NASA

Technical Memorandum **80549**

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AUGUST 1979

National Aeronautics and Space Administration

Goddard Space Flight Center
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DECAMETER-WAVE RADIO OBSERVATIONS OF JUPITER DURING THE 1979 APPARITION

by

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This report presents a catalog of observations of Jupiter's sporadic decameter wavelength radio emissions obtained with the Goddard Space Flight Center Jupiter Monitor system between November 1978 and March 1979. The data catalog is a continuation of a series of reports on results of the NASA Jupiter Monitor Network program. The details of the observing technique and data analysis procedures are discussed in earlier catalogs (references 1 thru 5).

The Jupiter Monitor program is designed to utilize a multi-station, global network of monitoring instruments in order to obtain nearly continuous, synoptic observations of the planet. During the 1979 apparition of Jupiter, data were collected only from the Goddard Space Flight Center station in Greenbelt, MD. and the Orroral Valley (Canberra) Australia station.

Observations were obtained daily at frequencies of 16.7 and 22.2 MHz using five-element Yagi antennas at each end of a two-element interferometer. During the 1979 apparition, the antennas at Goddard did not

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track but remained fixed at a given hour angle on any particular day. Consequently the finite antenna beam size limited the maximum possible length of an observing period to six hours per day. The flux sensitivity of the survey is estimated to be 5×10^4 Jy for Goddard and 2×10^5 Jy for Orroral. A summary of the data collected during the apparition is tabulated below.

FREQUENCY	STATION	TOTAL OBSERVATIONS	AVE. OBS. PER DAY	AVE. OCC. PROBABILITY
16.7 MHz	Goddard	522 hr.	4.8 hr	0.218
22.2	Goddard	596	5.5	0.084
	Orroral	221	5.7	0.033

Plots of the two-dimensional emission occurrence probability distribution as a function of System III (1965) central meridian longitude (CML III) and departure of Io from superior geocentric conjunction (Io phase) are given in Figure 1 for 16.7 MHz and in Figure 2 for 22.2 MHz. The complete data catalog is given in Table 1. Observations at 16.7 MHz are listed first and are followed by a listing of the 22.2 MHz data. For each day during the 1979 apparition, we list the Universal Time (to the nearest 5 min.) of the beginning and end of each period during which useful, interference-free observations of Jupiter could be obtained. The corresponding values of CML III and Io phase are also listed for each observation period. For those occasions when Jovian decametric activity was unambiguously detected during an observing period, the beginning and end times of the activity interval are listed along with the corresponding

values of CML III and Io phase for the event.

Figures 3 through 5 provide an overview of the observations from the entire 14-yr Jupiter Monitor Network program. Figure 3 shows the total amount of observing time from all stations at 16.7 and 22.2 MHz for each apparition and also displays the variation of the apparition average occurrence probability over the same span of time. Only a small set of observations were collected during the first two apparitions because a true multi-station network was not yet in full operation. The very limited set of observations available for the 1979 apparition presented in this report reflect the consequences of both the limitations of aging equipment and the problem of increasing radio frequency interference in the decameter-wave band. The minima in the occurrence probability plots in Figure 3 for the 1970 and 1971 apparitions are due to the well-known correlation of Jovian decametric activity with the declination of the earth as seen from Jupiter (D_E) which was at a minimum during that period.

Figure 4 and 5 display occurrence probability contours as a function of Io phase and System III (1965) central meridian longitude for the complete Jupiter Monitor Network data set. The 16.7 MHz catalog (Figure 4) contains a total of 21,077 hr of observations covering the period November 1965 to March 1979. At 22.2 MHz (Figure 5) there are a total of 33,179 hr of observations collected over the same interval. These data have been included in a larger Jupiter activity catalog (reference 6) which covers the observations from a number of monitoring programs since 1957.

ACKNOWLEDGMENTS

Routine operation and maintenance of the Goddard station was managed by Mr. Josepn Seek. We also thank Mr. M. L. Kaiser and Dr. M. D. Desch for their assistance in collecting the observations. The Orroral Valley equipment was operated and maintained by the staff of the NASA/STDN Orroral Station, and we gratefully acknowledge their support.

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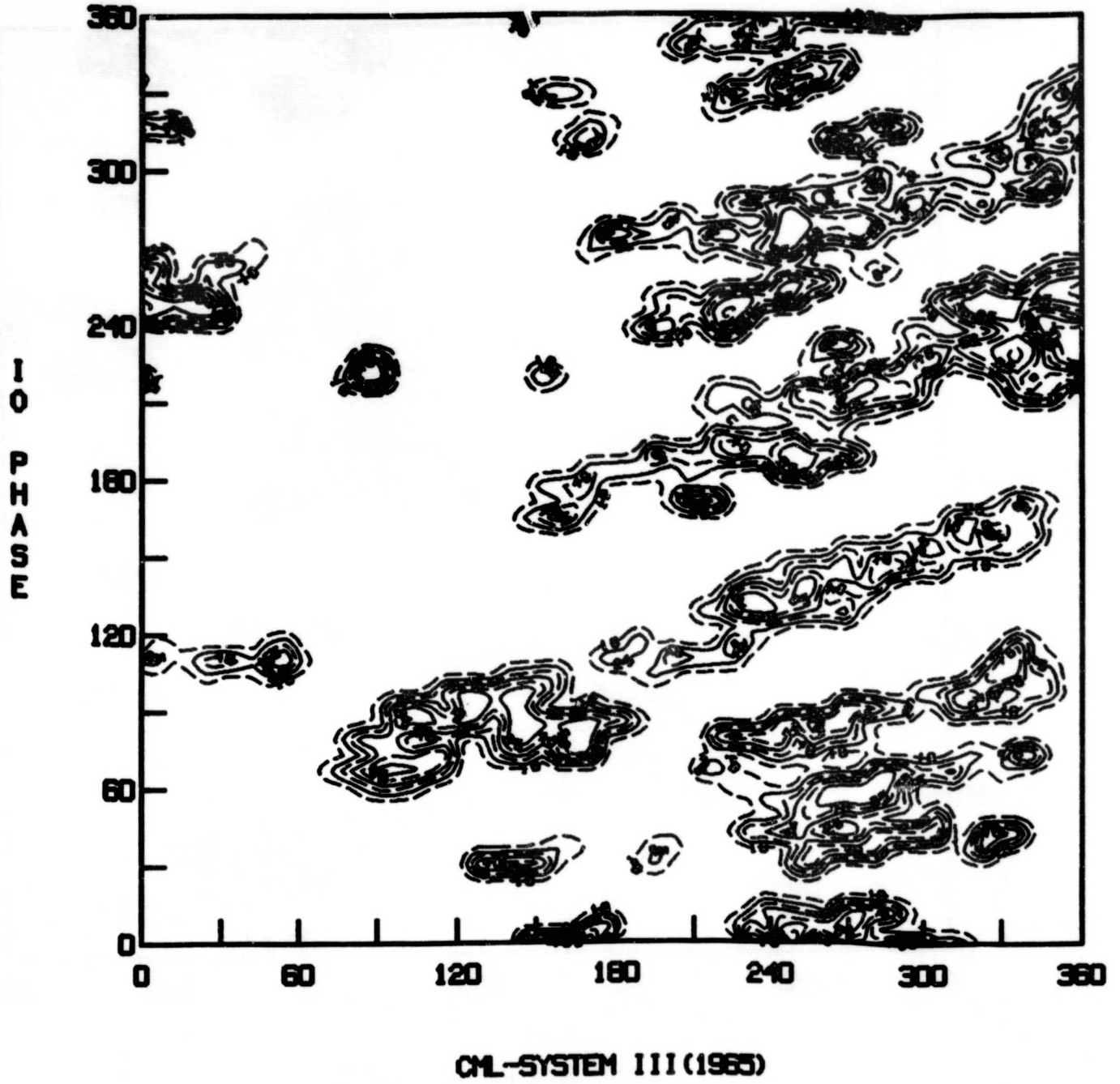

Fig. 1. Smoothed occurrence probability distribution at 16.7 MHz for the 1979 apparition as a function of System III (1965) central meridian longitude and phase of Io. Contours are plotted in 15% increments in occurrence probability beginning at a value of 10%.

