

General Disclaimer

One or more of the Following Statements may affect this Document

- This document has been reproduced from the best copy furnished by the organizational source. It is being released in the interest of making available as much information as possible.
- This document may contain data, which exceeds the sheet parameters. It was furnished in this condition by the organizational source and is the best copy available.
- This document may contain tone-on-tone or color graphs, charts and/or pictures, which have been reproduced in black and white.
- This document is paginated as submitted by the original source.
- Portions of this document are not fully legible due to the historical nature of some of the material. However, it is the best reproduction available from the original submission.



Technical Memorandum **80549**

(NASA-TM-80549) DECAMETER: WAVE RADIO
OBSERVATIONS OF JUPITER DURING THE 1979
APPARITION (NASA) 27 p HC AC3/MF A01

N79-31125

CSSL 03B

G3/91

Unclas

36070

Decameter - Wave Radio Observations of Jupiter during the 1979 Apparition

**S. S. Vaughan, J. R. Thleman,
and J. K. Alexander**

AUGUST 1979

National Aeronautics and
Space Administration

Goddard Space Flight Center
Greenbelt, Maryland 20771



DECAMETER-WAVE RADIO OBSERVATIONS OF JUPITER
DURING THE 1979 APPARITION

by

S. S. Vaughan* and J. R. Thiemant, J. K. Alexander
NASA/Goddard Space Flight Center
Laboratory for Extraterrestrial Physics
Planetary Magnetospheres branch
Greenbelt, Maryland 20771

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

* Computer Science Corp., Silver Spring, MD

† NAS/NRC Research Associate

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	5.3	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 ι_0 from superior geocentric conjunction (ι_0 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 ι_0 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. Joseph 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.

REFERENCES

1. "Decameter-wave Radio Observations of Jupiter: Apparitions of 1965 to 1969", J. K. Alexander, GSFC Report X-615-70-2 (January 1970).
2. "Decameter-wave Radio Observations of Jupiter: Apparitions of 1970-74", J. K. Alexander, M. L. Kaiser and S. S. Vaughan, GSFC Report X-693-75-48 (March 1975).
3. "Decameter-Wave Radio Observations of Jupiter during the 1975 Apparition", J. K. Alexander, M. L. Kaiser and S. S. Vaughan, GSFC Report X-695-76-146 (June 1976).
4. "Decameter-wave Radio Observations of Jupiter during the 1976 Apparition", J. K. Alexander, M. L. Kaiser, and S. S. Vaughan, GSFC Report X-695-77-158 (June 1977).
5. "Decameter-Wave Radio Observations of Jupiter during the 1977 Apparition", J. K. Alexander, M. L. Kaiser, J. R. Thieman and S. S. Vaughan, GSFC Report X-695-78-25 (September 1978).
6. "A Catalog of Jovian Decameter Radio Observations from 1957-1978", J. R. Thieman, GSFC Technical Memorandum 80308 (August 1979).

