
	TF (years)					10.37-12.76
20	1st launch date	2/14/87	2/6/87	2/1/87	1/29/87	2/7/87
	V_c (ft/sec)	70810	62150	58020	55860	52790
	C_3 (km^2/sec^2)	344.3	237.2	191.1	168.3	137.3
	VHP (km/sec)	24.98	18.27	14.08	11.26	6.07
	Rc (AU)	18.41	18.47	18.53	18.61	21.0
	TF (years)					10.37-15.65
30	1st launch date	2/9/87	2/1/87	1/27/87	1/24/87	2/2/87
	V_c (ft/sec)	72350	63500	59270	57080	53060
	C_3 (km^2/sec^2)	364.7	253.0	204.8	181.1	140.0
	VHP (km/sec)	25.04	18.30	14.11	11.28	6.75
	Rc (AU)	18.44	18.49	18.56	18.63	21.0
	TF (years)					9.50-17.01

URANUS 1987

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Jan.-Feb. 1988

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	2/29/88	2/21/88	2/16/88	2/13/88	2/16/88
	V_c (ft/sec)	69700	61020	56960	54830	52300
	C_3 (km^2/sec^2)	329.80	224.3	179.8	157.7	132.6
	VHP (km/sec)	24.95	18.26	14.09	11.27	5.50
	Rc (AU)	18.45	18.51	18.57	18.64	19.03
	TF (years)					11.38
10	1st launch date	2/24/88	2/16/88	2/11/88	2/8/88	2/11/88
	V_c (ft/sec)	70030	61350	57250	55110	52480
	C_3 (km^2/sec^2)	334.10	228.0	182.9	160.5	134.3
	VHP (km/sec)	25.02	18.31	14.12	11.30	6.17
	Rc (AU)	18.46	18.52	18.58	18.65	20.9
	TF (years)					10.26-12.64
20	1st launch date	2/19/88	2/11/88	2/6/88	2/3/88	2/11/88
	V_c (ft/sec)	71020	62190	58030	55850	52800
	C_3 (km^2/sec^2)	347.0	237.7	191.2	168.2	137.4
	VHP (km/sec)	25.08	18.35	14.15	11.32	6.17
	Rc (AU)	18.48	18.53	18.60	18.67	21.0
	TF (years)					10.26-15.56
30	1st launch date	2/14/88	2/6/88	2/1/88	1/29/88	2/6/88
	V_c (ft/sec)	72670	63510	59250	57040	53070
	C_3 (km^2/sec^2)	369.0	253.2	204.5	180.6	140.0
	VHP (km/sec)	25.15	18.38	14.17	11.34	6.86
	Rc (AU)	18.51	18.56	18.62	18.69	21.1
	TF (years)					9.42-16.95

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Feb.-Mar. 1989

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	3/5/89	2/25/89	2/20/89	2/17/89	2/20/89
	V_c (ft/sec)	69890	61140	57050	54900	52340
	C_3 (km^2/sec^2)	332.3	225.7	180.7	158.4	132.9
	VHP (km/sec)	25.05	18.34	14.16	11.33	5.45
	Rc (AU)	18.51	18.57	18.63	18.69	18.99
	TF (years)					11.53
10	1st launch date	2/27/89	2/20/89	2/14/89	2/11/89	2/15/89
	V_c (ft/sec)	70290	61420	57410	55230	52490
	C_3 (km^2/sec^2)	337.4	228.9	184.6	161.8	134.4
	VHP (km/sec)	25.13	18.38	14.19	11.35	6.12
	Rc (AU)	18.53	18.58	18.64	18.70	21.0
	TF (years)					10.37-12.81
20	1st launch date	2/22/89	2/15/89	2/9/89	2/6/89	2/15/89
	V_c (ft/sec)	71270	62270	58240	56030	52860
	C_3 (km^2/sec^2)	350.3	238.7	193.5	170.0	138.0
	VHP (km/sec)	25.20	18.43	14.22	11.37	6.12
	Rc (AU)	18.54	18.60	18.65	18.72	21.1
	TF (years)					10.37-15.76
30	1st launch date	2/17/89	2/10/89	2/4/89	2/1/89	2/10/89
	V_c (ft/sec)	72780	63700	59510	57270	53120
	C_3 (km^2/sec^2)	370.5	255.4	207.4	183.2	140.6
	VHP (km/sec)	25.26	18.46	14.24	11.39	6.82
	Rc (AU)	18.57	18.62	18.68	18.75	21.1
	TF (years)					9.50-17.16

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Feb.-Mar. 1990

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	3/9/90	3/2/90	2/25/90	2/21/90	2/24/90
	V_c (ft/sec)	70080	61260	57130	54960	52380
	C_3 (km^2/sec^2)	334.7	227.0	181.6	159.0	133.3
	VHP (km/sec)	25.1	18.42	14.22	11.38	5.52
	Rc (AU)	18.5	18.63	18.69	18.75	19.97
	TF (years)					11.43
10	1st launch date	3/4/90	2/24/90	2/19/90	2/16/90	2/19/90
	V_c (ft/sec)	70420	61610	57440	55250	52570
	C_3 (km^2/sec^2)	339.1	231.0	184.9	162.0	135.1
	VHP (km/sec)	25.2	18.47	14.26	11.41	6.20
	Rc (AU)	18.5	18.64	18.70	18.76	21.0
	TF (years)					10.29-12.79
20	1st launch date	2/27/90	2/19/90	2/14/90	2/11/90	2/19/90
	V_c (ft/sec)	71360	62480	58230	56000	52870
	C_3 (km^2/sec^2)	351.5	241.0	193.4	169.7	138.1
	VHP (km/sec)	25.30	18.51	14.28	11.43	6.20
	Rc (AU)	18.61	18.65	18.71	18.78	21.1
	TF (years)					10.29-15.69
30	1st launch date	2/22/90	2/14/90	2/9/90	2/6/90	2/14/90
	V_c (ft/sec)	72930	63820	59470	57210	53140
	C_3 (km^2/sec^2)	372.6	256.8	206.9	182.5	140.8
	VHP (km/sec)	25.36	18.55	14.31	11.45	6.90
	Rc (AU)	18.63	18.68	18.74	18.80	21.1
	TF (years)					9.44-17.07

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Feb.-Mar. 1991

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	3/14/91	3/6/91	3/1/91	2/26/91	3/1/91
	V_c (ft/sec)	70260	61370	57210	55020	52420
	C_3 (km^2/sec^2)	337.1	228.3	182.5	159.7	133.7
	VHP (km/sec)	25.2	18.50	14.29	11.44	5.45
	Rc (AU)	18.6	18.69	18.74	18.80	19.31
	TF (years)					11.60
10	1st launch date	3/8/91	3/1/91	2/24/91	2/20/91	2/24/91
	V_c (ft/sec)	70690	61670	57470	55360	52570
	C_3 (km^2/sec^2)	342.6	231.8	185.2	163.2	135.1
	VHP (km/sec)	25.3	18.55	14.32	11.46	6.12
	Rc (AU)	18.6	18.70	18.75	18.81	21.0
	TF (years)					10.43-12.91
20	1st launch date	3/3/91	2/24/91	2/19/91	2/15/91	2/24/91
	V_c (ft/sec)	71690	62500	58230	56140	52920
	C_3 (km^2/sec^2)	355.8	241.3	193.5	171.5	138.6
	VHP (km/sec)	25.4	18.59	14.35	11.48	6.12
	Rc (AU)	18.6	18.71	18.77	18.82	21.1
	TF (years)					10.43-15.91
30	1st launch date	2/26/91	2/19/91	2/14/91	2/10/91	2/19/91
	V_c (ft/sec)	73220	63870	59530	57430	53170
	C_3 (km^2/sec^2)	376.4	257.4	207.6	184.8	141.0
	VHP (km/sec)	25.4	18.63	14.37	11.50	6.95
	Rc (AU)	18.6	18.74	18.79	18.85	21.1
	TF (years)					9.41-17.31

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Feb.-Mar. 1992

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	3/17/92	3/10/92	3/5/92	3/1/92	3/4/92
	V_c (ft/sec)	70440	61480	57290	55080	52450
	C_3 (km^2/sec^2)	339.4	229.6	183.3	160.3	134.0
	VHP (km/sec)	25.35	18.58	14.35	11.49	5.51
	Rc (AU)	18.69	18.74	18.79	18.84	19.05
	TF (years)					11.51
10	1st launch date	3/12/92	3/4/90	2/28/92	2/25/92	2/28/92
	V_c (ft/sec)	70800	61850	57600	55370	52630
	C_3 (km^2/sec^2)	344.1	233.8	186.7	163.2	135.7
	VHP (km/sec)	25.43	18.63	14.38	11.51	6.19
	Rc (AU)	18.70	18.75	18.80	18.85	21.1
	TF (years)					10.37-12.83
20	1st launch date	3/7/92	2/28/92	2/23/92	2/20/92	2/28/92
	V_c (ft/sec)	71750	62730	58400	56120	52920
	C_3 (km^2/sec^2)	356.7	243.9	195.2	171.0	138.6
	VHP (km/sec)	25.50	18.67	14.41	11.53	6.19
	Rc (AU)	18.72	18.76	18.82	18.87	21.1
	TF (years)					10.37-15.85
30	1st launch date	3/2/92	2/23/92	2/18/92	2/15/92	2/23/92
	V_c (ft/sec)	73240	64070	59640	57340	53200
	C_3 (km^2/sec^2)	376.7	259.8	208.9	183.9	141.4
	VHP (km/sec)	25.56	18.71	14.44	11.55	6.92
	Rc (AU)	18.75	18.79	18.84	18.90	21.1
	TF (years)					9.48-17.27

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Feb.-Mar. 1993

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	3/22/93	3/14/93	3/9/93	3/6/93	3/9/93
	V_c (ft/sec)	70610	61590	57360	55140	52480
	C_3 (km^2/sec^2)	341.6	230.9	184.1	160.9	134.3
	VHP (km/sec)	25.45	18.65	14.41	11.54	5.43
	Rc (AU)	18.74	18.79	18.84	18.89	20.05
	TF (years)					11.70
10	1st launch date	3/16/93	3/9/93	3/4/93	3/1/93	3/4/93
	V_c (ft/sec)	71050	61900	57620	55400	52630
	C_3 (km^2/sec^2)	347.3	234.4	186.9	163.5	135.7
	VHP (km/sec)	25.53	18.70	14.44	11.56	6.11
	Rc (AU)	18.75	18.80	18.85	18.90	21.1
	TF (years)					10.52-12.37
20	1st launch date	3/11/93	3/4/93	2/27/93	2/24/93	3/4/93
	V_c (ft/sec)	72060	62730	58390	56140	52960
	C_3 (km^2/sec^2)	360.8	243.9	195.1	171.2	139.0
	VHP (km/sec)	25.60	18.74	14.47	11.58	6.11
	Rc (AU)	18.77	18.82	18.87	18.92	21.1
	TF (years)					10.52-16.09
30	1st launch date	3/6/93	2/27/93	2/22/93	2/19/93	2/27/93
	V_c (ft/sec)	73590	64070	59680	57370	53200
	C_3 (km^2/sec^2)	381.5	259.7	209.3	184.2	141.3
	VHP (km/sec)	25.66	18.78	14.49	11.60	6.84
	Rc (AU)	18.80	18.84	18.89	18.95	21.1
	TF (years)					9.60-17.48