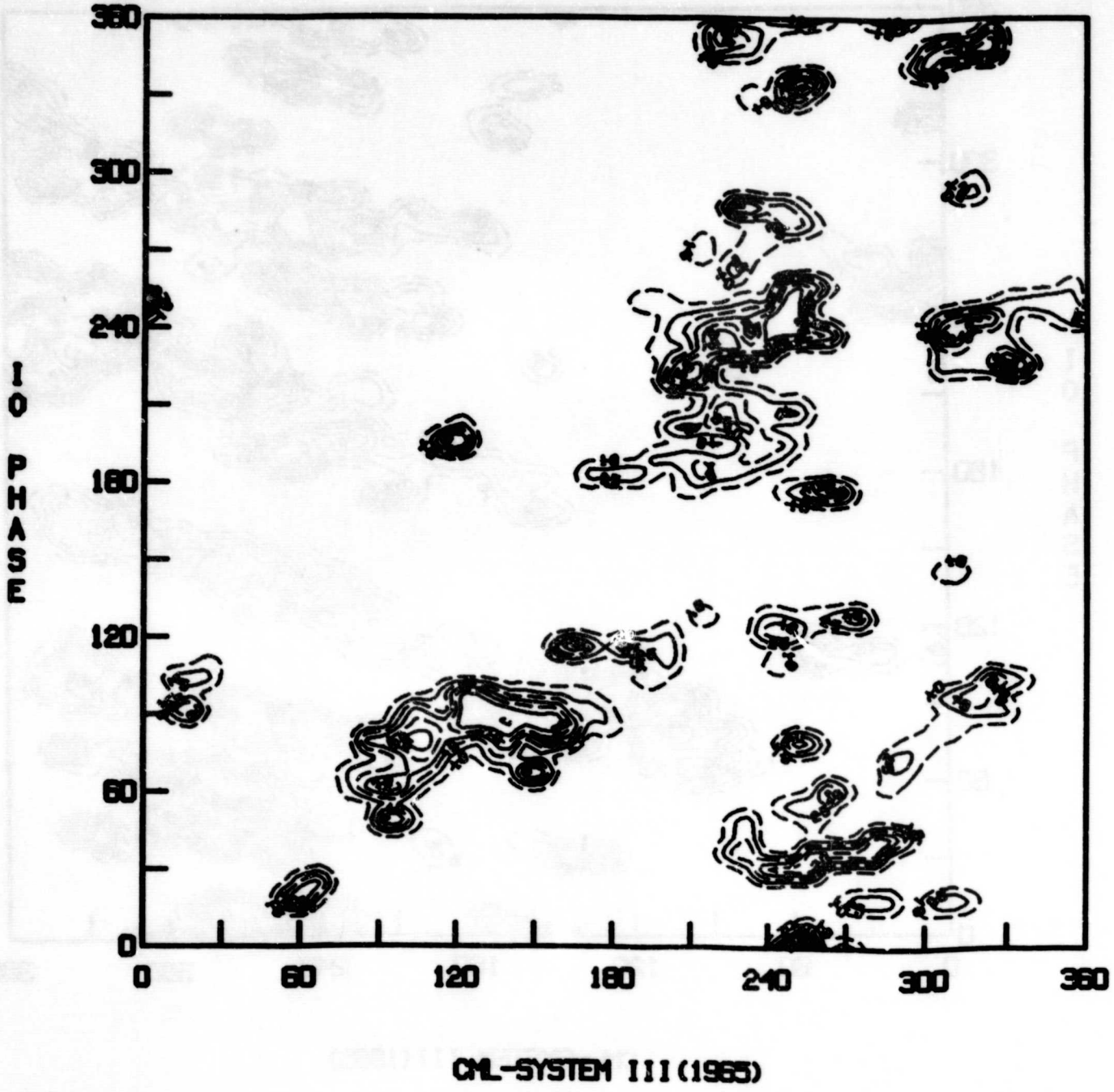

Fig. 2. Smoothed occurrence probability distribution at 22.2 MHz for the 1979 apparition as a function of System III (1965) central meridian longitude and phase of Io. Contours are plotted in 15% increments in occurrence probability beginning at a value of 10%.

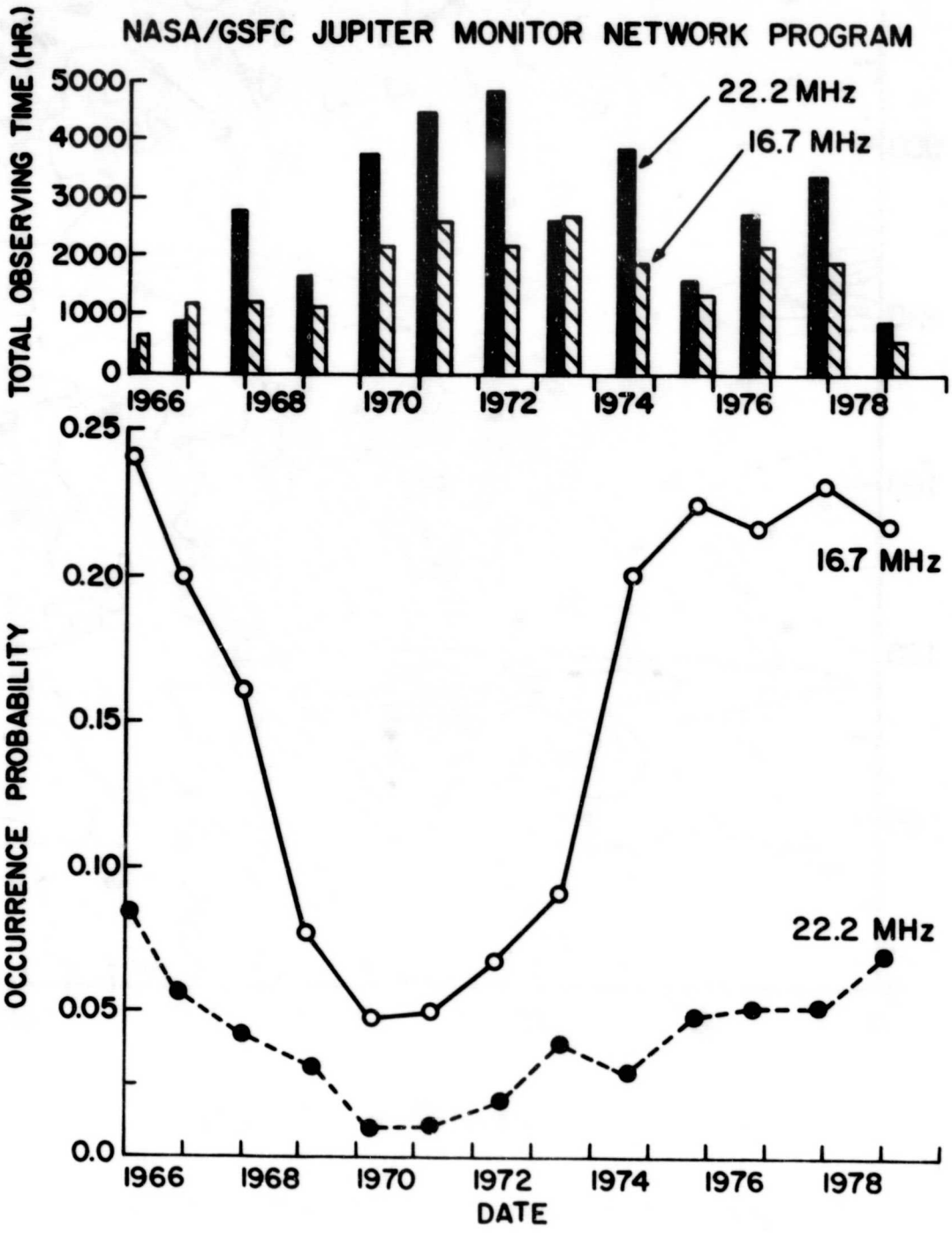

Fig. 3. (Upper panel) Total amount of observations of Jupiter at 16.7 and 22.2 MHz collected by the Jupiter Monitor Network for the apparitions of 1965 through 1979. (Lower panel) The variation of 16.7 and 22.2 MHz activity average occurrence probability as observed by the Jupiter Monitor Network between 1965 and 1979.

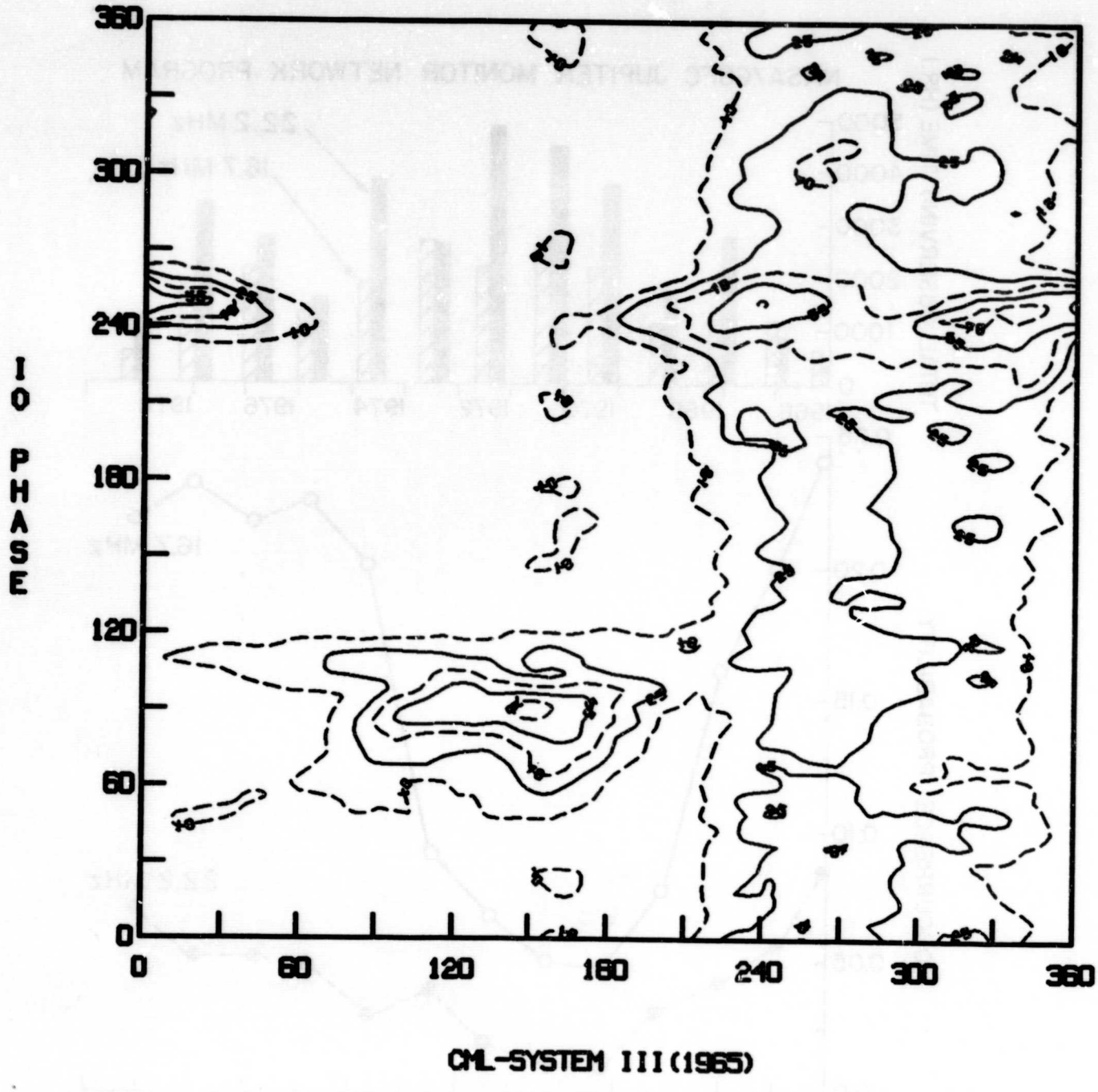

Fig. 4. Smoothed occurrence probability distribution at 16.7 MHz for the apparitions of 1965-1979 as a function of System III (1965) central meridian longitude and phase of Io from superior geocentric conjunction. Contours are plotted in 15% increments in occurrence probability beginning at a value of 10%.