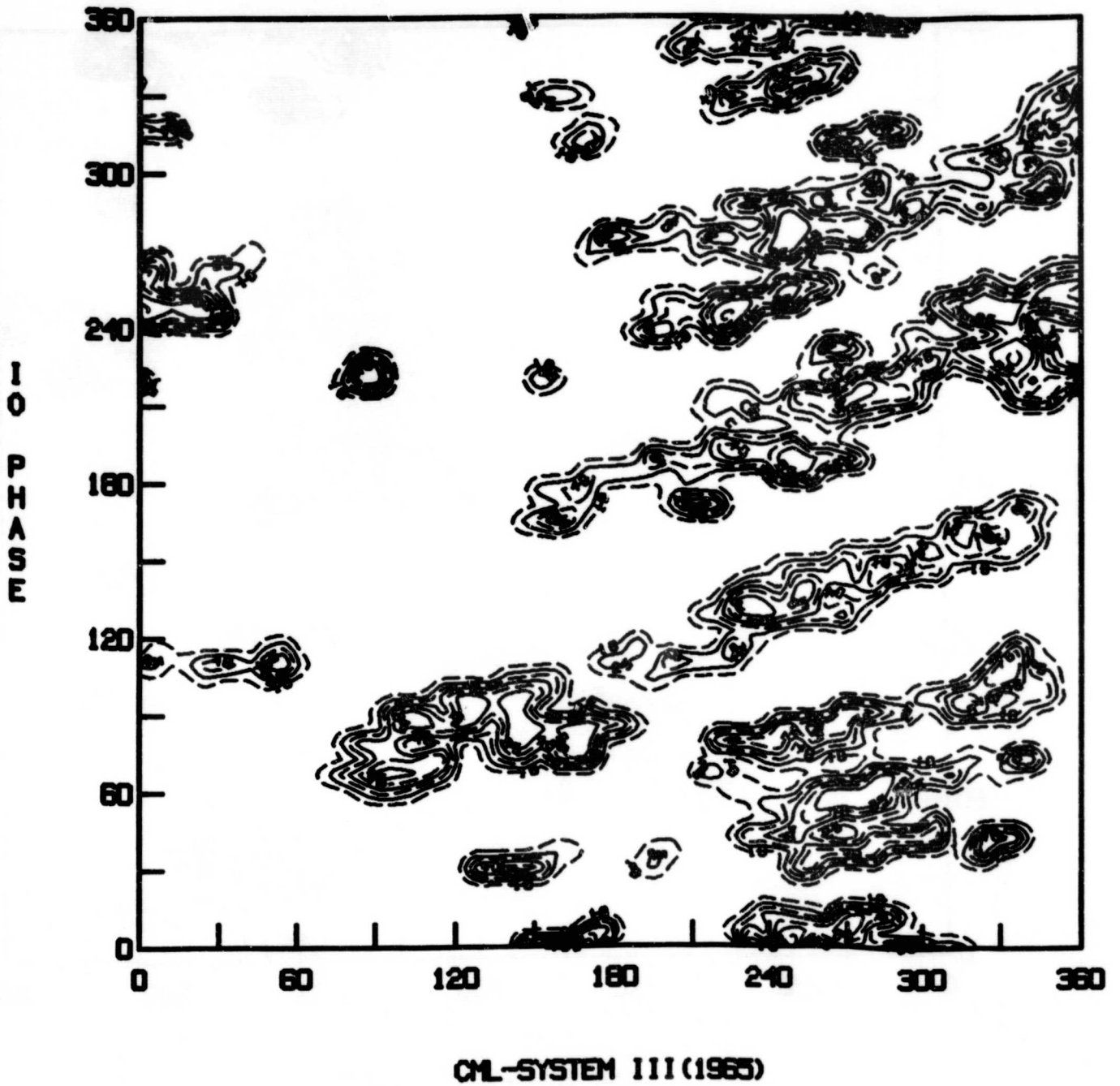


Fig. 1. Smoothed occurrence probability distribution at 16.7 MHz for the 1979 apparition as a function of System III (1965) central meridian longitude and phase of I_0 . Contours are plotted in 15% increments in occurrence probability beginning at a value of 10%.