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Feb.-Mar. 1994

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	3/26/94	3/19/94	3/14/94	3/10/94	3/13/94
	V_c (ft/sec)	70780	61700	57440	55200	52510
	C_3 (km^2/sec^2)	343.8	232.0	184.9	161.5	134.5
	VHP (km/sec)	25.54	18.72	14.47	11.59	5.47
	Rc (AU)	18.80	18.84	18.88	18.93	19.64
	TF (years)					11.64
10	1st launch date	3/21/94	3/13/94	3/8/94	3/5/94	3/8/94
	V_c (ft/sec)	71140	62060	57750	55470	52680
	C_3 (km^2/sec^2)	348.6	236.2	188.2	164.3	136.2
	VHP (km/sec)	25.62	18.77	14.50	11.61	6.16
	Rc (AU)	18.81	18.85	18.89	18.94	21.1
	TF (years)					10.47-13.00
20	1st launch date	3/16/94	3/8/94	3/3/94	2/28/94	3/8/94
	V_c (ft/sec)	72090	62940	58540	56220	52960
	C_3 (km^2/sec^2)	361.3	246.4	196.7	172.0	138.9
	VHP (km/sec)	25.69	18.81	14.53	11.63	6.16
	Rc (AU)	18.82	18.86	18.91	18.96	21.1
	TF (years)					10.47-16.06
30	1st launch date	3/11/94	3/3/94	2/26/94	2/23/94	3/3/94
	V_c (ft/sec)	73580	64280	59780	57430	53240
	C_3 (km^2/sec^2)	381.4	262.3	210.4	184.8	141.7
	VHP (km/sec)	25.75	18.85	14.55	11.65	6.90
	Rc (AU)	18.85	18.88	18.93	18.98	21.1
	TF (years)					9.56-17.45

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Feb.-Mar. 1995

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	3/31/95	3/23/95	3/18/95	3/15/95	3/18/95
	V_c (ft/sec)	70930	61800	57510	55250	52530
	C_3 (km^2/sec^2)	345.8	233.20	185.6	162.0	134.7
	VHP (km/sec)	25.63	18.79	14.52	11.63	5.38
	Rc (AU)	18.84	18.88	18.92	18.96	20.89
	TF (years)					11.87
10	1st launch date	3/25/95	3/18/95	3/12/95	3/9/95	3/13/95
	V_c (ft/sec)	71370	62100	57870	55570	52660
	C_3 (km^2/sec^2)	351.6	236.6	189.5	165.3	136.0
	VHP (km/sec)	25.71	18.84	14.56	11.66	6.06
	Rc (AU)	18.85	18.89	18.92	18.97	21.1
	TF (years)					10.64-13.24
20	1st launch date	3/20/95	3/13/95	3/7/95	3/4/95	3/13/95
	V_c (ft/sec)	72370	62920	58700	56360	52990
	C_3 (km^2/sec^2)	365.0	246.2	198.5	173.5	139.2
	VHP (km/sec)	25.78	18.88	14.59	11.68	6.06
	Rc (AU)	18.87	18.91	18.95	18.99	21.1
	TF (years)					10.64-16.31
30	1st launch date	3/15/95	3/8/95	3/2/95	2/27/95	3/8/95
	V_c (ft/sec)	73900	64280	59970	57600	53200
	C_3 (km^2/sec^2)	385.8	262.2	212.6	186.7	141.4
	VHP (km/sec)	25.84	18.92	14.61	11.70	6.81
	Rc (AU)	18.89	18.93	18.97	19.02	21.1
	TF (years)					9.69-17.76

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Mar.-Apr. 1996

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 5.43 years	Type I
0	1st launch date	4/3/96	3/27/96	3/21/96	3/18/96	3/22/96
	V_c (ft/sec)	71080	61890	57570	55300	52540
	C_3 (km^2/sec^2)	347.8	234.2	186.3	162.5	134.9
	VHP (km/sec)	25.71	18.85	14.57	11.67	5.30
	Rc (AU)	18.89	18.92	18.96	18.99	20.76
	TF (years)					12.10
10	1st launch date	3/29/96	3/21/96	3/16/96	3/13/96	3/17/96
	V_c (ft/sec)	71440	62240	57870	55560	52640
	C_3 (km^2/sec^2)	352.5	238.3	189.5	165.2	135.9
	VHP (km/sec)	25.79	18.90	14.61	11.70	5.97
	Rc (AU)	18.90	18.93	18.97	19.00	21.1
	TF (years)					10.81-13.50
20	1st launch date	3/24/96	3/16/96	3/11/96	3/8/96	3/17/96
	V_c (ft/sec)	72380	63100	58640	56280	53010
	C_3 (km^2/sec^2)	365.2	248.4	197.9	172.7	139.5
	VHP (km/sec)	25.85	18.95	14.64	11.72	5.97
	Rc (AU)	18.92	18.95	18.98	19.03	21.1
	TF (years)					10.81-16.56
30	1st launch date	3/19/96	3/11/96	3/6/96	3/3/96	3/12/96
	V_c (ft/sec)	73860	64440	59870	57470	53210
	C_3 (km^2/sec^2)	385.2	264.2	211.4	185.3	141.5
	VHP (km/sec)	25.92	18.98	14.66	11.74	6.69
	Rc (AU)	18.94	18.97	19.01	19.05	21.1
	TF (years)					9.85-18.01

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Mar.-Apr. 1997

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	4/8/97	3/31/97	3/26/97	3/23/97	3/26/97
	V_c (ft/sec)	71220	61980	57630	55350	52550
	C_3 (km^2/sec^2)	349.6	235.3	187.0	163.0	135.0
	VHP (km/sec)	25.79	18.91	14.62	11.71	5.32
	Rc (AU)	18.93	18.96	18.99	19.02	20.92
	TF (years)					12.06
10	1st launch date	4/2/97	3/26/97	3/20/97	3/17/97	3/21/97
	V_c (ft/sec)	71640	62260	57970	55640	52680
	C_3 (km^2/sec^2)	355.2	238.5	190.6	166.0	136.2
	VHP (km/sec)	25.87	18.96	14.66	11.74	6.01
	Rc (AU)	18.94	18.97	19.00	19.03	21.1
	TF (years)					10.78-13.46
20	1st launch date	3/28/97	3/21/97	3/15/97	3/12/97	3/21/97
	V_c (ft/sec)	72630	63090	58780	56400	52990
	C_3 (km^2/sec^2)	368.5	248.2	199.4	174.0	139.3
	VHP (km/sec)	25.94	19.00	14.69	11.76	6.01
	Rc (AU)	18.95	18.98	19.01	19.05	21.1
	TF (years)					10.78-16.53
30	1st launch date	3/23/97	3/16/97	3/10/97	3/7/97	3/16/97
	V_c (ft/sec)	74150	64500	60040	57630	53180
	C_3 (km^2/sec^2)	389.1	264.8	213.3	186.9	141.2
	VHP (km/sec)	26.00	19.04	14.71	11.78	6.73
	Rc (AU)	18.98	19.01	19.04	19.08	21.1
	TF (years)					9.82-18.00

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Mar-Apr 1998

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	4/12/98	4/4/98	3/30/98	3/27/98	3/31/98
	V_c (ft/sec)	71350	62060	57690	55390	52570
	C_3 (km^2/sec^2)	351.3	236.2	187.6	163.5	135.1
	VHP (km/sec)	25.86	18.97	14.67	11.75	5.23
	Rc (AU)	18.96	18.99	19.02	19.04	19.53
	TF (years)					12.31
10	1st launch date	4/7/98	3/30/98	3/25/98	3/21/98	3/26/98
	V_c (ft/sec)	71690	62390	57960	55720	52660
	C_3 (km^2/sec^2)	355.8	240.0	190.5	166.9	136.0
	VHP (km/sec)	25.94	19.02	14.70	11.78	6.00
	Rc (AU)	18.97	18.98	19.03	19.05	21.1
	TF (years)					10.82-13.81
20	1st launch date	4/2/98	3/25/98	3/20/98	3/16/98	3/26/98
	V_c (ft/sec)	72610	63230	58710	56520	53000
	C_3 (km^2/sec^2)	368.2	249.8	198.6	175.1	139.4
	VHP (km/sec)	26.00	19.06	14.73	11.80	6.00
	Rc (AU)	18.99	19.01	19.04	19.07	21.1
	TF (years)					10.82-16.76
30	1st launch date	3/28/98	3/20/98	3/15/98	3/11/98	3/21/98
	V_c (ft/sec)	74150	64550	59960	57770	53180
	C_3 (km^2/sec^2)	389.2	265.5	212.4	188.4	141.1
	VHP (km/sec)	26.07	19.10	14.75	11.82	6.63
	Rc (AU)	19.02	19.04	19.07	19.10	21.1
	TF (years)					9.97-18.26

URANUS 1998

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Mar-Apr 1999

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 5.43 years	Type I
0	1st launch date	4/17/99	4/9/99	4/4/99	3/31/99	4/5/99
	V_c (ft/sec)	71460	62130	57740	55430	52580
	C_3 (km^2/sec^2)	352.9	237.0	188.2	163.9	135.2
	VHP (km/sec)	25.93	19.02	14.71	11.79	5.17
	Rc (AU)	18.99	19.02	19.04	19.06	19.09
	TF (years)					12.50
10	1st launch date	4/11/99	4/3/99	3/29/99	3/26/99	3/21/99
	V_c (ft/sec)	71850	62510	58050	55690	52670
	C_3 (km^2/sec^2)	358.1	241.4	191.5	166.6	136.1
	VHP (km/sec)	26.01	19.07	14.74	11.81	5.78
	Rc (AU)	19.00	19.02	19.05	19.07	21.1
	TF (years)					11.20-14.09
20	1st launch date	4/6/99	3/29/99	3/24/99	3/21/99	3/26/99
	V_c (ft/sec)	72820	63390	58830	56420	53000
	C_3 (km^2/sec^2)	371.1	251.7	200.0	174.1	139.4
	VHP (km/sec)	26.08	19.12	14.77	11.83	6.51
	Rc (AU)	19.02	19.04	19.06	19.09	21.1
	TF (years)					10.13-15.61
30	1st launch date	4/1/99	3/24/99	3/19/99	3/16/	3/16/99
	V_c (ft/sec)	74320	64730	60060	57610	53170
	C_3 (km^2/sec^2)	391.5	267.7	213.6	186.7	141.0
	VHP (km/sec)	26.14	19.16	14.80	11.85	6.51
	Rc (AU)	19.05	19.06	19.09	19.12	21.1
	TF (years)					10.13-18.51

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target URANUS Opportunity Mar-Apr 2000

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		1225 days 3.35 years	1600 days 4.38 years	1975 days 5.41 years	2350 days 6.43 years	Type I
0	1st launch date	4/20/2000	4/12/2000	4/7/2000	4/4/2000	4/8/2000
	V_c (ft/sec)	71570	62200	57790	55470	52570
	C_3 (km^2/sec^2)	354.3	237.8	188.7	164.2	135.2
	VHP (km/sec)	25.99	19.07	14.75	11.82	5.18
	Rc (AU)	19.02	19.04	19.06	19.08	19.06
	TF (years)					12.48
10	1st launch date	4/15/2000	4/7/2000	4/1/2000	3/27/2000	4/3/2000
	V_c (ft/sec)	71880	62500	58130	55760	52660
	C_3 (km^2/sec^2)	358.4	241.3	192.4	167.3	136.0
	VHP (km/sec)	26.06	19.12	14.78	11.84	5.80
	Rc (AU)	19.03	19.05	19.07	19.09	21.1
	TF (years)					11.18-13.97
20	1st launch date	4/10/2000	4/2/2000	3/27/2000	3/24/2000	4/3/2000
	V_c (ft/sec)	72840	63310	58950	56520	52960
	C_3 (km^2/sec^2)	371.3	250.8	201.2	175.1	139.0
	VHP (km/sec)	26.13	19.16	14.81	11.86	5.80
	Rc (AU)	19.05	19.06	19.08	19.11	21.1
	TF (years)					11.18-17.08
30	1st launch date	4/5/2000	3/28/2000	3/22/2000	3/19/2000	3/29/2000
	V_c (ft/sec)	74440	64650	60210	57730	53120
	C_3 (km^2/sec^2)	393.2	266.7	215.1	188.0	140.5
	VHP (km/sec)	26.19	19.20	14.84	11.88	6.63
	Rc (AU)	19.08	19.09	19.10	19.13	21.1
	TF (years)					10.00-18.48