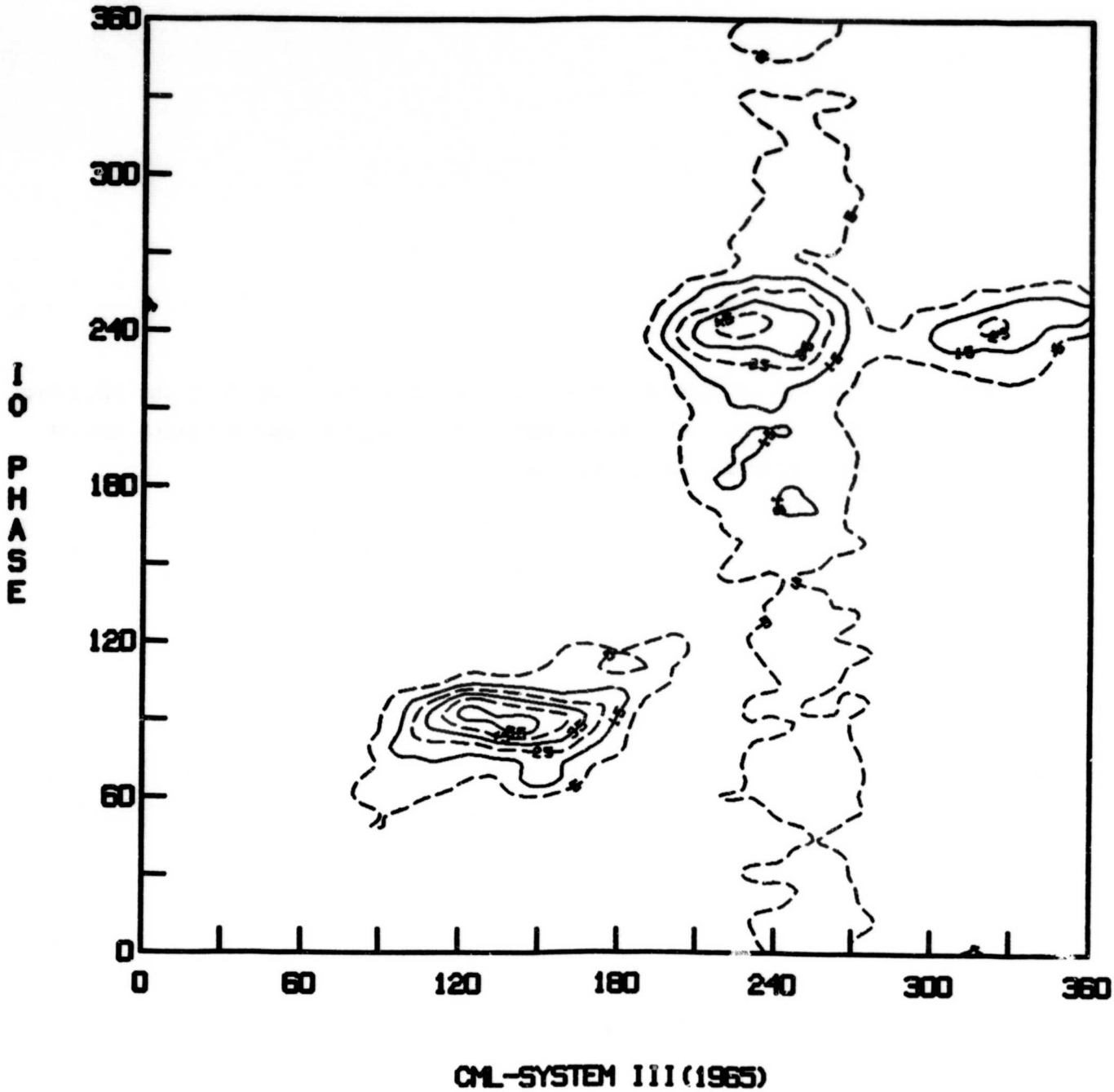

Fig. 5. Smoothed occurrence probability distribution at 22.2 MHz for the apparitions of 1965-1979 as a function of System III (1965) central meridian longitude and phase of Io from superior geocentric conjunction. Contours are plotted in 10% increments in occurrence probability beginning at a value of 5%.

Table 1. Catalog of Jupiter observations and activity at 16.7 and 22.2 MHz for the 1979 apparition obtained at Goddard Space Flight Center and Orroral Valley, Australia.

16.7 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE	TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	IO PHASE
78/11/ 3	700 - 1155	155.0 - 333.3	275.3 - 317.1			
78/11/ 9	750 - 935	8.5 - 72.0	62.6 - 77.3			
78/11/ 9	1005 - 1055	90.2 - 120.4	81.6 - 88.6			
78/11/10	635 - 1100	113.8 - 274.0	255.8 - 293.4	1025 - 1055	102.2 - 120.4	84.4 - 88.6
				810 - 915	171.2 - 210.5	269.3 - 278.5
78/11/11	630 - 745	261.3 - 306.6	98.0 - 108.5	940 - 1100	225.6 - 274.0	282.1 - 293.4
78/11/11	910 - 1105	358.0 - 67.6	120.5 - 136.7			
78/11/12	625 - 1120	48.8 - 227.2	301.5 - 343.2			
78/11/13	925 - 1100	308.2 - 5.7	169.6 - 183.1	915 - 945	151.6 - 169.8	325.6 - 329.8
78/11/13	1105 - 1135	8.7 - 26.8	183.8 - 188.1			
78/11/14	620 - 1220	347.0 - 204.6	347.7 - 38.2			
78/11/15	615 - 1035	134.5 - 291.7	189.8 - 226.8	1155 - 1220	189.5 - 204.6	34.7 - 38.2
78/11/15	1045 - 1150	297.8 - 337.0	228.3 - 237.5			
				825 - 855	213.1 - 231.2	208.3 - 212.6
78/11/16	610 - 1110	282.1 - 103.4	32.9 - 75.0	1045 - 1150	297.8 - 337.0	228.3 - 237.5
				705 - 740	315.3 - 336.5	40.6 - 45.6
78/11/17	605 - 1120	69.6 - 260.1	235.7 - 280.5	1030 - 1110	79.3 - 103.4	69.4 - 75.0
				955 - 1030	208.7 - 229.8	268.4 - 273.4
78/11/18	605 - 1120	220.2 - 50.7	78.8 - 123.2	1045 - 1120	238.9 - 260.1	275.5 - 280.5
78/11/19	600 - 1125	7.8 - 204.3	282.3 - 328.2	605 - 910	220.2 - 332.1	78.8 - 104.8
78/11/20	555 - 1120	155.4 - 351.8	124.2 - 170.2			
				755 - 1045	227.9 - 330.7	141.2 - 165.3
78/11/21	550 - 1105	302.9 - 133.4	327.9 - 12.2			
78/11/22	550 - 1150	93.5 - 311.2	170.6 - 221.8			
78/11/23	545 - 1150	241.1 - 101.8	13.9 - 65.1	955 - 1125	241.6 - 296.1	205.4 - 218.3
78/11/24	540 - 1115	28.7 - 231.2	216.5 - 264.2			
78/11/25	535 - 1015	176.3 - 345.5	59.1 - 98.5			
78/11/25	1020 - 1150	348.6 - 43.0	99.2 - 111.9			
				635 - 645	212.5 - 218.6	67.6 - 69.0
				715 - 730	236.7 - 245.8	73.2 - 75.3
				915 - 1015	309.3 - 345.5	90.0 - 98.5
				1120 - 1150	24.8 - 43.0	107.6 - 111.9
78/11/26	530 - 1130	323.8 - 181.5	262.4 - 313.4			
				1055 - 1130	160.3 - 181.5	308.5 - 313.4
78/11/27	630 - 1030	150.7 - 295.8	113.6 - 147.6			
				830 - 855	223.3 - 238.4	130.6 - 134.1

16.7 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE	TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	IO PHASE
				905 - 930	244.4 - 259.5	135.5 - 139.1
				955 - 1130	274.7 - 332.1	142.6 - 156.1
78/11/28	525 - 1110	262.0 - 110.6	308.9 - 357.5			
				525 - 615	262.0 - 292.3	308.9 - 315.9
				735 - 810	340.6 - 1.8	327.2 - 332.2
78/11/29	520 - 1120	49.6 - 267.3	150.8 - 202.0			
				805 - 840	149.4 - 170.5	174.3 - 179.2
				1000 - 1120	218.9 - 267.3	190.6 - 202.0
78/11/30	515 - 850	197.2 - 327.2	354.3 - 24.5			
78/11/30	915 - 1115	342.3 - 54.9	28.0 - 44.8			
				605 - 745	227.5 - 287.9	1.4 - 15.4
78/12/ 1	510 - 1105	344.8 - 199.5	196.7 - 247.3			
				745 - 815	78.5 - 96.7	218.8 - 223.1
78/12/ 2	510 - 1055	135.4 - 344.0	40.3 - 88.8			
				735 - 750	223.1 - 232.2	60.7 - 62.8
78/12/ 3	505 - 835	283.0 - 50.0	243.4 - 273.3			
78/12/ 3	940 - 1115	89.3 - 146.8	282.5 - 296.0			
				535 - 615	301.2 - 325.4	247.7 - 253.4
				635 - 735	337.5 - 13.7	256.2 - 264.8
78/12/ 4	500 - 1105	70.7 - 291.3	85.6 - 137.2			
				540 - 730	94.8 - 161.3	91.3 - 106.8
				945 - 1040	243.0 - 276.2	125.8 - 133.6
78/12/ 5	605 - 800	260.6 - 330.1	299.2 - 315.4			
78/12/ 5	810 - 1025	336.2 - 57.8	316.9 - 335.9			
				810 - 835	336.2 - 351.3	316.9 - 320.4
78/12/ 6	450 - 1055	5.9 - 226.6	131.2 - 183.1			
				840 - 925	144.9 - 172.1	163.9 - 170.3
78/12/ 7	505 - 1050	165.6 - 14.2	337.7 - 26.1			
				605 - 825	201.9 - 286.5	346.1 - 5.8
78/12/ 8	445 - 950	304.1 - 128.5	177.8 - 221.3			
78/12/ 8	1020 - 1050	146.7 - 164.8	225.5 - 229.8			
78/12/ 9	440 - 1100	91.7 - 321.5	20.9 - 74.3			
				545 - 640	131.0 - 164.3	30.1 - 37.8
				835 - 1100	233.8 - 321.5	53.9 - 74.3
78/12/10	435 - 1040	239.4 - 100.0	223.9 - 275.8			
				500 - 530	254.5 - 272.6	227.4 - 231.7
				600 - 610	290.8 - 296.8	236.0 - 237.4
				635 - 810	311.9 - 9.4	241.0 - 254.5
78/12/11	430 - 735	27.0 - 138.8	66.3 - 92.3			
78/12/11	810 - 1035	160.0 - 247.7	97.2 - 117.7			
				600 - 730	81.4 - 135.8	78.9 - 91.6
78/12/12	445 - 620	186.7 - 244.1	272.7 - 286.1			
78/12/12	640 - 740	256.2 - 292.5	289.0 - 297.5			
78/12/12	800 - 1030	304.6 - 35.3	300.3 - 321.4			
				555 - 620	229.0 - 244.1	282.6 - 286.1