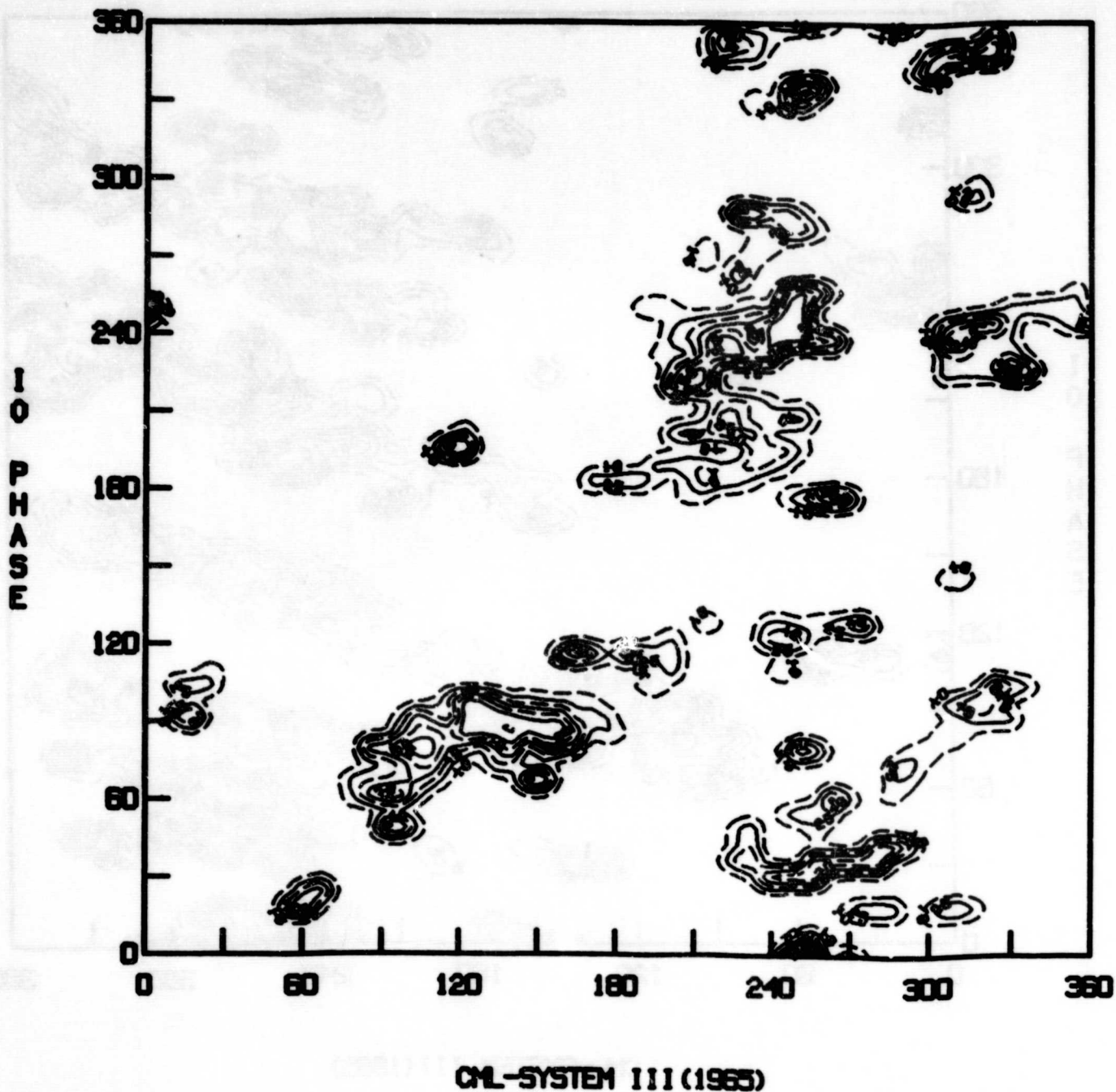


Fig. 2. Smoothed occurrence probability distribution at 22.2 MHz for the 1979 apparition as a function of System III (1965) central meridian longitude and phase of Io. Contours are plotted in 15% increments in occurrence probability beginning at a value of 10%.