OPPORTUNITIES TO NEPTUNE 1975-2000

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Jan-Feb 1975

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	1/31/75	1/27/75	1/24/75	1/22/75	2/4/75
	V_c (ft/sec)	64050	60710	58510	57010	52380
	C_3 (km^2/sec^2)	259.6	220.9	196.5	180.4	133.3
	VHP (km/sec)	20.37	17.34	15.00	13.17	4.07
	Rc (AU)	29.34	29.25	29.27	29.41	31.04
	TF (years)					29.97
10	1st launch date	1/25/75	1/21/75	1/19/75	1/16/75	1/30/75
	V_c (ft/sec)	64420	61090	58800	57360	52620
	C_3 (km^2/sec^2)	264.0	225.2	199.6	184.1	135.6
	VHP (km/sec)	20.41	17.37	15.02	13.17	4.16
	Rc (AU)	29.38	29.25	29.03	29.47	31.1
	TF (years)					26.71-31.37
20	1st launch date	1/20/75	1/16/75	1/14/75	1/11/75	1/25/75
	V_c (ft/sec)	65340	62000	59650	58240	52910
	C_3 (km^2/sec^2)	275.1	235.6	208.9	193.5	138.4
	VHP (km/sec)	20.44	17.40	15.04	13.18	4.56
	Rc (AU)	29.42	29.27	29.33	29.53	31.1
	TF (years)					22.68-33.03
30	1st launch date	1/15/75	1/11/75	1/9/75	1/6/75	1/20/75
	V_c (ft/sec)	66780	63410	61040	59650	53280
	C_3 (km^2/sec^2)	292.7	252.0	224.5	209.0	142.1
	VHP (km/sec)	20.47	17.42	15.06	13.19	5.36
	Rc (AU)	29.47	29.29	29.38	29.60	31.2
	TF (years)					19.10-34.82

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Jan-Feb 1976

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/2/76	1/29/76	1/26/76	1/24/76	2/5/76
	V_c (ft/sec)	64050	60710	58500	57000	52390
	C_3 (km^2/sec^2)	259.5	220.8	196.4	180.2	133.4
	VHP (km/sec)	20.37	17.34	15.00	13.14	4.08
	Rc (AU)	29.33	29.24	29.27	29.41	29.83
	TF (years)					29.28
10	1st launch date	1/27/76	1/24/76	1/21/76	1/19/76	1/31/76
	V_c (ft/sec)	64470	61010	58810	57280	52590
	C_3 (km^2/sec^2)	264.5	224.2	199.7	183.2	135.3
	VHP (km/sec)	20.41	17.37	15.02	13.16	4.20
	Rc (AU)	29.37	29.25	29.30	29.46	31.1
	TF (years)					26.07-30.55
20	1st launch date	1/22/76	1/19/76	1/16/76	1/14/76	1/26/76
	V_c (ft/sec)	65430	61860	596.40	58080	52900
	C_3 (km^2/sec^2)	276.2	233.9	208.8	191.8	138.4
	VHP (km/sec)	20.44	17.39	15.04	13.18	4.67
	Rc (AU)	29.41	29.26	29.33	29.52	31.1
	TF (years)					22.02-32.22
30	1st launch date	1/17/76	1/14/76	1/11/76	1/9/76	1/21/76
	V_c (ft/sec)	66910	63240	60970	59410	53270
	C_3 (km^2/sec^2)	294.3	249.9	223.8	206.3	142.0
	VHP (km/sec)	20.46	17.41	15.06	13.19	5.53
	Rc (AU)	29.46	29.29	29.37	29.58	31.2
	TF (years)					18.59-34.06

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Jan-Feb 1977

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/3/77	1/31/77	1/28/77	1/25/77	2/1/77
	V_c (ft/sec)	64050	60700	58500	56990	52360
	C_3 (km^2/sec^2)	259.5	220.7	19.3	180.1	133.1
	VHP (km/sec)	20.37	17.34	15.00	13.14	3.94
	Rc (AU)	29.33	29.23	29.26	29.40	30.49
	TF (years)					27.82
10	1st launch date	1/31/77	1/25/77	1/22/77	1/20/77	2/1/77
	V_c (ft/sec)	64580	61050	58840	56300	52640
	C_3 (km^2/sec^2)	265.9	224.7	200.1	183.5	135.8
	VHP (km/sec)	20.39	17.37	15.02	13.16	4.07
	Rc (AU)	29.38	29.24	29.29	29.46	31.1
	TF (years)					27.82-30.03
20	1st launch date	1/26/77	1/20/77	1/17/77	1/15/77	1/27/77
	V_c (ft/sec)	65710	61930	59710	58140	52960
	C_3 (km^2/sec^2)	279.5	234.8	209.6	192.5	139.0
	VHP (km/sec)	20.42	17.39	15.04	13.17	4.64
	Rc (AU)	29.43	29.25	29.33	29.52	31.1
	TF (years)					22.18-31.81
30	1st launch date	1/21/77	1/15/77	1/12/77	1/10/77	1/22/77
	V_c (ft/sec)	66680	63310	61080	59500	53340
	C_3 (km^2/sec^2)	291.4	250.8	225.0	207.4	142.7
	VHP (km/sec)	20.45	17.41	15.06	13.19	5.49
	Rc (AU)	29.46	29.28	29.34	29.58	31.2
	TF (years)					18.71-33.66

NEPTUNE 1977

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Jan-Feb 1978

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/6/78	2/2/78	1/30/78	1/28/78	2/2/78
	V_c (ft/sec)	64040	60690	58490	56970	52370
	C_3 (km^2/sec^2)	259.4	220.6	196.2	180.0	133.2
	VHP (km/sec)	20.36	17.33	15.00	13.14	3.85
	Rc (AU)	29.32	29.22	29.25	29.39	30.96
	TF (years)					26.93
10	1st launch date	1/31/78	1/27/78	1/25/78	1/22/78	2/2/78
	V_c (ft/sec)	64430	61090	58760	57330	52640
	C_3 (km^2/sec^2)	264.1	225.2	199.2	183.8	135.8
	VHP (km/sec)	20.40	17.36	15.02	13.16	4.12
	Rc (AU)	29.35	29.23	29.28	29.46	31.1
	TF (years)					26.93-29.23
20	1st launch date	1/26/78	1/22/78	1/20/78	1/17/78	1/28/78
	V_c (ft/sec)	65370	62010	59570	58210	52950
	C_3 (km^2/sec^2)	275.4	235.7	208.1	193.2	138.9
	VHP (km/sec)	20.43	17.39	15.03	13.17	4.73
	Rc (AU)	29.40	29.25	29.32	29.51	31.1
	TF (years)					21.66-31.02
30	1st launch date	1/21/78	1/17/78	1/15/78	1/12/78	1/23/78
	V_c (ft/sec)	66820	63430	60940	59600	53320
	C_3 (km^2/sec^2)	293.2	252.2	223.4	208.4	142.6
	VHP (km/sec)	20.46	17.41	15.05	13.19	5.46
	Rc (AU)	29.45	29.27	29.33	29.58	31.2
	TF (years)					18.25-32.89

NEPTUNE 1978

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Jan-Feb 1979

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/8/79	2/4/79	2/1/79	1/30/79	2/9/79
	V_c (ft/sec)	64040	60680	58480	56960	52460
	C_3 (km^2/sec^2)	259.4	220.5	196.1	179.8	134.1
	VHP (km/sec)	20.36	17.33	14.99	13.14	4.15
	Rc (AU)	29.31	29.22	29.25	29.39	30.98
	TF (years)					27.04
10	1st launch date	1/3/79	1/30/79	1/27/79	1/25/79	2/4/79
	V_c (ft/sec)	64350	61010	58800	57250	52690
	C_3 (km^2/sec^2)	263.1	224.2	199.6	182.9	136.3
	VHP (km/sec)	20.39	17.36	15.01	13.15	4.37
	Rc (AU)	29.35	29.23	29.28	29.44	31.1
	TF (years)					24.09-28.79
20	1st launch date	1/29/79	1/25/79	1/22/79	1/20/79	1/30.79
	V_c (ft/sec)	65220	61870	59630	58050	53010
	C_3 (km^2/sec^2)	273.6	234.0	208.8	191.5	139.5
	VHP (km/sec)	20.42	17.38	15.03	13.17	4.68
	Rc (AU)	29.39	29.24	29.31	29.50	31.1
	TF (years)					21.95-30.52
30	1st launch date	1/24/79	1/20/79	1/17/79	1/15/79	1/25/79
	V_c (ft/sec)	66790	62220	60960	59370	53390
	C_3 (km^2/sec^2)	292.1	249.7	223.7	205.8	143.2
	VHP (km/sec)	20.45	17.40	15.05	13.18	5.58
	Rc (AU)	29.45	29.26	29.35	29.56	31.1
	TF (years)					18.41-32.44

NEPTUNE 1979

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Jan-Feb 1980

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/11/80	2/7/80	2/4/80	2/2/80	2/5/80
	V_c (ft/sec)	64030	60680	58470	56950	52420
	C_3 (km^2/sec^2)	259.3	220.5	196.0	179.7	133.7
	VHP (km/sec)	20.35	17.33	14.99	13.13	4.30
	Rc (AU)	29.30	29.21	29.24	29.38	30.52
	TF (years)					24.82
10	1st launch date	2/5/80	2/1/80	1/29/80	1/27/80	2/5/80
	V_c (ft/sec)	64390	61050	58840	57280	52690
	C_3 (km^2/sec^2)	263.6	224.7	200.0	183.2	136.3
	VHP (km/sec)	20.39	17.35	15.01	13.15	4.30
	Rc (AU)	29.34	29.22	29.27	29.44	31.1
	TF (years)					24.82-27.87
20	1st launch date	1/31/80	1/27/80	1/24/80	1/22/80	1/31/80
	V_c (ft/sec)	65310	61950	59710	58120	53000
	C_3 (km^2/sec^2)	274.7	234.9	209.6	192.2	139.3
	VHP (km/sec)	20.42	17.38	15.03	13.17	4.76
	Rc (AU)	29.38	29.23	29.31	29.50	31.1
	TF (years)					21.49-29.77
30	1st launch date	1/26/80	1/22/80	1/19/80	1/17/80	1/26/80
	V_c (ft/sec)	66730	63330	61070	59460	53370
	C_3 (km^2/sec^2)	292.1	251.0	224.9	206.8	143.0
	VHP (km/sec)	20.45	17.40	15.05	13.18	5.72
	Rc (AU)	29.43	29.25	29.35	29.56	31.1
	TF (years)					18.02-31.70