16.7 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	OBSERVATIONS TIME(UT) HHMM - HHMM	CML III (1965.0)	IO PHASE
78/12/13	425 - 530	325.3 - 4.6	112.5 - 121.7
78/12/13	715 - 755	68.0 - 92.2	136.6 - 142.3
78/12/13	920 - 1025	143.6 - 182.9	154.3 - 163.6
78/12/14	420 - 755	112.9 - 242.9	316.3 - 346.5
78/12/14	930 - 1025	300.3 - 333.6	359.9 - 7.6
78/12/15	415 - 820	260.5 - 48.6	158.4 - 193.3
78/12/15	835 - 905	57.7 - 75.9	195.4 - 199.7
78/12/15	915 - 930	81.9 - 91.0	201.1 - 203.2
78/12/15	945 - 1020	100.0 - 121.2	205.4 - 210.4
78/12/16	410 - 1055	48.1 - 293.0	1.7 - 58.5
78/12/17	405 - 525	195.8 - 244.1	204.4 - 215.8
78/12/17	550 - 750	259.3 - 331.8	219.4 - 236.5
78/12/17	800 - 1010	337.9 - 56.5	237.9 - 256.4
78/12/18	520 - 945	31.8 - 192.0	58.3 - 95.6
78/12/18	1000 - 1020	201.1 - 213.2	97.7 - 100.6
78/12/19	400 - 510	134.1 - 175.4	251.2 - 261.2
78/12/19	550 - 615	200.6 - 215.7	266.8 - 270.4
78/12/19	650 - 1000	236.9 - 351.7	275.3 - 302.2
78/12/20	355 - 545	281.7 - 348.2	93.3 - 108.8
78/12/20	605 - 800	0.3 - 69.8	111.8 - 127.9
78/12/20	810 - 1000	75.9 - 142.4	129.3 - 145.0
78/12/21	350 - 830	69.4 - 238.7	297.1 - 336.5
78/12/21	850 - 955	250.7 - 290.0	339.3 - 348.4
78/12/22	345 - 950	217.0 - 77.7	139.1 - 191.0
78/12/23	340 - 945	4.6 - 225.3	342.6 - 33.8
78/12/24	335 - 940	152.3 - 13.0	185.1 - 237.1

ACTIVITY TIME(UT) HHMM - HHMM	CML III (1965.0)	IO PHASE
710 - 730	274.4 - 286.5	293.2 - 296.0
800 - 1000	304.6 - 17.2	300.3 - 317.2
425 - 445	325.3 - 337.3	112.5 - 115.4
910 - 1000	229.5 - 259.8	43.8 - 50.8
1020 - 1055	271.9 - 293.0	53.6 - 58.5
635 - 730	286.5 - 319.7	225.8 - 233.6
835 - 930	359.0 - 32.3	242.9 - 250.7
625 - 745	71.1 - 119.5	67.4 - 78.7
810 - 910	134.6 - 170.8	82.2 - 90.7
650 - 750	236.9 - 273.1	275.3 - 283.8
815 - 900	288.3 - 315.5	287.4 - 293.7
920 - 930	327.6 - 333.6	296.6 - 298.0
440 - 545	308.9 - 348.2	99.6 - 108.8
610 - 620	3.3 - 9.4	112.4 - 113.8
620 - 630	9.4 - 15.4	113.8 - 115.2
850 - 905	250.7 - 259.8	339.3 - 341.4
700 - 720	334.9 - 347.0	166.8 - 169.7
640 - 705	264.1 - 279.3	211.5 - 215.1
800 - 855	312.5 - 345.8	222.9 - 230.7

16.7 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE	TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	IO PHASE
78/12/25	330 - 935	299.9 - 160.6	28.0 - 79.3			
				735 - 815	88.1 - 112.3	62.4 - 68.0
				850 - 915	133.4 - 148.5	73.0 - 76.5
78/12/26	330 - 950	90.6 - 320.4	232.0 - 285.9			
				715 - 845	226.7 - 281.1	263.9 - 276.7
				935 - 950	311.3 - 320.4	283.8 - 285.9
78/12/27	325 - 830	238.3 - 62.7	74.2 - 117.3			
				340 - 430	247.3 - 277.6	76.3 - 83.4
				520 - 545	307.8 - 322.9	90.4 - 93.9
				605 - 625	335.0 - 347.1	96.8 - 99.6
				810 - 825	50.6 - 59.6	114.4 - 116.6
78/12/28	320 - 955	25.9 - 264.7	277.9 - 333.6			
				715 - 725	168.0 - 174.0	311.1 - 312.5
				840 - 900	219.4 - 231.5	323.1 - 325.9
				915 - 955	240.6 - 264.7	328.0 - 333.6
78/12/29	315 - 920	173.6 - 34.3	119.9 - 171.8			
				415 - 630	209.8 - 291.5	128.4 - 147.6
				735 - 750	330.8 - 339.8	156.9 - 159.0
78/12/30	325 - 335	330.3 - 336.3	325.7 - 327.1			
78/12/30	345 - 420	342.4 - 3.5	328.5 - 333.5			
78/12/30	435 - 745	12.6 - 127.5	335.6 - 2.2			
78/12/30	755 - 810	133.5 - 142.6	3.6 - 5.7			
78/12/30	835 - 915	157.7 - 181.9	9.3 - 14.9			
78/12/31	305 - 445	108.9 - 169.3	166.0 - 180.2			
78/12/31	450 - 620	172.4 - 226.8	180.9 - 193.7			
78/12/31	635 - 910	235.8 - 329.6	195.9 - 218.0			
				450 - 620	172.4 - 226.8	180.9 - 193.7
79/ 1/ 1	235 - 415	241.4 - 301.9	5.6 - 19.6			
79/ 1/ 1	425 - 905	307.9 - 117.2	21.0 - 60.3			
				235 - 400	241.4 - 292.8	5.6 - 17.5
79/ 1/ 2	300 - 900	47.2 - 264.9	212.8 - 264.0			
				400 - 415	83.5 - 92.6	221.4 - 223.5
				700 - 725	192.3 - 207.4	247.0 - 250.5
79/ 1/ 3	255 - 525	194.9 - 265.6	55.2 - 76.4			
79/ 1/ 3	740 - 855	7.2 - 52.5	95.4 - 106.0			
79/ 1/ 4	250 - 525	342.5 - 76.2	258.9 - 280.8			
79/ 1/ 4	615 - 855	106.5 - 203.2	287.9 - 310.5			
79/ 1/ 5	250 - 445	133.2 - 202.7	101.6 - 117.9			
79/ 1/ 5	510 - 855	217.8 - 353.9	121.4 - 153.4			
				355 - 425	172.5 - 190.6	110.8 - 115.1
				535 - 600	233.0 - 248.1	125.0 - 128.5
79/ 1/ 6	420 - 600	338.3 - 38.8	318.8 - 332.8			
79/ 1/ 6	620 - 845	50.9 - 138.5	335.6 - 356.0			
79/ 1/ 7	235 - 840	65.5 - 286.2	146.9 - 198.9			
				629 - 650	201.5 - 219.7	178.9 - 183.2

16.7 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE
79/ 1/ 8	230 - 550	213.2 - 334.1	350.2 - 18.3
79/ 1/ 8	655 - 715	13.4 - 25.5	27.4 - 30.2
79/ 1/ 8	725 - 835	31.5 - 73.8	31.6 - 41.4
79/ 1/ 9	230 - 310	3.8 - 28.0	193.8 - 199.5
79/ 1/ 9	340 - 605	46.2 - 133.8	203.7 - 224.4
79/ 1/ 9	705 - 940	170.1 - 263.8	232.9 - 254.9
79/ 1/10	225 - 725	151.5 - 332.9	36.4 - 78.6
79/ 1/11	220 - 705	299.1 - 111.5	239.9 - 280.3
79/ 1/11	725 - 820	123.6 - 156.8	283.1 - 290.9
79/ 1/12	215 - 610	86.8 - 228.9	82.0 - 115.2
79/ 1/12	640 - 820	247.0 - 307.5	119.5 - 133.7
79/ 1/13	210 - 605	234.5 - 16.6	285.8 - 318.9
79/ 1/13	620 - 720	25.6 - 61.9	321.0 - 329.5
79/ 1/13	750 - 815	80.0 - 95.2	333.7 - 337.2
79/ 1/14	205 - 255	22.1 - 52.4	127.9 - 135.0
79/ 1/14	340 - 810	79.6 - 242.8	141.4 - 179.8
79/ 1/15	235 - 805	190.9 - 30.5	336.3 - 22.6
79/ 1/16	155 - 220	317.4 - 332.6	174.0 - 177.6
79/ 1/16	245 - 800	347.7 - 178.1	181.2 - 226.0
79/ 1/17	150 - 205	105.1 - 114.2	16.9 - 19.0
79/ 1/17	220 - 755	123.2 - 325.8	21.1 - 68.2
79/ 1/18	145 - 620	252.7 - 59.0	220.2 - 259.3
79/ 1/18	635 - 750	68.1 - 113.4	261.4 - 272.0
79/ 1/19	140 - 405	40.4 - 128.1	62.4 - 82.9
79/ 1/19	605 - 650	200.6 - 227.8	99.9 - 106.2
79/ 1/20	325 - 740	254.6 - 48.7	281.8 - 317.7
79/ 1/21	135 - 710	338.7 - 181.3	108.9 - 156.6
79/ 1/21	715 - 735	184.3 - 196.4	157.3 - 160.1
79/ 1/22	130 - 220	126.4 - 156.6	312.6 - 319.7
79/ 1/22	240 - 735	168.7 - 347.1	322.5 - 3.9

TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	IO PHASE
720 - 800	237.8 - 262.0	187.5 - 193.2
735 - 940	188.2 - 263.8	237.2 - 254.9
515 - 620	254.3 - 293.6	60.3 - 69.4
235 - 405	308.2 - 2.6	242.0 - 254.8
440 - 515	23.8 - 45.0	259.8 - 264.7
215 - 415	86.8 - 159.4	82.0 - 98.9
505 - 610	189.6 - 228.9	106.0 - 115.2
700 - 730	200.5 - 218.6	169.9 - 174.1
320 - 405	218.1 - 245.4	342.7 - 349.0
440 - 600	266.5 - 314.9	353.9 - 5.1
715 - 725	150.9 - 157.0	219.6 - 221.6
510 - 525	226.0 - 235.1	45.0 - 47.1
550 - 645	250.2 - 283.5	50.6 - 58.3
350 - 405	328.3 - 337.4	238.0 - 240.1
420 - 530	346.5 - 28.8	242.2 - 252.2

16.7 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE	TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	IO PHASE
79/ 1/23	200 - 535	295.2 - 65.2	160.0 - 190.7			
79/ 1/23	550 - 730	74.3 - 134.7	192.8 - 207.0			
				220 - 310	307.3 - 337.5	162.9 - 170.0
79/ 1/25	145 - 625	227.5 - 36.8	205.5 - 245.3			
79/ 1/25	645 - 720	48.8 - 70.0	248.1 - 253.1			
				145 - 355	227.5 - 306.1	205.5 - 224.0
				420 - 455	321.2 - 342.3	227.6 - 232.5
				550 - 625	15.6 - 36.8	240.3 - 245.3
79/ 1/26	210 - 305	33.2 - 66.5	52.1 - 59.8			
79/ 1/26	320 - 715	75.6 - 217.7	61.9 - 95.1			
				340 - 430	87.7 - 117.9	64.7 - 71.8
				510 - 625	142.1 - 187.4	77.4 - 88.0
79/ 1/27	120 - 145	153.7 - 168.8	249.4 - 253.0			
79/ 1/27	155 - 710	174.8 - 5.3	254.4 - 298.9			
				330 - 410	232.3 - 256.5	267.8 - 273.5
				430 - 520	268.6 - 298.8	276.3 - 283.4
				600 - 645	323.0 - 350.2	289.0 - 295.4
79/ 1/28	135 - 250	313.4 - 358.8	94.3 - 104.9			
79/ 1/28	300 - 355	4.8 - 38.1	106.3 - 114.1			
79/ 1/28	410 - 705	47.1 - 152.9	116.3 - 141.1			
				330 - 355	22.9 - 38.1	110.6 - 114.1
79/ 1/29	220 - 300	131.3 - 155.5	305.1 - 310.7			
79/ 1/29	310 - 655	161.5 - 297.5	312.1 - 343.7			
				450 - 610	222.0 - 270.3	326.2 - 337.4
79/ 1/31	615 - 640	214.7 - 229.8	25.0 - 28.5			
79/ 2/ 1	220 - 645	223.2 - 23.5	195.8 - 233.5			
				320 - 425	259.5 - 298.8	204.3 - 213.6
				510 - 540	326.0 - 344.2	220.0 - 224.2
79/ 2/ 2	315 - 525	47.2 - 125.8	46.6 - 64.9			
79/ 2/ 2	600 - 645	146.9 - 174.1	69.9 - 76.2			
				615 - 645	156.0 - 174.1	72.0 - 76.2
79/ 2/ 3	230 - 340	170.6 - 212.9	244.7 - 254.6			
79/ 2/ 3	350 - 610	219.0 - 303.6	256.0 - 275.8			
79/ 2/ 3	650 - 755	327.8 - 7.1	281.4 - 290.6			
79/ 2/ 3	810 - 835	16.2 - 31.3	292.7 - 296.2			
79/ 2/ 4	300 - 535	339.4 - 73.1	91.6 - 113.6			
79/ 2/ 4	645 - 710	115.4 - 130.5	123.6 - 127.1			
79/ 2/ 4	730 - 830	142.6 - 178.9	130.0 - 138.5			
				450 - 515	45.9 - 61.0	107.2 - 110.8
79/ 2/ 5	410 - 825	172.4 - 326.5	305.9 - 341.7			
79/ 2/ 6	430 - 740	335.1 - 90.0	151.9 - 179.0			
79/ 2/ 7	245 - 815	62.2 - 261.8	340.9 - 27.2			
				500 - 600	143.9 - 180.1	359.8 - 8.2
79/ 2/ 8	225 - 500	200.8 - 294.5	181.7 - 203.8			
79/ 2/ 8	550 - 710	324.7 - 13.1	210.9 - 222.2			

16.7 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	OBSERVATIONS TIME(UT) HHMM - HHMM	CML III (1965.0)	IO PHASE
79/ 2/ 9	230 - 535	354.4 - 106.3	25.6 - 51.6
79/ 2/ 9	545 - 610	112.3 - 127.5	53.0 - 56.6
79/ 2/ 9	635 - 715	142.6 - 166.8	60.1 - 65.7
79/ 2/10	325 - 450	178.3 - 229.7	237.7 - 249.7
79/ 2/10	510 - 750	241.8 - 338.5	252.6 - 275.2
79/ 2/11	315 - 605	322.9 - 65.7	79.0 - 103.1
79/ 2/12	325 - 350	119.6 - 134.7	284.9 - 288.4
79/ 2/12	430 - 555	158.9 - 210.3	294.0 - 306.0
79/ 2/13	510 - 720	333.7 - 52.3	142.7 - 161.3
79/ 2/13	735 - 750	61.4 - 70.4	163.4 - 165.5
79/ 2/14	405 - 605	85.0 - 157.6	337.4 - 354.2
79/ 2/14	700 - 845	190.8 - 254.3	1.9 - 16.7
79/ 2/15	300 - 525	196.3 - 284.0	171.8 - 192.4
79/ 2/15	630 - 740	323.3 - 5.6	201.7 - 211.7
79/ 2/17	510 - 545	216.1 - 237.3	237.7 - 242.7
79/ 2/18	340 - 500	312.3 - 0.7	67.7 - 79.0
79/ 2/19	525 - 545	166.4 - 178.5	287.0 - 289.8
79/ 2/19	615 - 635	196.6 - 208.7	294.0 - 296.8
79/ 2/21	450 - 630	86.4 - 146.9	328.9 - 342.9
79/ 2/23	320 - 345	333.2 - 348.3	3.0 - 6.5
79/ 2/23	400 - 520	357.4 - 45.8	8.6 - 19.9
79/ 2/24	330 - 525	129.8 - 199.4	208.5 - 224.9
79/ 2/24	640 - 705	244.7 - 259.8	235.5 - 239.0
79/ 2/25	425 - 540	313.7 - 359.0	59.1 - 69.7
79/ 2/25	600 - 645	11.1 - 38.3	72.5 - 78.9
79/ 2/28	155 - 240	314.7 - 341.9	289.4 - 295.7
79/ 2/28	345 - 400	21.2 - 30.3	304.8 - 306.9
79/ 2/28	420 - 450	42.4 - 60.5	309.7 - 313.9
79/ 3/ 1	415 - 455	189.9 - 214.1	152.3 - 158.0
79/ 3/ 4	315 - 455	245.3 - 305.7	34.1 - 48.2

ACTIVITY TIME(UT) HHMM - HHMM	CML III (1965.0)	IO PHASE
300 - 350	221.9 - 252.2	186.7 - 193.8
600 - 655	330.8 - 4.0	212.3 - 220.1
430 - 450	217.6 - 229.7	246.9 - 249.7
510 - 545	241.8 - 263.0	252.6 - 257.5
605 - 620	275.1 - 284.1	260.4 - 262.5
800 - 845	227.1 - 254.3	10.3 - 16.7
415 - 510	241.7 - 274.9	182.5 - 190.3
510 - 540	216.1 - 234.3	237.7 - 242.0
405 - 430	327.4 - 342.6	71.2 - 74.8
315 - 455	245.3 - 305.7	34.1 - 48.2