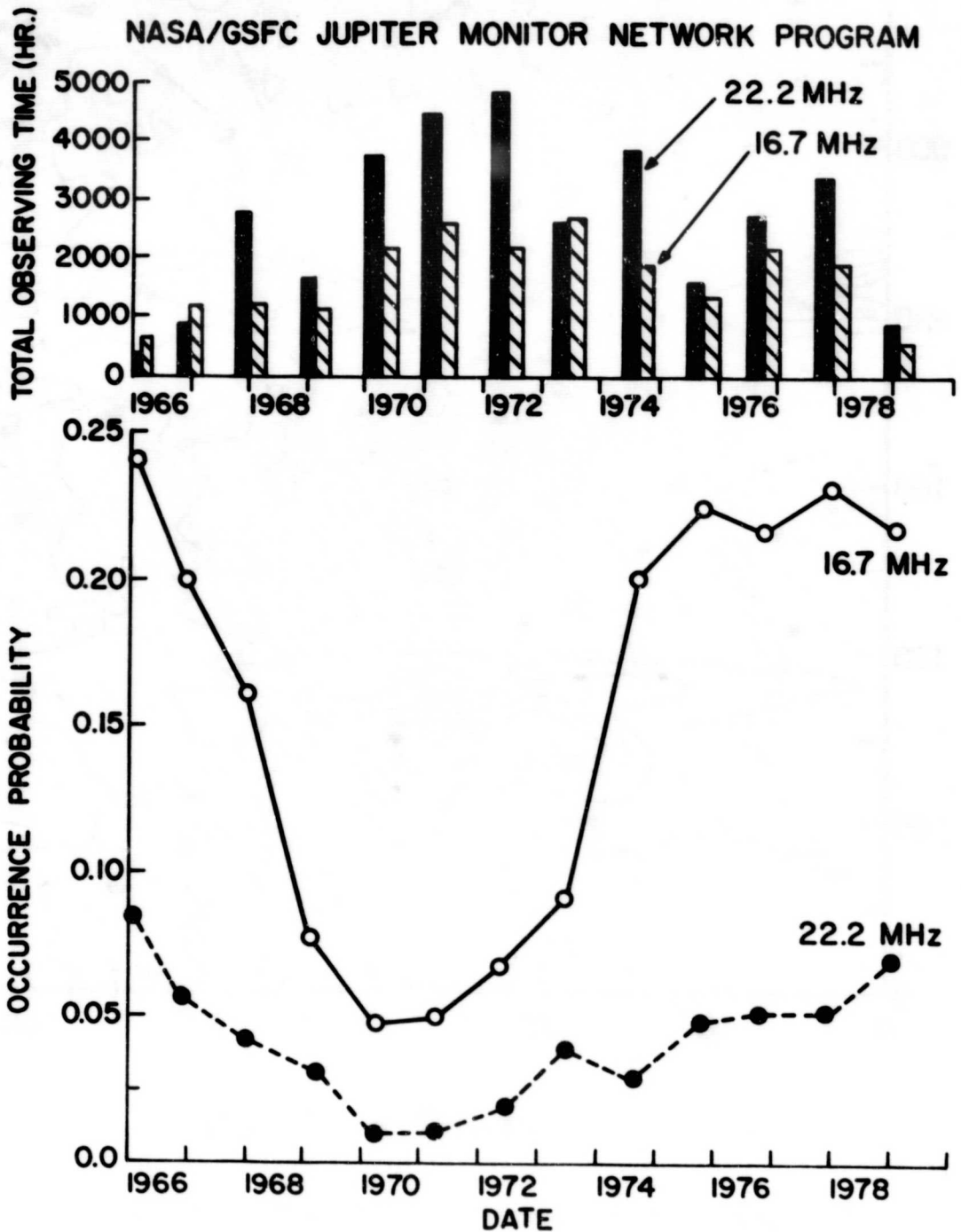


Fig. 3. (Upper panel) Total amount of observations of Jupiter at 16.7 and 22.2 MHz collected by the Jupiter Monitor Network for the apparitions of 1965 through 1979. (Lower panel) The variation of 16.7 and 22.2 MHz activity average occurrence probability as observed by the Jupiter Monitor Network between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