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Jan-Feb 1981

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/12/81	2/8/81	2/5/81	2/3/81	2/5/81
	V_c (ft/sec)	64030	60670	58460	56940	52450
	C_3 (km^2/sec^2)	259.3	220.4	195.9	179.6	134.0
	VHP (km/sec)	20.35	17.32	14.98	13.13	4.38
	Rc (AU)	29.30	29.20	29.23	29.37	31.05
	TF (years)					24.00
10	1st launch date	2/6/81	2/3/81	1/31/81	1/28/81	2/5/81
	V_c (ft/sec)	64440	60970	58750	57320	52680
	C_3 (km^2/sec^2)	264.2	223.8	199.1	183.6	136.2
	VHP (km/sec)	20.39	17.35	15.01	13.15	4.38
	Rc (AU)	29.33	29.21	29.26	29.44	31.1
	TF (years)					24.00-27.10
20	1st launch date	2/1/81	1/29/81	1/26/81	1/23/81	1/31/81
	V_c (ft/sec)	65400	61810	59560	58190	52980
	C_3 (km^2/sec^2)	275.8	233.3	208.0	192.9	139.2
	VHP (km/sec)	20.42	17.37	15.02	13.16	4.83
	Rc (AU)	29.37	29.23	29.30	29.50	31.1
	TF (years)					21.16-29.00
30	1st launch date	1/27/81	1/24/81	1/21/81	1/18/81	1/26/81
	V_c (ft/sec)	66860	63190	60860	59550	53360
	C_3 (km^2/sec^2)	293.7	249.4	222.5	207.90	142.9
	VHP (km/sec)	20.44	17.39	15.04	13.18	5.83
	Rc (AU)	29.42	29.25	29.34	29.56	31.1
	TF (years)					17.74-30.94

NEPTUNE 1981

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Jan-Feb 1982

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/14/82	2/11/82	2/8/82	2/5/82	2/7/82
	V_c (ft/sec)	64030	60670	58450	56930	52470
	C_3 (km^2/sec^2)	259.2	220.4	195.8	179.5	134.2
	VHP (km/sec)	20.34	17.32	14.98	13.13	4.51
	Rc (AU)	29.29	29.19	29.23	29.37	31.04
	TF (years)					23.01
10	1st launch date	2/9/82	2/5/82	2/2/82	1/31/82	2/2/82
	V_c (ft/sec)	64360	61020	58790	57230	52690
	C_3 (km^2/sec^2)	263.2	224.3	199.5	182.7	136.3
	VHP (km/sec)	20.38	17.35	15.00	13.14	4.69
	Rc (AU)	29.32	29.20	29.26	29.42	31.1
	TF (years)					21.88-24.68
20	1st launch date	2/4/82	1/31/82	1/28/82	1/26/82	2/2/82
	V_c (ft/sec)	65250	61890	59640	58040	53040
	C_3 (km^2/sec^2)	274.0	234.2	208.8	191.3	139.7
	VHP (km/sec)	20.41	17.37	15.02	13.16	4.69
	Rc (AU)	29.37	29.22	29.29	29.48	31.1
	TF (years)					21.88-28.50
30	1st launch date	1/30/82	1/26/82	1/23/82	1/21/82	1/28/82
	V_c (ft/sec)	66650	63240	60970	59330	53410
	C_3 (km^2/sec^2)	291.1	250.0	223.7	205.5	143.4
	VHP (km/sec)	20.44	17.39	15.04	13.17	5.75
	Rc (AU)	29.42	29.24	29.33	29.55	31.1
	TF (years)					17.95-30.57

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Jan-Feb 1983

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/17/83	2/13/83	2/10/83	2/7/83	2/9/83
	V_c (ft/sec)	64020	60670	58450	56940	52500
	C_3 (km^2/sec^2)	259.2	220.3	195.8	179.6	134.5
	VHP (km/sec)	20.34	17.31	14.98	13.13	4.57
	Rc (AU)	29.28	29.19	29.22	29.37	29.39
	TF (years)					22.62
10	1st launch date	2/11/83	2/8/83	2/5/83	2/1/83	2/4/83
	V_c (ft/sec)	64410	60950	58720	57400	52670
	C_3 (km^2/sec^2)	263.8	223.5	198.7	184.5	136.2
	VHP (km/sec)	20.38	17.34	15.00	13.14	4.79
	Rc (AU)	29.31	29.19	29.25	29.43	31.1
	TF (years)					21.38-25.18
20	1st launch date	2/6/83	2/3/83	1/31/83	1/27/83	2/4/83
	V_c (ft/sec)	65340	51810	59530	58330	53090
	C_3 (km^2/sec^2)	275.1	233.3	207.7	194.5	140.3
	VHP (km/sec)	20.40	17.36	15.01	13.16	4.79
	Rc (AU)	29.36	29.21	29.28	29.49	31.1
	TF (years)					21.38-28.07
30	1st launch date	2/1/83	1/29/83	1/26/83	1/22/83	1/30/83
	V_c (ft/sec)	66780	63240	60890	59750	53470
	C_3 (km^2/sec^2)	292.7	249.9	222.8	210.1	144.0
	VHP (km/sec)	20.43	17.38	15.03	13.17	5.63
	Rc (AU)	29.41	29.23	29.32	29.56	31.1
	TF (years)					18.28-30.05

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Jan-Feb 1984

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/19/84	2/15/84	2/12/84	2/10/84	2/11/84
	V_c (ft/sec)	64020	60060	58440	56920	52540
	C_3 (km^2/sec^2)	259.2	220.3	195.7	179.4	134.8
	VHP (km/sec)	29.33	17.31	14.97	13.12	4.65
	Rc (AU)	29.27	29.18	29.21	29.35	30.64
	TF (years)					22.13
10	1st launch date	2/14/84	2/10/84	2/7/84	2/5/84	2/6/84
	V_c (ft/sec)	64330	60980	58760	57190	52690
	C_3 (km^2/sec^2)	262.9	223.9	199.1	182.3	136.4
	VHP (km/sec)	20.37	17.34	14.99	13.13	4.94
	Rc (AU)	29.31	29.19	29.24	29.40	31.1
	TF (years)					20.68-23.88
20	1st launch date	2/9/84	2/5/84	2/2/84	1/31/84	2/6/84
	V_c (ft/sec)	65200	61830	59580	57970	53140
	C_3 (km^2/sec^2)	273.4	233.6	208.1	190.6	140.8
	VHP (km/sec)	20.40	17.36	15.01	13.15	4.94
	Rc (AU)	29.35	29.20	29.28	29.46	31.1
	TF (years)					20.68-27.75
30	1st launch date	2/4/84	1/31/84	1/28/84	1/26/84	1/1/84
	V_c (ft/sec)	66680	63160	60870	59220	53520
	C_3 (km^2/sec^2)	291.5	249.10	222.6	204.3	144.5
	VHP (km/sec)	20.42	17.38	15.03	13.16	5.45
	Rc (AU)	29.40	29.22	29.32	29.53	31.1
	TF (years)					18.80-29.76

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Jan-Feb 1985

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/21/85	2/17/85	2/14/85	2/12/85	2/11/85
	V_c (ft/sec)	64020	60660	58440	56910	52590
	C_3 (km^2/sec^2)	259.2	220.2	195.7	179.3	135.3
	VHP (km/sec)	20.33	17.30	14.97	13.11	4.80
	Rc (AU)	29.26	29.17	29.20	29.34	29.58
	TF (years)					21.31
10	1st launch date	2/15/85	2/11/85	2/8/85	2/6/85	2/6/85
	V_c (ft/sec)	64380	61030	58800	57230	52800
	C_3 (km^2/sec^2)	263.5	224.4	199.6	182.7	137.4
	VHP (km/sec)	20.36	17.33	14.99	13.13	5.14
	Rc (AU)	29.30	29.18	29.23	29.40	31.1
	TF (years)					19.87-23.07
20	1st launch date	2/10/85	2/6/85	2/3/85	2/1/85	2/6/85
	V_c (ft/sec)	65290	61920	59660	58040	53120
	C_3 (km^2/sec^2)	274.5	234.6	209.0	191.4	140.6
	VHP (km/sec)	20.39	17.35	15.01	13.15	5.14
	Rc (AU)	29.34	29.19	29.27	29.46	31.1
	TF (years)					19.87-26.99
30	1st launch date	2/5/85	2/1/85	1/29/85	1/27/85	2/2/85
	V_c (ft/sec)	66710	63280	60980	59320	53500
	C_3 (km^2/sec^2)	291.8	250.4	223.9	205.3	144.3
	VHP (km/sec)	20.42	17.37	15.02	13.16	5.25
	Rc (AU)	29.39	29.21	29.31	29.52	31.1
	TF (years)					19.47-29.02

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Jan-Feb 1986

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/23/86	2/19/86	2/16/86	2/14/86	2/17/86
	V_c (ft/sec)	64020	60660	58440	56910	52640
	C_3 (km^2/sec^2)	259.1	220.2	195.7	179.3	135.8
	VHP (km/sec)	20.32	17.30	14.96	13.11	4.63
	Rc (AU)	29.25	29.16	29.19	29.33	30.02
	TF (years)					22.23
10	1st launch date	2/17/86	2/14/86	2/11/86	2/8/86	2/12/86
	V_c (ft/sec)	64430	60960	58730	57270	52810
	C_3 (km^2/sec^2)	264.1	223.6	198.8	183.1	137.5
	VHP (km/sec)	20.36	17.32	14.98	13.13	4.98
	Rc (AU)	29.28	29.17	29.22	29.40	31.1
	TF (years)					20.49-24.19
20	1st launch date	2/12/86	2/9/86	2/6/96	2/3/86	2/7/86
	V_c (ft/sec)	65390	61780	59520	58110	53100
	C_3 (km^2/sec^2)	275.6	233.0	207.5	192.2	140.4
	VHP (km/sec)	20.39	17.35	15.00	13.14	5.29
	Rc (AU)	29.33	29.18	29.26	29.46	31.1
	TF (years)					19.31-26.19
30	1st launch date	2/7/86	2/4/86	2/1/86	1/29/86	2/2/86
	V_c (ft/sec)	66840	63140	60790	59420	53470
	C_3 (km^2/sec^2)	293.4	248.8	221.8	206.4	144.0
	VHP (km/sec)	20.42	17.37	15.02	13.16	5.29
	Rc (AU)	29.38	29.21	29.30	29.52	31.1
	TF (years)					18.98-28.25

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity February 1987

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/25/87	2/22/86	2/19/87	2/16/87	2/15/87
	V_c (ft/sec)	64020	60660	58430	56910	52680
	C_3 (km^2/sec^2)	259.1	220.2	195.6	179.2	136.2
	VHP (km/sec)	20.32	17.29	14.96	13.11	5.04
	Rc (AU)	29.25	29.15	29.18	29.33	30.06
	TF (years)					20.22
10	1st launch date	2/20/87	2/16/87	2/13/87	2/11/87	2/10/87
	V_c (ft/sec)	64360	61000	58770	57200	52900
	C_3 (km^2/sec^2)	263.2	224.1	199.3	182.3	138.4
	VHP (km/sec)	20.35	17.32	14.98	13.12	5.42
	Rc (AU)	29.28	29.16	29.22	29.38	31.0
	TF (years)					18.88-22.15
20	1st launch date	2/15/87	2/11/87	2/8/87	2/6/87	2/10/87
	V_c (ft/sec)	65250	61870	59600	57980	53220
	C_3 (km^2/sec^2)	273.9	234.0	208.4	190.7	141/6
	VHP (km/sec)	20.38	17.34	15.00	13.14	5.42
	Rc (AU)	29.32	29.17	29.25	29.44	31.1
	TF (years)					18.88-26.12
30	1st launch date	2/10/87	2/6/87	2/3/87	2/1/87	2/5/87
	V_c (ft/sec)	66640	63210	60900	59230	53600
	C_3 (km^2/sec^2)	291.0	249.6	223.0	204.3	145.3
	VHP (km/sec)	20.41	17.36	15.01	13.15	5.73
	Rc (AU)	29.37	29.20	29.29	29.51	31.1
	TF (years)					17.97-28.30