22.2 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	OBSERVATIONS TIME(UT) HHMM - HHMM	CML III (1965.0)	IO PHASE	ACTIVITY TIME(UT) HHMM - HHMM	CML III (1965.0)	IO PHASE
78/11/15	615 - 1150	134.5 - 337.0	189.8 - 237.5			
				825 - 905	213.1 - 237.3	208.3 - 214.0
78/11/16	610 - 1110	282.1 - 103.4	32.9 - 75.0			
78/11/17	605 - 1105	69.6 - 251.0	235.7 - 278.4			
				955 - 1010	208.7 - 217.8	268.4 - 270.6
				1050 - 1105	241.9 - 251.0	276.3 - 278.4
78/11/18	605 - 1105	220.2 - 41.6	78.8 - 121.0			
				820 - 915	301.8 - 335.1	97.8 - 105.5
78/11/19	600 - 1125	7.8 - 204.3	282.3 - 328.2			
78/11/20	555 - 1105	155.4 - 342.8	124.2 - 168.1			
78/11/20	1115 - 1140	348.8 - 3.9	169.5 - 173.1			
78/11/21	550 - 1105	302.9 - 133.4	327.9 - 12.2			
78/11/22	550 - 1120	93.5 - 293.0	170.6 - 217.5			
				910 - 1015	214.4 - 253.7	199.0 - 208.3
78/11/23	545 - 1125	241.1 - 86.7	13.9 - 61.6			
78/11/24	540 - 1100	28.7 - 222.1	216.5 - 262.1			
78/11/24	1120 - 1140	234.2 - 246.3	264.9 - 267.7			
78/11/25	535 - 1130	176.3 - 30.9	59.1 - 109.0			
				900 - 950	300.2 - 330.4	87.9 - 95.0
				1100 - 1130	12.7 - 30.9	104.8 - 109.0
78/11/26	530 - 1115	323.8 - 172.4	262.4 - 311.3			
78/11/27	530 - 1125	114.4 - 329.1	105.2 - 155.4			
				640 - 710	156.8 - 174.9	115.1 - 119.3
				810 - 820	211.2 - 217.2	127.8 - 129.2
78/11/28	525 - 1110	262.0 - 110.6	308.9 - 357.5			
78/11/29	520 - 1110	49.6 - 261.2	150.8 - 200.6			
				1015 - 1055	228.0 - 252.2	192.8 - 198.4
78/11/30	515 - 1115	197.2 - 54.9	354.3 - 44.8			
				625 - 655	239.5 - 257.7	4.2 - 8.4
				800 - 830	297.0 - 315.1	17.5 - 21.7
78/12/ 1	510 - 1115	344.8 - 205.5	196.7 - 248.7			
78/12/ 2	510 - 1110	135.4 - 353.1	40.3 - 90.9			
78/12/ 3	505 - 1125	283.0 - 152.8	243.4 - 297.4			
78/12/ 4	500 - 1105	70.7 - 291.3	85.6 - 137.2			
				550 - 655	100.9 - 140.2	92.7 - 101.8
78/12/ 5	605 - 1100	260.6 - 78.9	299.2 - 340.8			
78/12/ 6	450 - 1055	5.9 - 226.6	131.2 - 183.1			
				1015 - 1035	202.4 - 214.5	177.4 - 180.2
78/12/ 7	450 - 1050	156.5 - 14.2	335.6 - 26.1			
				625 - 805	213.9 - 274.4	348.9 - 3.0
78/12/ 8	445 - 950	304.1 - 128.5	177.8 - 221.3			
78/12/ 8	1020 - 1050	146.7 - 164.8	225.5 - 229.8			
78/12/ 9	540 - 1045	128.0 - 312.4	29.4 - 72.2			
				820 - 835	224.8 - 233.8	51.8 - 53.9
				850 - 935	242.9 - 270.1	56.0 - 62.3

16.7 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE
79/ 2/ 9	230 - 535	354.4 - 106.3	25.6 - 51.6
79/ 2/ 9	545 - 610	112.3 - 127.5	53.0 - 56.6
79/ 2/ 9	635 - 715	142.6 - 166.8	60.1 - 65.7
79/ 2/10	325 - 450	178.3 - 229.7	237.7 - 249.7
79/ 2/10	510 - 750	241.8 - 338.5	252.6 - 275.2
79/ 2/11	315 - 605	322.9 - 65.7	79.0 - 103.1
79/ 2/12	325 - 350	119.6 - 134.7	284.9 - 288.4
79/ 2/12	430 - 555	158.9 - 210.3	294.0 - 306.0
79/ 2/13	510 - 720	333.7 - 52.3	142.7 - 161.3
79/ 2/13	735 - 750	61.4 - 70.4	163.4 - 165.5
79/ 2/14	405 - 605	85.0 - 157.6	337.4 - 354.2
79/ 2/14	700 - 845	190.8 - 254.3	1.9 - 16.7
79/ 2/15	300 - 525	196.3 - 284.0	171.8 - 192.4
79/ 2/15	630 - 740	323.3 - 5.6	201.7 - 211.7
79/ 2/17	510 - 545	216.1 - 237.3	237.7 - 242.7
79/ 2/18	340 - 500	312.3 - 0.7	67.7 - 79.0
79/ 2/19	525 - 545	166.4 - 178.5	287.0 - 289.8
79/ 2/19	615 - 635	196.6 - 208.7	294.0 - 296.8
79/ 2/21	450 - 630	86.4 - 146.9	328.9 - 342.9
79/ 2/23	320 - 345	333.2 - 348.3	3.0 - 6.5
79/ 2/23	400 - 520	357.4 - 45.8	8.6 - 19.9
79/ 2/24	330 - 525	129.8 - 199.4	208.5 - 224.9
79/ 2/24	640 - 705	244.7 - 259.8	235.5 - 239.0
79/ 2/25	425 - 540	313.7 - 359.0	59.1 - 69.7
79/ 2/25	600 - 645	11.1 - 38.3	72.5 - 78.9
79/ 2/28	155 - 240	314.7 - 341.9	289.4 - 295.7
79/ 2/28	345 - 400	21.2 - 30.3	304.8 - 306.9
79/ 2/28	420 - 450	42.4 - 60.5	309.7 - 313.9
79/ 3/ 1	415 - 455	189.9 - 214.1	152.3 - 158.0
79/ 3/ 4	315 - 455	245.3 - 305.7	34.1 - 48.2

TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	IO PHASE
300 - 350	221.9 - 252.2	186.7 - 193.8
600 - 655	330.8 - 4.0	212.3 - 220.1
430 - 450	217.6 - 229.7	246.9 - 249.7
510 - 545	241.8 - 263.0	252.6 - 257.5
605 - 620	275.1 - 284.1	260.4 - 262.5
800 - 845	227.1 - 254.3	10.3 - 16.7
415 - 510	241.7 - 274.9	182.5 - 190.3
510 - 540	216.1 - 234.3	237.7 - 242.0
405 - 430	327.4 - 342.6	71.2 - 74.8
315 - 455	245.3 - 305.7	34.1 - 48.2

22.2 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	OBSERVATIONS TIME(UT) HHMM - HHMM	CML III (1965.0)	IO PHASE	ACTIVITY TIME(UT) HHMM - HHMM	CML III (1965.0)	IO PHASE
78/11/15	615 - 1150	134.5 - 337.0	189.8 - 237.5			
				825 - 905	213.1 - 237.3	208.3 - 214.0
78/11/16	610 - 1110	282.1 - 103.4	32.9 - 75.0			
78/11/17	605 - 1105	69.6 - 251.0	235.7 - 278.4			
				955 - 1010	208.7 - 217.8	268.4 - 270.6
				1050 - 1105	241.9 - 251.0	276.3 - 278.4
78/11/18	605 - 1105	220.2 - 41.6	78.8 - 121.0			
				820 - 915	301.8 - 335.1	97.8 - 105.5
78/11/19	600 - 1125	7.8 - 204.3	282.3 - 328.2			
78/11/20	555 - 1105	155.4 - 342.8	124.2 - 168.1			
78/11/20	1115 - 1140	348.8 - 3.9	169.5 - 173.1			
78/11/21	550 - 1105	302.9 - 133.4	327.9 - 12.2			
78/11/22	550 - 1120	93.5 - 293.0	170.6 - 217.5			
				910 - 1015	214.4 - 253.7	199.0 - 208.3
78/11/23	545 - 1125	241.1 - 86.7	13.9 - 61.6			
78/11/24	540 - 1100	28.7 - 222.1	216.5 - 262.1			
78/11/24	1120 - 1140	234.2 - 246.3	264.9 - 267.7			
78/11/25	535 - 1130	176.3 - 30.9	59.1 - 109.0			
				900 - 950	300.2 - 330.4	87.9 - 95.0
				1100 - 1130	12.7 - 30.9	104.8 - 109.0
78/11/26	530 - 1115	323.8 - 172.4	262.4 - 311.3			
78/11/27	530 - 1125	114.4 - 329.1	105.2 - 155.4			
				640 - 710	156.8 - 174.9	115.1 - 119.3
				810 - 820	211.2 - 217.2	127.8 - 129.2
78/11/28	525 - 1110	262.0 - 110.6	308.9 - 357.5			
78/11/29	520 - 1110	49.6 - 261.2	150.8 - 200.6			
				1015 - 1055	228.0 - 252.2	192.8 - 198.4
78/11/30	515 - 1115	197.2 - 54.9	354.3 - 44.8			
				625 - 655	239.5 - 257.7	4.2 - 8.4
				800 - 830	297.0 - 315.1	17.5 - 21.7
78/12/ 1	510 - 1115	344.8 - 205.5	196.7 - 248.7			
78/12/ 2	510 - 1110	135.4 - 353.1	40.3 - 90.9			
78/12/ 3	505 - 1125	283.0 - 152.8	243.4 - 297.4			
78/12/ 4	500 - 1105	70.7 - 291.3	85.6 - 137.2			
				550 - 655	100.9 - 140.2	92.7 - 101.8
78/12/ 5	605 - 1100	260.6 - 78.9	299.2 - 340.8			
78/12/ 6	450 - 1055	5.9 - 226.6	131.2 - 183.1			
				1015 - 1035	202.4 - 214.5	177.4 - 180.2
78/12/ 7	450 - 1050	156.5 - 14.2	335.6 - 26.1			
				625 - 805	213.9 - 274.4	348.9 - 3.0
78/12/ 8	445 - 950	304.1 - 128.5	177.8 - 221.3			
78/12/ 8	1020 - 1050	146.7 - 164.8	225.5 - 229.8			
78/12/ 9	540 - 1045	128.0 - 312.4	29.4 - 72.2			
				820 - 835	224.8 - 233.8	51.8 - 53.9
				850 - 935	242.9 - 270.1	56.0 - 62.3