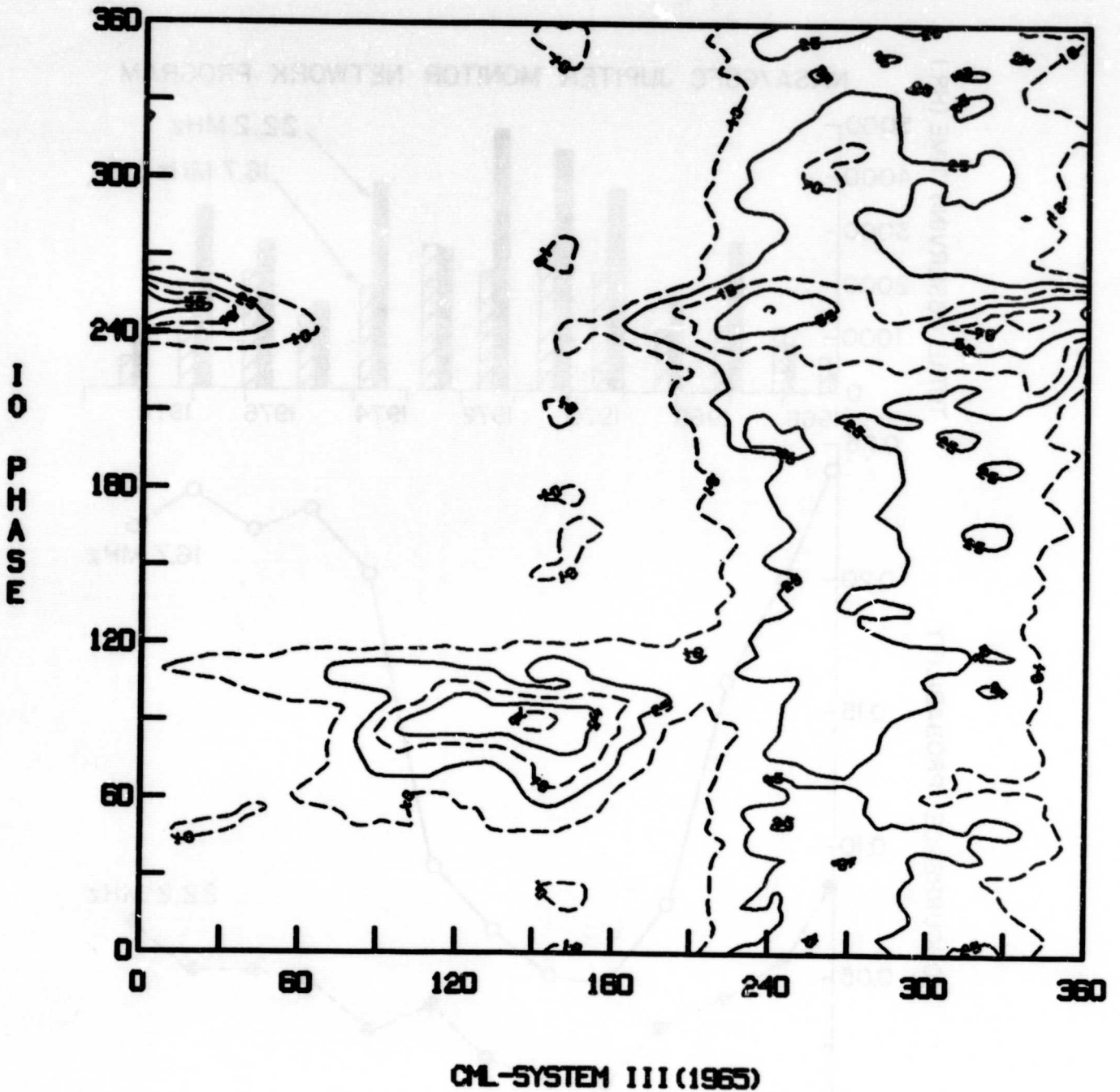


Fig. 4. Smoothed occurrence probability distribution at 16.7 MHz for the apparitions of 1965-1979 as a function of System III (1965) central meridian longitude and phase of i_0 from superior geocentric conjunction. Contours are plotted in 15% increments in occurrence probability beginning at a value of 10%.