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity February 1988

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	2/28/88	2/4/88	2/21/88	2/19/88	2/17/88
	V_c (ft/sec)	64020	60660	58430	56900	52730
	C_3 (km^2/sec^2)	259.1	220.2	195.6	179.2	136.7
	VHP (km/sec)	20.31	17.29	14.95	13.10	5.12
	Rc (AU)	29.24	29.14	29.18	29.32	30.91
	TF (years)					19.90
10	1st launch date	2/22/88	2/19/88	2/16/88	2/13/88	2/17/88
	V_c (ft/sec)	64410	60930	58700	57240	52950
	C_3 (km^2/sec^2)	263.8	223.4	198.5	182.8	138.9
	VHP (km/sec)	20.35	17.31	14.97	13.12	5.12
	Rc (AU)	29.27	29.15	29.20	29.38	31.0
	TF (years)					19.90-23.73
20	1st launch date	2/17/88	2/14/88	2/11/88	2/8/88	2/12/88
	V_c (ft/sec)	65340	61780	59500	58060	53270
	C_3 (km^2/sec^2)	275.10	232.9	207.3	191.6	142.0
	VHP (km/sec)	20.38	17.34	14.99	13.13	5.56
	Rc (AU)	29.31	29.17	29.24	29.44	31.1
	TF (years)					18.44-25.82
30	1st launch date	2/12/88	2/9/88	2/6/88	2/3/88	2/7/88
	V_c (ft/sec)	66770	63180	60840	59330	53650
	C_3 (km^2/sec^2)	292.6	249.3	222.2	205.5	145.8
	VHP (km/sec)	20.42	17.36	15.01	13.15	5.95
	Rc (AU)	29.36	29.19	29.28	29.50	31.1
	TF (years)					17.42-27.85

NEPTUNE 1988

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Feb-Mar 1989

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	3/1/89	2/25/89	2/22/89	2/20/89	2/18/89
	V_c (ft/sec)	64020	60660	58430	56900	52790
	C_3 (km^2/sec^2)	259.2	220.2	195.6	179.2	137.3
	VHP (km/sec)	20.30	17.28	14.95	13.10	5.27
	Rc (AU)	29.23	29.13	29.17	29.31	29.23
	TF (years)					19.37
10	1st launch date	2/24/89	2/20/89	2/17/89	2/15/89	2/18/89
	V_c (ft/sec)	64340	60980	58750	57170	53000
	C_3 (km^2/sec^2)	263.0	223.9	199.0	182.1	139.4
	VHP (km/sec)	20.34	17.31	14.97	13.11	5.27
	Rc (AU)	29.26	29.14	29.20	29.36	31.0
	TF (years)					19.37-23.32
20	1st launch date	2/19/89	2/15/89	2/12/89	2/10/89	2/13/89
	V_c (ft/sec)	65210	61830	59560	57930	53310
	C_3 (km^2/sec^2)	273.4	233.5	207.9	190.2	142.5
	VHP (km/sec)	20.37	17.33	14.99	13.13	5.72
	Rc (AU)	29.31	29.16	29.23	29.42	31.0
	TF (years)					17.99-25.43
30	1st launch date	2/14/89	2/10/89	2/7/89	2/5/89	2/8/89
	V_c (ft/sec)	66630	63150	60830	59170	53700
	C_3 (km^2/sec^2)	290.8	248.8	222.2	203.7	146.3
	VHP (km/sec)	20.39	17.35	15.00	13.14	6.07
	Rc (AU)	29.36	29.18	29.28	29.49	31.1
	TF (years)					17.12-27.57

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Feb-Mar 1990

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	3/4/90	2/28/90	2/25/90	2/23/90	2/21/90
	V_c (ft/sec)	64020	60660	58430	56900	52830
	C_3 (km^2/sec^2)	259.2	220.2	195.6	179.2	137.7
	VHP (km/sec)	20.30	17.28	14.94	13.09	5.29
	Rc (AU)	29.22	29.12	29.16	29.30	29.65
	TF (years)					19.28
10	1st launch date	2/26/90	2/22/90	2/19/90	2/17/90	2/16/90
	V_c (ft/sec)	64390	61030	58800	57220	53060
	C_3 (km^2/sec^2)	263.6	224.5	199.6	182.6	139.9
	VHP (km/sec)	20.33	17.31	14.97	13.11	5.78
	Rc (AU)	29.25	29.13	29.19	29.36	31.0
	TF (years)					17.82-21.14
20	1st launch date	2/21/90	2/17/90	2/14/90	2/12/90	2/16/90
	V_c (ft/sec)	65300	61920	59640	58010	53450
	C_3 (km^2/sec^2)	274.6	234.6	208.9	191.1	143.8
	VHP (km/sec)	20.36	17.33	14.98	13.12	5.78
	Rc (AU)	29.29	29.14	29.23	29.42	31.0
	TF (years)					17.82-25.98
30	1st launch date	2/16/90	2/12/90	2/9/90	2/7/90	2/11/90
	V_c (ft/sec)	66710	63270	50950	59260	53830
	C_3 (km^2/sec^2)	291.9	250.3	223.5	204.6	147.6
	VHP (km/sec)	20.39	17.35	15.00	13.14	6.23
	Rc (AU)	29.34	29.17	29.27	29.48	31.10
	TF (years)					16.76-27.38

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Feb-Mar 1991

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	3/6/91	3/2/91	2/27/91	2/25/91	2/23/91
	V_c (ft/sec)	64020	60660	58440	56900	52890
	C_3 (km^2/sec^2)	259.2	220.3	195.6	179.2	138.3
	VHP (km/sec)	20.29	17.27	14.94	13.09	5.37
	Rc (AU)	29.21	29.11	29.15	29.29	30.97
	TF (years)					19.01
10	1st launch date	3/1/91	2/26/91	2/22/91	2/20/91	2/23/91
	V_c (ft/sec)	64320	61020	58730	57160	53140
	C_3 (km^2/sec^2)	262.8	224.3	198.8	181.9	140.8
	VHP (km/sec)	20.32	17.29	14.96	13.10	5.37
	Rc (AU)	29.25	29.12	29.18	29.35	31.0
	TF (years)					19.01-22.93
20	1st launch date	2/24/91	2/20/91	2/17/91	2/15/91	2/18/91
	V_c (ft/sec)	65190	61790	59520	57930	53480
	C_3 (km^2/sec^2)	273.2	233.1	207.5	190.2	144.1
	VHP (km/sec)	20.35	17.32	14.98	13.12	5.93
	Rc (AU)	29.29	29.14	29.22	29.40	31.0
	TF (years)					17.44-25.11
30	1st launch date	2/19/91	2/16/91	2/12/91	2/10/91	2/13/91
	V_c (ft/sec)	66670	63430	60770	59220	53870
	C_3 (km^2/sec^2)	291.4	252.1	221.5	204.2	148.0
	VHP (km/sec)	20.38	17.34	14.99	13.13	6.40
	Rc (AU)	29.34	29.16	29.26	29.47	31.0
	TF (years)					16.38-27.28

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Feb-Mar 1992

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	3/8/92	3/4/92	3/1/92	2/27/92	2/26/92
	V_c (ft/sec)	64030	60660	58440	56910	52940
	C_3 (km^2/sec^2)	259.2	220.3	195.7	179.3	138.8
	VHP (km/sec)	20.28	17.26	14.93	13.08	5.38
	Rc (AU)	29.20	29.11	29.14	29.28	31.00
	TF (years)					18.97
10	1st launch date	3/2/92	2/27/92	2/24/92	2/22/92	2/21/92
	V_c (ft/sec)	64380	61020	58780	57210	53160
	C_3 (km^2/sec^2)	263.4	224.3	199.4	182.4	140.9
	VHP (km/sec)	20.32	17.29	14.96	13.10	5.93
	Rc (AU)	29.23	29.11	29.17	29.34	31.0
	TF (years)					17.43-20.86
20	1st launch date	2/26/92	2/22/92	2/19/92	2/17/92	2/21/92
	V_c (ft/sec)	65260	61880	59610	57980	53590
	C_3 (km^2/sec^2)	274.2	234.2	208.5	190.7	145.3
	VHP (km/sec)	20.35	17.31	14.97	13.11	5.93
	Rc (AU)	29.28	29.13	29.21	29.40	31.0
	TF (years)					17.43-25.17
30	1st launch date	2/21/92	2/17/92	2/14/92	2/12/92	2/16/92
	V_c (ft/sec)	66660	63220	60900	59200	54030
	C_3 (km^2/sec^2)	291.2	249.7	222.9	204.0	149.6
	VHP (km/sec)	20.37	17.34	14.99	13.13	6.49
	Rc (AU)	29.33	29.15	29.25	29.47	31.0
	TF (years)					16.19-27.90

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Feb-Mar 1993

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	3/10/93	3/6/93	3/3/93	3/1/93	2/28/93
	V_c (ft/sec)	64030	60670	58440	56910	52990
	C_3 (km^2/sec^2)	259.3	220.3	195.7	179.3	139.3
	VHP (km/sec)	20.28	17.26	14.93	13.08	5.39
	Rc (AU)	29.19	29.10	29.13	29.27	30.96
	TF (years)					18.93
10	1st launch date	3/5/93	3/1/93	2/26/93	2/23/93	2/23/93
	V_c (ft/sec)	64330	60960	58720	57260	53170
	C_3 (km^2/sec^2)	262.9	223.6	198.7	183.0	141.1
	VHP (km/sec)	20.31	17.28	14.95	13.10	5.96
	Rc (AU)	29.23	29.10	29.16	29.34	31.0
	TF (years)					17.35-20.88
20	1st launch date	2/28/93	2/24/93	2/21/93	2/18/93	2/23/93
	V_c (ft/sec)	65230	61750	59490	58070	53710
	C_3 (km^2/sec^2)	273.7	232.8	207.2	191.7	146.4
	VHP (km/sec)	20.34	17.31	14.97	13.11	5.96
	Rc (AU)	29.27	29.12	29.20	29.40	31.0
	TF (years)					17.35-25.24
30	1st launch date	2/23/93	2/19/93	2/16/93	2/13/93	2/18/93
	V_c (ft/sec)	66720	63130	60790	59320	54130
	C_3 (km^2/sec^2)	292.0	248.7	221.7	205.4	150.6
	VHP (km/sec)	20.37	17.33	14.98	13.12	6.55
	Rc (AU)	29.32	29.14	29.24	29.46	31.0
	TF (years)					16.06-27.46

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Feb-Mar 1994

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	3/12/94	3/9/94	3/6/94	3/3/94	3/2/94
	V_c (ft/sec)	64030	60670	58450	56920	53060
	C_3 (km^2/sec^2)	259.3	220.4	195.8	179.4	139.9
	VHP (km/sec)	20.27	17.35	14.92	13.07	5.52
	Rc (AU)	29.18	29.09	29.12	29.26	29.08
	TF (years)					18.54
10	1st launch date	3/7/94	3/3/94	2/28/94	2/26/94	2/25/94
	V_c (ft/sec)	64370	61010	58770	57200	53270
	C_3 (km^2/sec^2)	263.3	224.2	199.3	182.4	142.0
	VHP (km/sec)	20.30	17.28	14.94	13.09	6.10
	Rc (AU)	29.21	29.09	29.15	29.32	31.0
	TF (years)					17.02-20.07
20	1st launch date	3/2/94	2/26/94	2/23/94	2/21/94	2/25/94
	V_c (ft/sec)	65240	61860	59590	57960	53760
	C_3 (km^2/sec^2)	273.9	233.9	208.3	190.5	146.9
	VHP (km/sec)	20.33	17.30	14.96	13.10	6.10
	Rc (AU)	29.26	29.11	29.19	29.38	31.0
	TF (years)					17.02-24.74
30	1st launch date	2/25/94	2/21/94	2/18/94	2/16/94	2/20/94
	V_c (ft/sec)	66610	63180	60850	59160	54170
	C_3 (km^2/sec^2)	290.7	249.2	222.4	203.6	151.0
	VHP (km/sec)	20.36	17.32	14.98	13.12	6.72
	Rc (AU)	29.31	29.13	29.23	29.45	31.0
	TF (years)					15.75-27.12