22.2 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE
78/12/10	435 - 1040	239.4 - 100.0	223.9 - 275.8
78/12/11	430 - 750	27.0 - 147.9	66.3 - 94.4
78/12/11	800 - 1035	153.9 - 247.7	95.8 - 117.7
78/12/12	425 - 1030	174.6 - 35.3	269.8 - 321.4
78/12/13	425 - 1025	325.3 - 182.9	112.5 - 163.6
78/12/14	420 - 935	112.9 - 303.3	316.3 - 0.6
78/12/14	945 - 1025	309.4 - 333.6	2.0 - 7.6
78/12/15	415 - 1020	260.5 - 121.2	158.4 - 210.4
78/12/16	410 - 1015	48.1 - 268.8	1.7 - 52.9
78/12/17	405 - 1010	195.8 - 56.5	204.4 - 256.4
78/12/18	400 - 1005	343.4 - 204.1	47.1 - 98.4
78/12/19	400 - 1000	134.1 - 351.7	251.2 - 302.2
78/12/20	355 - 1000	281.7 - 142.4	93.3 - 145.0
78/12/21	350 - 955	69.4 - 290.0	297.1 - 348.4
78/12/22	345 - 950	217.0 - 77.7	139.1 - 191.0
78/12/23	340 - 945	4.6 - 225.3	342.6 - 33.8
78/12/24	335 - 940	152.3 - 13.0	185.1 - 237.1
78/12/25	330 - 935	299.9 - 160.6	28.0 - 79.3
78/12/26	330 - 930	90.6 - 308.3	232.0 - 283.1
78/12/27	325 - 930	238.3 - 99.0	74.2 - 125.8
78/12/28	320 - 930	25.9 - 249.6	277.9 - 330.1
78/12/29	315 - 920	173.6 - 34.3	119.9 - 171.8
78/12/30	310 - 915	321.2 - 181.9	323.6 - 14.9
78/12/31	305 - 910	108.9 - 329.6	166.0 - 218.0
79/ 1/ 1	300 - 415	256.5 - 301.9	9.1 - 19.6
79/ 1/ 1	425 - 905	307.9 - 117.2	21.0 - 60.3
79/ 1/ 2	300 - 900	47.2 - 264.9	212.8 - 264.0

TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	IO PHASE
950 - 1010	279.2 - 291.3	64.4 - 67.2
615 - 655	299.8 - 324.0	238.1 - 243.8
605 - 650	84.4 - 111.6	79.6 - 86.0
700 - 750	117.7 - 147.9	87.4 - 94.4
550 - 625	226.0 - 247.2	281.9 - 286.9
700 - 735	301.6 - 322.7	229.4 - 234.4
635 - 755	77.1 - 125.5	68.9 - 80.1
810 - 920	134.6 - 176.9	82.2 - 92.1
640 - 720	230.8 - 255.0	273.9 - 279.6
850 - 905	309.4 - 318.5	292.3 - 294.4
445 - 505	311.9 - 324.0	100.3 - 103.2
540 - 550	227.9 - 233.9	203.0 - 204.4
820 - 835	324.6 - 333.7	225.7 - 227.9
715 - 820	76.0 - 115.3	59.6 - 68.8
845 - 905	130.4 - 142.5	72.3 - 75.1
710 - 725	223.6 - 232.7	263.2 - 265.4
920 - 930	243.6 - 249.6	328.7 - 330.1
440 - 600	166.3 - 214.7	179.5 - 190.9

22.2 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE
79/ 1/ 3	255 - 640	194.9 - 330.9	55.2 - 86.9
79/ 1/ 3	655 - 855	340.0 - 52.5	89.0 - 106.0
79/ 1/ 4	250 - 855	342.5 - 203.2	258.9 - 310.5
79/ 1/ 5	250 - 855	133.2 - 353.9	101.6 - 153.4
79/ 1/ 6	240 - 845	277.8 - 138.5	304.7 - 356.0
79/ 1/ 7	235 - 840	65.5 - 286.2	146.9 - 198.9
79/ 1/ 8	245 - 325	222.2 - 246.4	352.3 - 357.9
79/ 1/ 8	350 - 835	261.5 - 73.8	1.5 - 41.4
79/ 1/ 9	230 - 930	3.8 - 257.8	193.8 - 253.5
79/ 1/10	225 - 825	151.5 - 9.2	36.4 - 87.1
79/ 1/11	220 - 820	299.1 - 156.8	239.9 - 290.9
79/ 1/12	220 - 820	89.8 - 307.5	82.7 - 133.7
79/ 1/13	210 - 815	234.5 - 95.2	285.8 - 337.2
79/ 1/14	205 - 345	22.1 - 82.6	127.9 - 142.1
79/ 1/14	400 - 650	91.7 - 194.4	144.2 - 168.4
79/ 1/14	735 - 810	221.7 - 242.8	174.9 - 179.8
79/ 1/15	200 - 805	169.8 - 30.5	331.4 - 22.6
79/ 1/16	255 - 800	353.7 - 178.1	182.6 - 226.0
79/ 1/17	150 - 520	105.1 - 232.1	16.9 - 46.4
79/ 1/17	525 - 755	235.1 - 325.8	47.1 - 68.2
79/ 1/18	145 - 750	252.7 - 113.4	220.2 - 272.0
79/ 1/19	140 - 430	40.4 - 143.2	62.4 - 86.4
79/ 1/19	500 - 745	161.3 - 261.1	90.7 - 114.0
79/ 1/20	140 - 740	191.1 - 48.7	266.9 - 317.7
79/ 1/21	135 - 735	338.7 - 196.4	108.9 - 160.1
79/ 1/22	130 - 735	126.4 - 347.1	312.6 - 3.9

TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	IO PHASE
655 - 715	189.3 - 201.4	246.3 - 249.1
520 - 550	282.5 - 300.7	75.6 - 79.9
435 - 450	196.7 - 205.8	116.5 - 118.6
535 - 555	233.0 - 245.1	125.0 - 127.8
635 - 715	210.6 - 234.8	181.1 - 186.8
750 - 850	197.3 - 233.6	239.3 - 247.8
900 - 930	239.6 - 257.8	249.3 - 253.5
520 - 530	257.3 - 263.3	61.0 - 62.4
220 - 350	299.1 - 353.6	239.9 - 252.7
225 - 405	92.9 - 153.3	83.4 - 97.5
505 - 530	189.6 - 204.7	106.0 - 109.6
315 - 345	215.1 - 233.3	342.0 - 346.2
450 - 520	272.6 - 290.7	355.3 - 359.5
510 - 520	226.0 - 232.1	45.0 - 46.4
555 - 605	253.2 - 259.3	51.3 - 52.7
340 - 350	322.3 - 328.3	236.6 - 238.0
420 - 455	346.5 - 7.6	242.2 - 247.2
325 - 345	103.9 - 116.0	77.2 - 80.1
410 - 430	131.1 - 143.2	83.6 - 86.4

22.2 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE	TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	IO PHASE
79/ 1/23	125 - 730	274.0 - 134.7	155.0 - 207.0			
79/ 1/25	140 - 720	224.4 - 70.0	204.8 - 253.1			
				200 - 220	236.5 - 248.6	207.6 - 210.5
				345 - 435	300.0 - 330.2	222.6 - 229.7
79/ 1/26	125 - 515	6.0 - 145.1	45.7 - 78.2			
				335 - 415	84.6 - 108.8	64.0 - 69.7
79/ 1/26	525 - 715	151.1 - 217.7	79.6 - 95.1			
				525 - 545	151.1 - 163.2	79.6 - 82.4
				605 - 615	175.3 - 181.4	85.2 - 86.6
79/ 1/27	150 - 710	171.8 - 5.3	253.7 - 298.9			
79/ 1/28	120 - 705	304.3 - 152.9	92.2 - 141.1			
79/ 1/29	220 - 655	131.3 - 297.5	305.1 - 343.7			
				500 - 510	228.0 - 234.1	327.6 - 329.0
				525 - 550	243.1 - 258.2	331.1 - 334.6
79/ 1/30	130 - 500	251.7 - 18.7	141.0 - 170.9			
79/ 1/30	510 - 655	24.7 - 88.2	172.4 - 187.3			
79/ 1/31	305 - 535	99.8 - 190.5	358.3 - 19.3			
79/ 1/31	550 - 650	199.6 - 235.8	21.4 - 29.9			
79/ 2/ 1	220 - 520	223.2 - 332.1	195.8 - 221.4			
79/ 2/ 1	535 - 645	341.1 - 23.5	223.5 - 233.5			
79/ 2/ 2	150 - 510	355.8 - 116.7	34.6 - 62.8			
79/ 2/ 2	520 - 640	122.7 - 171.1	64.2 - 75.5			
				555 - 615	143.9 - 156.0	69.1 - 72.0
79/ 2/ 3	230 - 835	170.6 - 31.3	244.7 - 296.2			
79/ 2/ 4	225 - 830	318.2 - 178.9	86.7 - 138.5			
79/ 2/ 5	300 - 825	130.0 - 326.5	296.1 - 341.7			
79/ 2/ 6	230 - 820	262.5 - 114.1	134.8 - 184.7			
				335 - 350	301.8 - 310.9	144.1 - 146.2
79/ 2/ 7	215 - 525	44.1 - 159.0	336.7 - 3.3			
79/ 2/ 7	540 - 815	168.0 - 261.8	5.4 - 27.2			
79/ 2/ 8	210 - 815	191.7 - 52.4	179.5 - 231.5			
79/ 2/ 9	230 - 605	354.4 - 124.4	25.6 - 55.9			
				510 - 530	91.2 - 103.3	48.1 - 50.9
79/ 2/ 9	635 - 810	142.6 - 200.0	60.1 - 73.5			
79/ 2/10	250 - 805	157.2 - 347.6	232.7 - 277.3			
				510 - 540	241.8 - 260.0	252.6 - 256.8
79/ 2/11	200 - 600	277.6 - 62.7	68.4 - 102.4			
				440 - 455	14.3 - 23.4	91.0 - 93.2
79/ 2/11	625 - 700	77.8 - 98.9	105.9 - 110.9			
79/ 2/12	210 - 555	74.2 - 210.3	274.3 - 306.0			
79/ 2/12	720 - 755	261.7 - 282.8	317.9 - 322.8			
79/ 2/13	435 - 735	312.5 - 61.4	137.8 - 163.4			
79/ 2/14	215 - 515	18.5 - 127.3	322.0 - 347.2			
79/ 2/14	525 - 935	133.4 - 284.5	348.6 - 23.7			
				905 - 935	266.4 - 284.5	19.5 - 23.7