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Feb-Mar 1995

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	3/15/95	3/11/95	3/8/95	3/6/95	3/4/95
	V_c (ft/sec)	64040	60680	58450	56930	53120
	C_3 (km^2/sec^2)	259.4	220.4	195.8	179.5	140.6
	VHP (km/sec)	20.26	17.25	14.92	13.07	5.62
	Rc (AU)	29.17	29.08	29.11	29.26	29.94
	TF (years)					18.22
10	1st launch date	3/9/95	3/6/95	3/3/98	2/28/95	2/27/95
	V_c (ft/sec)	64430	60950	58720	57250	53370
	C_3 (km^2/sec^2)	264.0	223.5	198.7	182.9	143.0
	VHP (km/sec)	20.30	17.27	14.94	13.09	6.24
	Rc (AU)	29.20	29.09	29.14	29.32	31.0
	TF (years)					16.70-20.10
20	1st launch date	3/4/95	3/1/95	2/26/98	2/23/95	2/27/95
	V_c (ft/sec)	65350	61780	59510	58050	53790
	C_3 (km^2/sec^2)	275.1	233.0	207.4	191.5	147.2
	VHP (km/sec)	20.33	17.29	14.95	13.10	6.24
	Rc (AU)	29.24	29.10	29.18	29.38	31.0
	TF (years)					16.70-24.53
30	1st launch date	2/27/95	2/24/95	2/21/98	2/18/95	2/22/95
	V_c (ft/sec)	66760	63170	60830	59290	54210
	C_3 (km^2/sec^2)	292.4	249.2	222.2	205.0	151.4
	VHP (km/sec)	20.36	17.31	14.97	13.11	6.83
	Rc (AU)	29.29	29.12	29.22	29.44	31.0
	TF (years)					15.54-26.78

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Feb-Mar 1996

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	3/16/96	3/12/96	3/9/96	3/7/96	3/5/96
	V_c (ft/sec)	64040	60680	58460	56930	53190
	C_3 (km^2/sec^2)	259.5	220.5	195.9	179.5	141.2
	VHP (km/sec)	20.26	17.24	14.91	13.06	5.76
	Rc (AU)	29.16	29.07	29.10	29.25	30.66
	TF (years)					17.84
10	1st launch date	3/11/96	3/7/96	3/4/96	3/2/96	2/29/96
	V_c (ft/sec)	64360	61010	58770	57200	53480
	C_3 (km^2/sec^2)	263.3	224.2	199.3	182.4	144.1
	VHP (km/sec)	20.29	17.27	14.93	13.08	6.36
	Rc (AU)	29.20	29.07	29.14	29.30	31.0
	TF (years)					16.42-19.78
20	1st launch date	3/6/96	3/2/96	2/28/96	2/26/96	2/29/96
	V_c (ft/sec)	65220	61840	59570	57950	53830
	C_3 (km^2/sec^2)	273.6	233.7	208.1	190.4	147.6
	VHP (km/sec)	20.31	17.29	14.95	13.09	6.36
	Rc (AU)	29.24	29.09	29.17	29.36	31.0
	TF (years)					16.42-24.18
30	1st launch date	3/1/96	2/26/96	2/23/96	2/21/96	2/24/96
	V_c (ft/sec)	66610	63140	60820	59170	54250
	C_3 (km^2/sec^2)	290.6	248.8	222.1	203.7	151.8
	VHP (km/sec)	20.34	17.31	14.97	13.11	6.99
	Rc (AU)	29.29	29.11	29.21	29.43	31.0
	TF (years)					15.24-26.43

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Feb-Mar 1997

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	3/19/97	3/15/97	3/12/97	3/10/97	3/8/97
	V_c (ft/sec)	64050	60690	58470	56940	53240
	C_3 (km^2/sec^2)	259.5	220.6	196.0	179.7	141.8
	VHP (km/sec)	20.25	17.23	14.90	13.06	5.76
	Rc (AU)	29.15	29.06	29.09	29.24	30.65
	TF (years)					17.83
10	1st launch date	3/13/97	3/9/97	3/6/97	3/5/97	3/3/97
	V_c (ft/sec)	64420	61070	58830	57240	53500
	C_3 (km^2/sec^2)	264.0	224.9	200.0	182.8	144.3
	VHP (km/sec)	20.28	17.26	14.93	13.07	6.39
	Rc (AU)	29.18	29.06	29.13	29.28	31.0
	TF (years)					16.36-19.76
20	1st launch date	3/8/97	3/4/97	3/1/97	2/28/97	3/3/97
	V_c (ft/sec)	65330	61940	59670	58040	53950
	C_3 (km^2/sec^2)	274.9	234.9	209.2	191.4	148.8
	VHP (km/sec)	20.31	17.28	14.95	13.09	6.39
	Rc (AU)	29.23	29.08	29.17	29.35	31.0
	TF (years)					16.36-24.28
30	1st launch date	3/3/97	2/27/97	2/24/97	2/23/97	2/26/97
	V_c (ft/sec)	66720	63280	60960	59350	54370
	C_3 (km^2/sec^2)	292.0	250.5	223.6	205.6	153.1
	VHP (km/sec)	20.34	17.30	14.96	13.10	7.02
	Rc (AU)	29.28	29.10	29.21	29.41	31.0
	TF (years)					15.19-26.41

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Feb-Mar 1998

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	3/21/98	3/17/98	3/14/98	3/12/98	3/10/98
	V_c (ft/sec)	64060	60700	58480	56950	53310
	C_3 (km^2/sec^2)	259.6	220.7	196.1	179.8	142.5
	VHP (km/sec)	20.24	17.23	14.90	13.05	5.89
	Rc (AU)	29.14	29.05	29.08	29.23	28.98
	TF (years)					17.50
10	1st launch date	3/16/98	3/12/98	3/9/98	3/7/98	3/5/98
	V_c (ft/sec)	64360	61010	58780	57210	53610
	C_3 (km^2/sec^2)	263.3	224.2	199.4	182.5	145.4
	VHP (km/sec)	20.27	17.25	14.92	13.07	6.53
	Rc (AU)	29.18	29.06	29.12	29.28	31.0
	TF (years)					16.07-19.39
20	1st launch date	3/11/98	3/7/98	3/4/98	3/2/98	3/5/98
	V_c (ft/sec)	65210	61830	59560	57960	53980
	C_3 (km^2/sec^2)	273.4	233.6	208.0	190.5	149.1
	VHP (km/sec)	20.30	17.27	14.94	13.08	6.53
	Rc (AU)	29.22	29.07	29.15	29.34	31.0
	TF (years)					16.07-23.93
30	1st launch date	3/6/98	3/2/98	2/27/98	2/25/98	2/28/98
	V_c (ft/sec)	66650	63120	60800	59220	54410
	C_3 (km^2/sec^2)	291.1	248.5	221.9	204.2	153.4
	VHP (km/sec)	20.33	17.30	14.95	13.10	7.17
	Rc (AU)	29.27	29.09	29.20	29.41	31.0
	TF (years)					14.93-26.24

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity Feb-Mar 1999

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	3/24/99	3/20/99	3/17/99	3/15/99	3/13/99
	V_c (ft/sec)	64070	60710	58490	56970	53370
	C_3 (km^2/sec^2)	259.7	220.8	196.2	179.9	143.0
	VHP (km/sec)	20.23	17.22	14.89	13.05	5.88
	Rc (AU)	29.13	29.04	29.08	29.22	29.01
	TF (years)					17.52
10	1st launch date	3/18/99	3/15/99	3/11/99	3/9/99	3/8/99
	V_c (ft/sec)	64420	61010	58840	57270	53630
	C_3 (km^2/sec^2)	264.0	224.1	200.0	183.1	145.1
	VHP (km/sec)	20.27	17.24	14.92	13.06	6.54
	Rc (AU)	29.16	29.05	29.11	29.28	31.0
	TF (years)					16.05-19.46
20	1st launch date	3/13/99	3/10/99	3/6/99	3/4/99	3/8/99
	V_c (ft/sec)	65320	61860	59670	58050	54100
	C_3 (km^2/sec^2)	274.7	233.9	209.2	191.5	150.3
	VHP (km/sec)	20.30	17.27	14.93	13.08	6.54
	Rc (AU)	29.21	29.06	29.15	29.34	31.0
	TF (years)					16.05-24.05
30	1st launch date	3/8/99	3/5/99	3/1/99	2/27/99	3/3/99
	V_c (ft/sec)	66690	62960	60950	59270	54530
	C_3 (km^2/sec^2)	291.6	246.7	223.5	204.8	154.6
	VHP (km/sec)	20.32	17.29	14.95	13.09	7.18
	Rc (AU)	29.26	29.08	29.19	29.40	31.0
	TF (years)					14.91-26.37

TARGET DATA FOR EARTH LAUNCHED ONE WAY TRANSFERS

Target NEPTUNE Opportunity March 2000

Launch Window (days)	Parameters	Constant Flight Times				Min. Energy
		2350 days 6.43 years	2700 days 7.39 years	3050 days 8.35 years	3400 days 9.31 years	Type I
0	1st launch date	3/25/2000	3/21/2000	3/18/2000	3/16/2000	3/15/2000
	V_c (ft/sec)	64070	60720	58500	56980	53420
	C_3 (km^2/sec^2)	259.8	220.9	196.4	180.0	143.6
	VHP (km/sec)	20.23	17.21	14.89	13.04	5.89
	Rc (AU)	29.12	29.03	29.07	29.21	28.96
	TF (years)					17.49
10	1st launch date	3/20/2000	3/16/2000	3/13/2000	3/11/2000	3/10/2000
	V_c (ft/sec)	64370	61020	58790	57230	53650
	C_3 (km^2/sec^2)	263.3	224.3	199.5	182.7	145.8
	VHP (km/sec)	20.26	17.24	14.91	13.06	6.54
	Rc (AU)	29.16	29.04	29.10	29.26	31.0
	TF (years)					16.04-19.53
20	1st launch date	3/15/2000	3/11/2000	3/8/2000	3/6/2000	3/10/2000
	V_c (ft/sec)	65230	61820	59570	58000	54210
	C_3 (km^2/sec^2)	273.7	233.5	208.0	190.9	151.44
	VHP (km/sec)	20.29	17.26	14.93	13.07	6.54
	Rc (AU)	29.20	29.05	29.13	29.32	31.0
	TF (years)					16.04-24.18
30	1st launch date	3/10/2000	3/6/2000	3/3/2000	3/1/2000	3/5/2000
	V_c (ft/sec)	66690	63120	60800	59260	54650
	C_3 (km^2/sec^2)	291.6	248.5	221.8	204.7	155.8
	VHP (km/sec)	20.31	17.28	14.94	13.08	7.33
	Rc (AU)	29.25	29.07	29.18	29.39	31.0
	TF (years)					14.66-26.51

OPPORTUNITIES TO PLUTO

1975 - 76
1980 - 81
1985 - 86
1990 - 91
1996
1999 - 2000

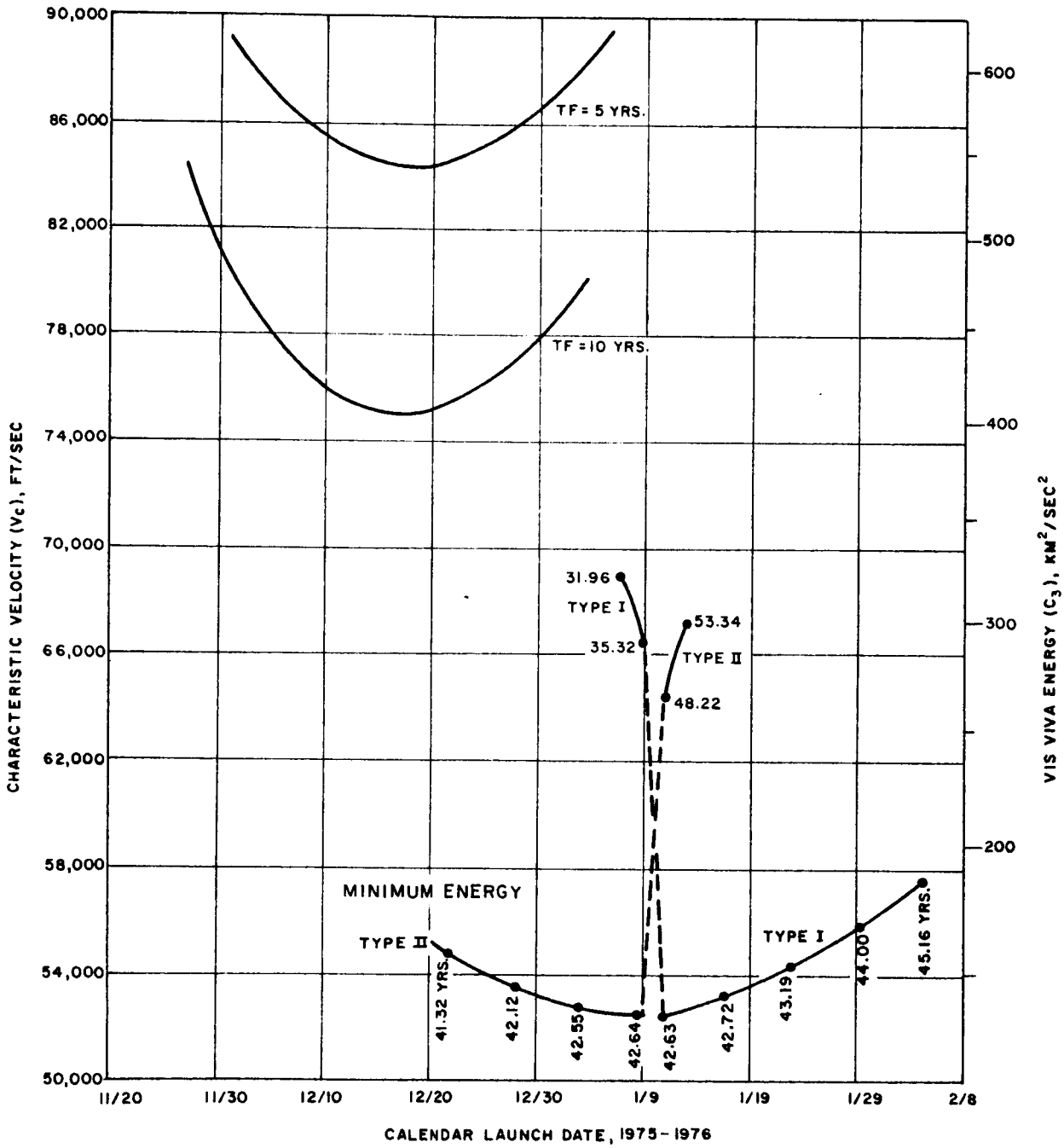

FIGURE I. ENERGY CURVES FOR 1975-76 PLUTO OPPORTUNITY

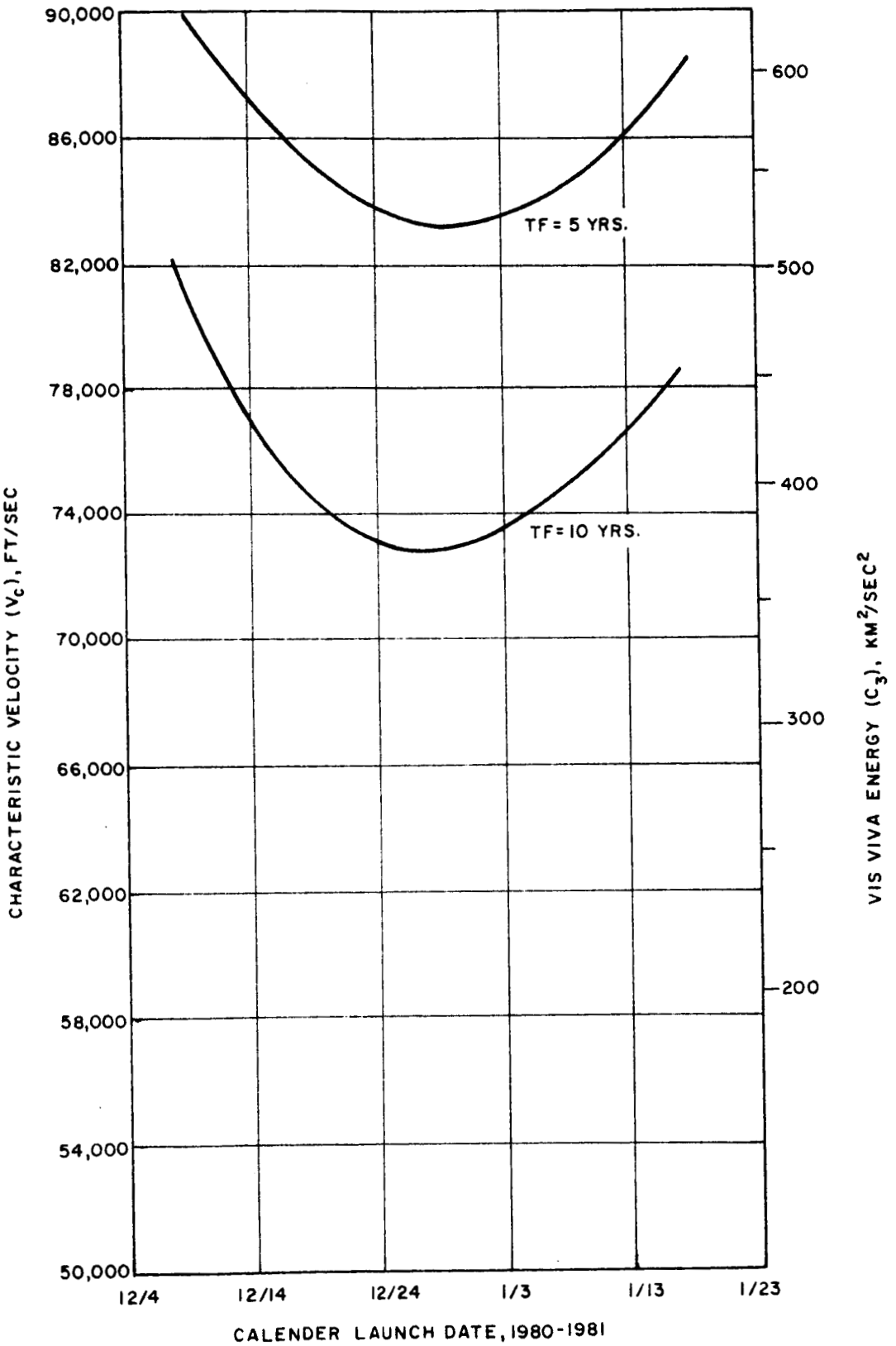

FIGURE 2. ENERGY CURVES FOR 1980-81 PLUTO OPPORTUNITY

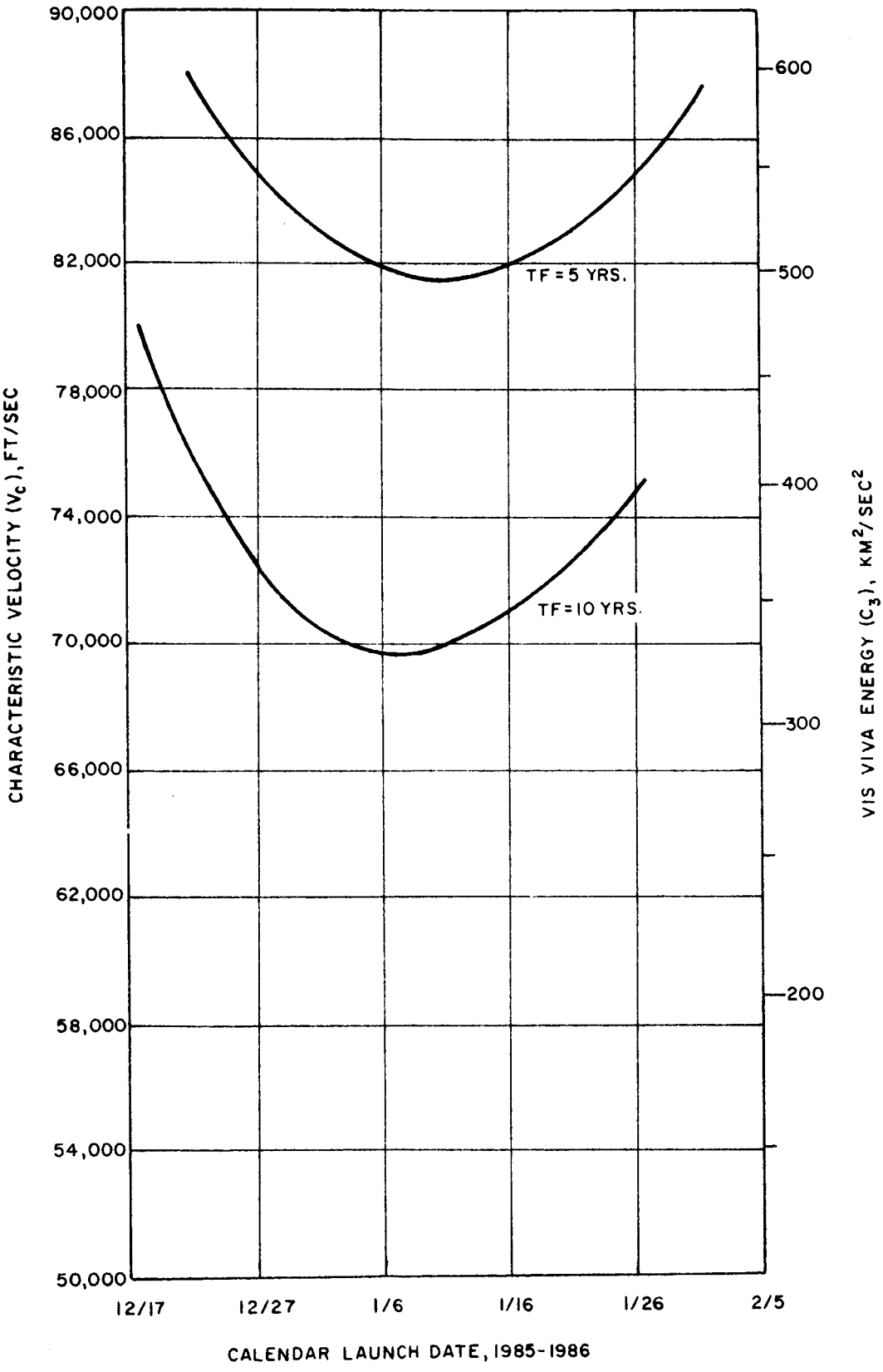