22.2 MHZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE	TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	IO PHASE
79/ 2/15	300 - 740	196.3 - 5.6	171.8 - 211.7			
79/ 2/16	400 - 515	23.2 - 68.6	23.5 - 34.0			
79/ 2/16	525 - 735	74.6 - 153.2	35.5 - 53.8			
79/ 2/17	220 - 355	113.4 - 170.8	213.6 - 227.1			
79/ 2/17	400 - 605	173.8 - 249.4	227.8 - 245.5			
				435 - 605	195.0 - 249.4	232.8 - 245.5
79/ 2/17	625 - 735	261.5 - 303.8	248.3 - 258.2			
79/ 2/18	255 - 730	285.1 - 91.4	61.3 - 100.3			
79/ 2/19	340 - 620	102.9 - 199.7	272.2 - 294.7			
79/ 2/19	635 - 725	208.7 - 239.0	296.8 - 303.8			
79/ 2/20	225 - 720	208.2 - 26.5	104.3 - 146.3			
				315 - 325	238.4 - 244.5	111.4 - 112.8
79/ 2/21	420 - 715	68.3 - 174.1	324.7 - 349.2			
79/ 2/22	215 - 710	143.3 - 321.7	150.4 - 192.4			
				500 - 540	243.1 - 267.3	173.9 - 179.6
79/ 2/23	330 - 555	339.3 - 66.9	4.4 - 24.8			
				535 - 555	54.8 - 66.9	22.0 - 24.8
79/ 2/24	330 - 705	129.8 - 259.8	208.5 - 239.0			
				530 - 705	202.4 - 259.8	225.6 - 239.0
79/ 2/25	425 - 700	313.7 - 47.4	59.1 - 81.0			
79/ 2/26	610 - 655	167.7 - 194.9	278.3 - 284.7			
79/ 2/27	210 - 320	173.2 - 215.5	87.1 - 97.1			
79/ 2/27	500 - 535	276.0 - 297.1	111.3 - 116.3			
79/ 2/27	620 - 650	324.3 - 342.5	122.7 - 126.9			
79/ 2/28	150 - 545	311.7 - 93.7	288.7 - 321.7			
79/ 3/ 1	340 - 455	168.7 - 214.1	147.4 - 158.0			
79/ 3/ 3	245 - 600	76.6 - 194.5	187.0 - 214.7			
				345 - 405	112.9 - 125.0	195.5 - 198.4
79/ 3/ 3	610 - 635	200.5 - 215.6	216.1 - 219.7			
				610 - 635	200.5 - 215.6	216.1 - 219.7
79/ 3/ 4	300 - 500	236.2 - 308.8	32.0 - 48.9			
				300 - 430	236.2 - 290.6	32.0 - 44.7
79/ 3/ 5	305 - 535	29.8 - 120.5	237.1 - 258.3			
79/ 3/ 6	340 - 540	201.5 - 274.0	84.7 - 101.8			
79/ 3/ 7	435 - 500	25.3 - 40.4	296.7 - 300.2			
79/ 3/ 7	510 - 615	46.4 - 85.7	301.6 - 310.8			
79/ 3/ 8	340 - 515	142.6 - 200.0	132.1 - 145.6			

22.2 MHZ ORRORAL, AUSTRALIA

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE	TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	IO PHASE
78/10/25	1735 - 1940	264.1 - 339.7	334.3 - 352.0			
				1820 - 1915	291.3 - 324.5	340.7 - 348.4
78/12/ 4	1535 - 1650	94.6 - 139.9	175.5 - 186.2			
78/12/ 4	1700 - 1850	146.0 - 212.5	187.6 - 203.3			
78/12/ 4	1810 - 2225	188.3 - 342.5	197.6 - 233.9			
				1830 - 1915	200.4 - 227.6	200.4 - 206.8
78/12/ 5	1150 - 1340	109.2 - 175.7	347.8 - 3.3			
78/12/ 5	1415 - 1500	196.8 - 224.0	8.2 - 14.5			
78/12/ 5	1510 - 2220	230.1 - 130.1	15.9 - 76.2			
78/12/ 6	1515 - 2245	23.8 - 295.8	220.1 - 284.1			
78/12/ 7	1340 - 1410	116.9 - 135.1	50.0 - 54.2			
78/12/ 7	1430 - 1505	147.2 - 168.3	57.0 - 61.9			
78/12/ 7	1520 - 2100	177.4 - 23.0	64.0 - 111.9			
				1710 - 1735	243.9 - 259.0	79.5 - 83.0
78/12/ 8	1330 - 1410	261.5 - 285.7	252.6 - 258.3			
78/12/ 8	1420 - 1455	291.8 - 312.9	259.7 - 264.7			
78/12/ 8	1510 - 1610	322.0 - 358.3	266.8 - 275.3			
78/12/ 8	1620 - 1815	4.3 - 73.9	276.7 - 293.0			
78/12/ 8	1830 - 2230	82.9 - 228.0	295.1 - 329.0			
78/12/ 9	1340 - 2220	58.2 - 12.6	96.8 - 170.5			
78/12/10	1625 - 1835	308.6 - 27.2	324.5 - 342.8			
78/12/10	1850 - 1930	36.3 - 60.5	344.9 - 350.5			
78/12/11	1605 - 1955	87.2 - 226.2	164.5 - 197.3			
78/12/12	1335 - 1400	147.1 - 162.3	347.5 - 351.0			
78/12/12	1405 - 1505	165.3 - 201.6	351.7 - 0.1			
78/12/12	1520 - 1550	210.6 - 228.8	2.2 - 6.4			
78/12/12	1615 - 1640	243.9 - 259.0	9.9 - 13.4			
78/12/12	1735 - 1905	292.3 - 346.7	21.1 - 33.8			
78/12/12	1920 - 2025	355.7 - 35.0	35.9 - 45.0			
78/12/14	1450 - 1600	133.8 - 176.1	44.7 - 54.6			
78/12/14	1620 - 1730	188.2 - 230.5	57.4 - 67.2			
78/12/14	1745 - 1815	239.6 - 257.7	69.3 - 73.5			
78/12/14	1830 - 2050	266.8 - 351.5	75.6 - 95.4			
78/12/15	1400 - 2155	254.2 - 181.4	241.7 - 309.0			
78/12/16	1440 - 2145	69.1 - 326.0	90.2 - 150.3			
				1745 - 1820	180.9 - 202.1	116.3 - 121.3
78/12/17	1535 - 2225	253.0 - 140.9	302.4 - 0.1			
78/12/18	1255 - 2235	306.9 - 297.6	122.5 - 204.9			
				2005 - 2110	206.9 - 246.2	183.6 - 192.8
78/12/19	1430 - 1655	155.0 - 242.7	340.2 - 0.6			
78/12/19	1705 - 2020	248.7 - 6.6	2.0 - 29.3			
				1705 - 1720	248.7 - 257.8	2.0 - 4.1
78/12/20	1405 - 2225	290.5 - 232.9	179.8 - 251.0			
78/12/22	1535 - 1740	286.3 - 1.9	240.2 - 257.9			
78/12/23	1425 - 2000	34.6 - 237.2	73.2 - 120.5			

22.2 MHZ ORRORAL, AUSTRALIA

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE	TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	IO PHASE
				1645 - 1710	119.3 - 134.4	92.9 - 96.4
78/12/25	1240 - 1305	272.5 - 287.6	105.4 - 108.9			
78/12/25	1400 - 1740	320.9 - 93.9	116.7 - 147.9			
78/12/25	1800 - 1835	106.0 - 127.1	150.8 - 155.8			
78/12/25	1855 - 2155	139.2 - 248.1	158.6 - 184.2			
78/12/26	1455 - 2225	144.8 - 56.9	328.9 - 32.0			
78/12/27	1100 - 1235	153.4 - 210.8	138.5 - 152.0			
78/12/27	1500 - 2220	298.5 - 204.5	172.7 - 235.4			
78/12/28	1310 - 2040	22.6 - 294.7	1.0 - 64.2			
79/ 1/ 4	1400 - 1620	27.6 - 112.3	353.3 - 13.0			
79/ 1/ 4	1635 - 2025	121.3 - 260.4	15.1 - 47.4			
				1920 - 1940	221.1 - 233.2	38.2 - 41.0
79/ 1/23	1415 - 1715	19.6 - 128.4	264.6 - 290.0			
79/ 1/24	1110 - 1215	58.4 - 97.7	81.1 - 90.3			
79/ 1/24	1400 - 1445	161.2 - 188.4	105.2 - 111.5			
79/ 1/24	1505 - 1715	200.5 - 279.1	114.4 - 132.9			
				1600 - 1710	233.7 - 276.1	122.2 - 132.1
79/ 1/25	1440 - 1710	336.0 - 66.7	315.2 - 336.3			
79/ 1/26	1410 - 1910	108.6 - 290.0	154.1 - 196.8			
79/ 1/27	1340 - 1905	241.1 - 77.6	353.7 - 39.3			
79/ 1/28	1540 - 1910	104.3 - 231.3	214.5 - 244.4			
79/ 1/29	1600 - 1910	267.1 - 21.9	60.3 - 87.1			
79/ 1/30	1630 - 1910	75.9 - 172.6	269.0 - 291.6			
79/ 1/31	1420 - 1455	147.9 - 169.1	93.3 - 98.3			
				1425 - 1455	150.9 - 169.1	94.0 - 98.3
79/ 1/31	1510 - 1540	178.2 - 196.3	100.4 - 104.7			
79/ 1/31	1555 - 1910	205.4 - 323.3	106.8 - 134.5			
79/ 2/ 1	1615 - 1910	8.1 - 113.9	313.9 - 338.5			
79/ 2/ 2	1610 - 1920	155.7 - 270.6	156.4 - 183.5			
79/ 2/ 3	1550 - 1920	294.3 - 61.3	357.3 - 26.8			
79/ 2/ 4	1520 - 1920	66.8 - 211.9	196.9 - 231.1			
79/ 2/ 5	945 - 1020	14.9 - 36.1	352.9 - 357.9			
79/ 2/ 5	1210 - 1255	102.6 - 129.8	13.3 - 19.6			
79/ 2/ 5	1315 - 1535	141.9 - 226.5	22.4 - 42.1			
79/ 2/ 5	1550 - 1920	235.6 - 2.6	44.2 - 73.8			
79/ 2/ 6	1630 - 1920	50.4 - 153.2	254.3 - 278.3			