FIGURE 3. ENERGY CURVES FOR 1985-1986 PLUTO OPPORTUNITY

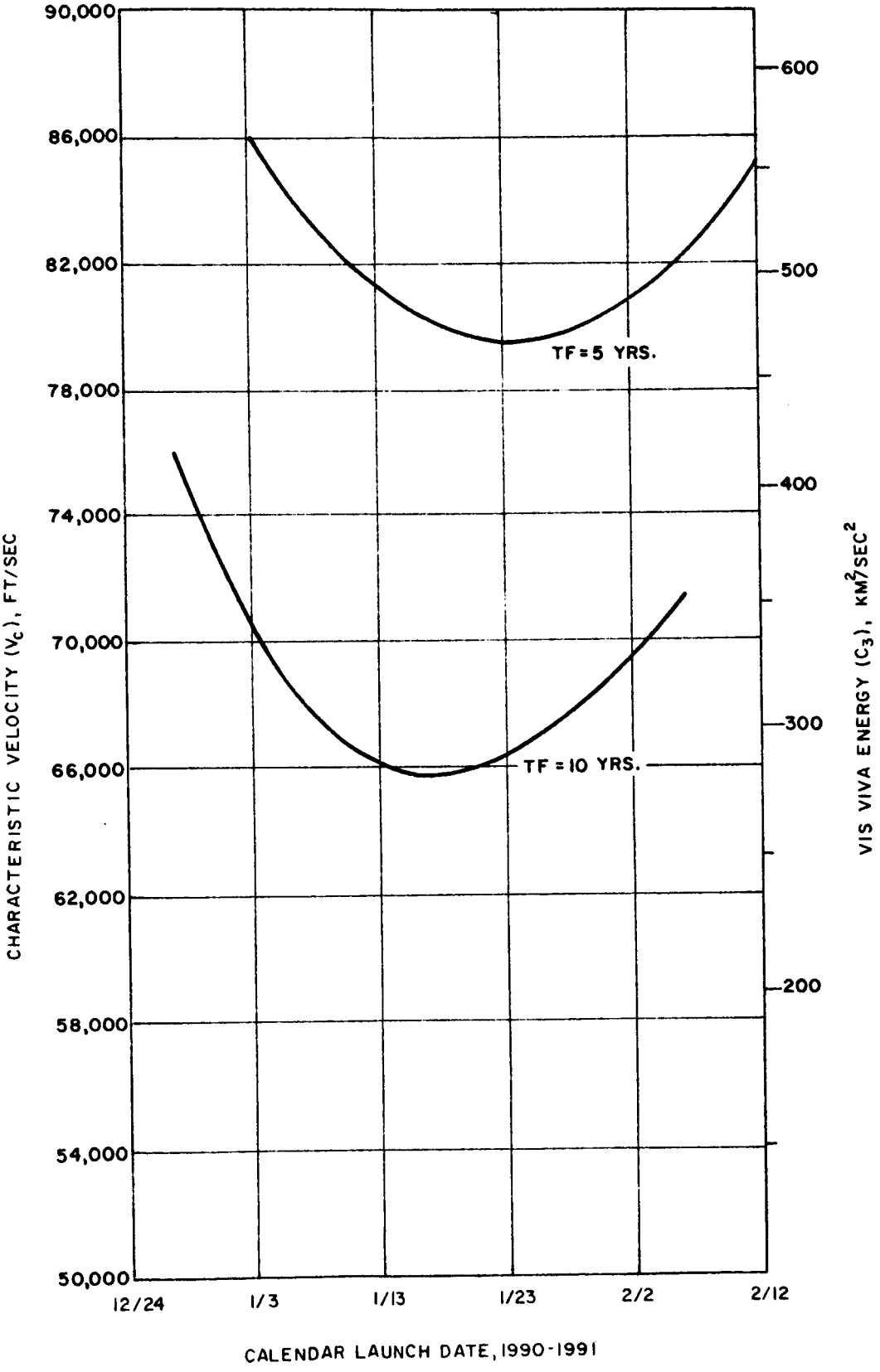

FIGURE 4. ENERGY CURVES FOR 1990-91 PLUTO OPPORTUNITY

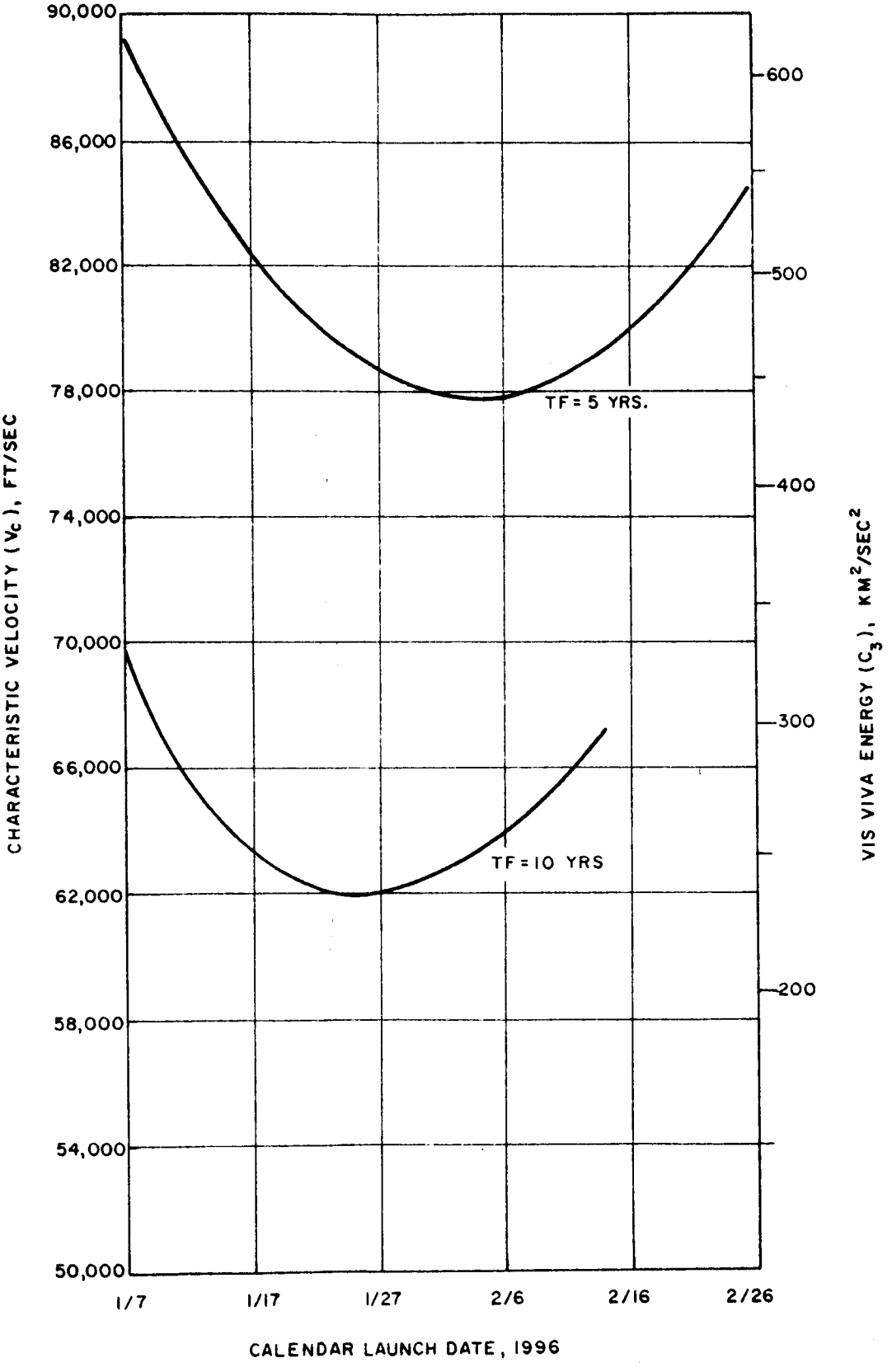

FIGURE 5. ENERGY CURVES FOR 1996 PLUTO OPPORTUNITY

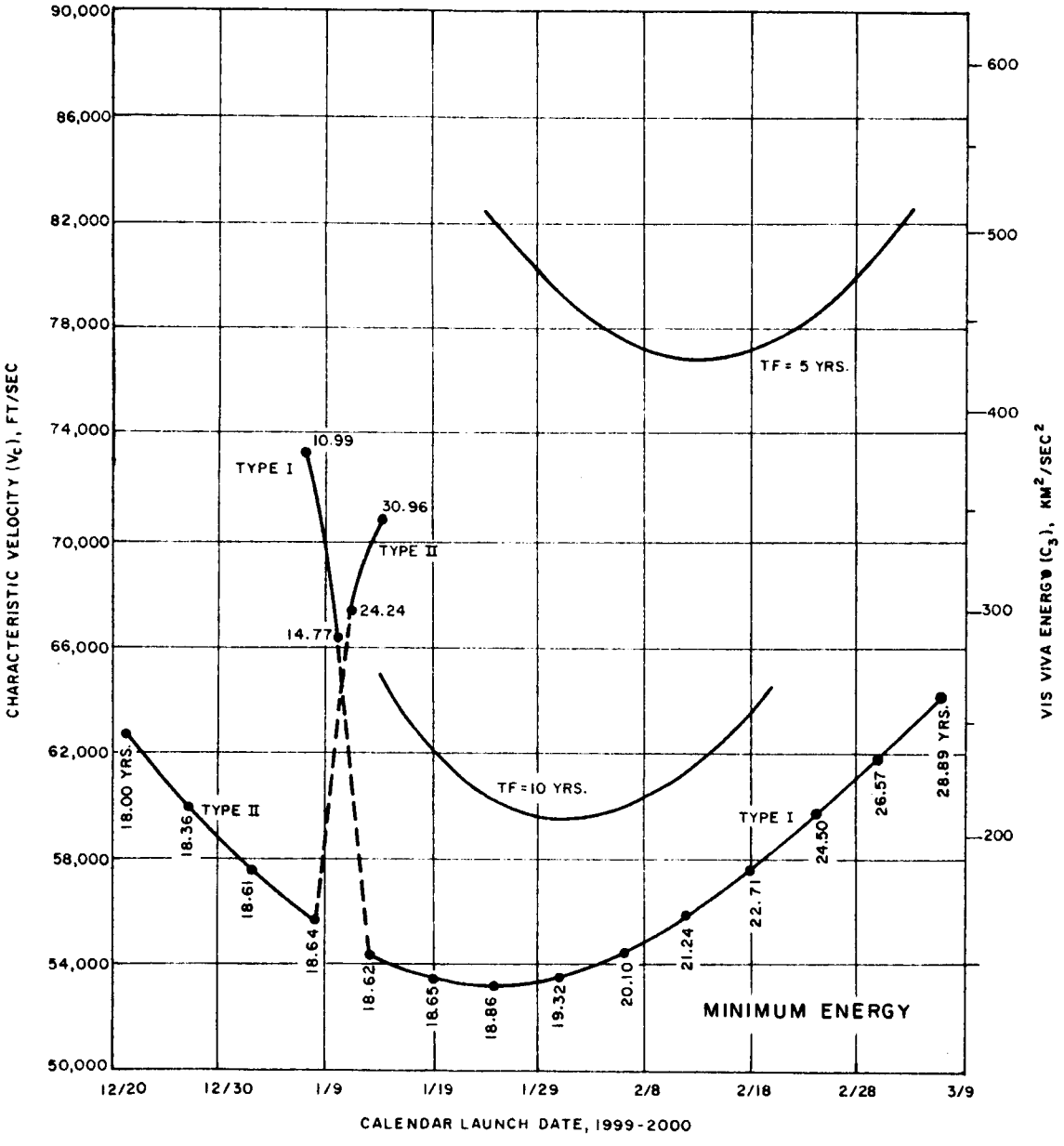

FIGURE 6. ENERGY CURVES FOR 1999-2000 PLUTO OPPORTUNITY