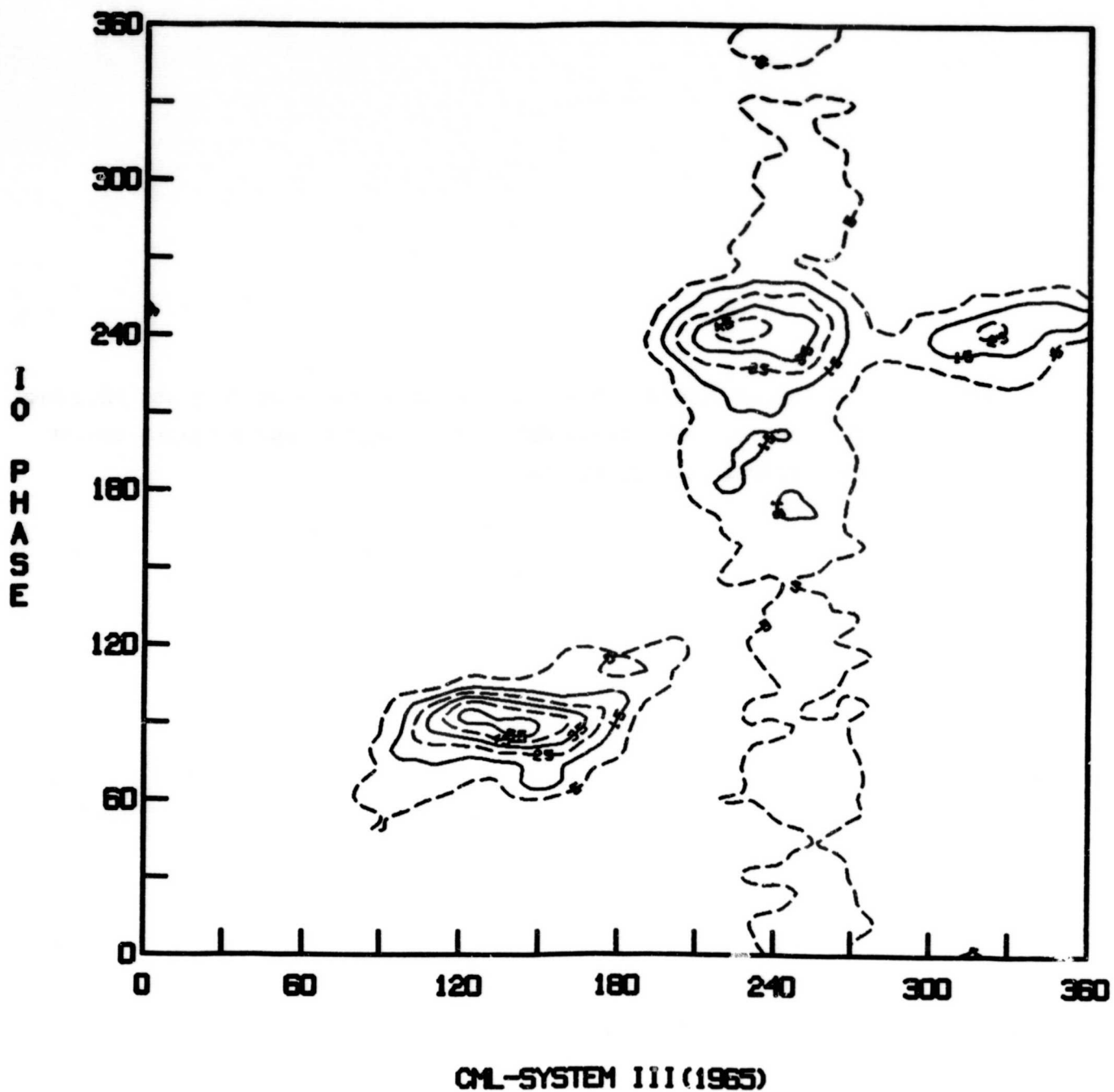


Fig. 5. Smoothed occurrence probability distribution at 22.2 MHz for the apparitions of 1965-1979 as a function of System III (1965) central meridian longitude and phase of Io from superior geocentric conjunction. Contours are plotted in 10% increments in occurrence probability beginning at a value of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

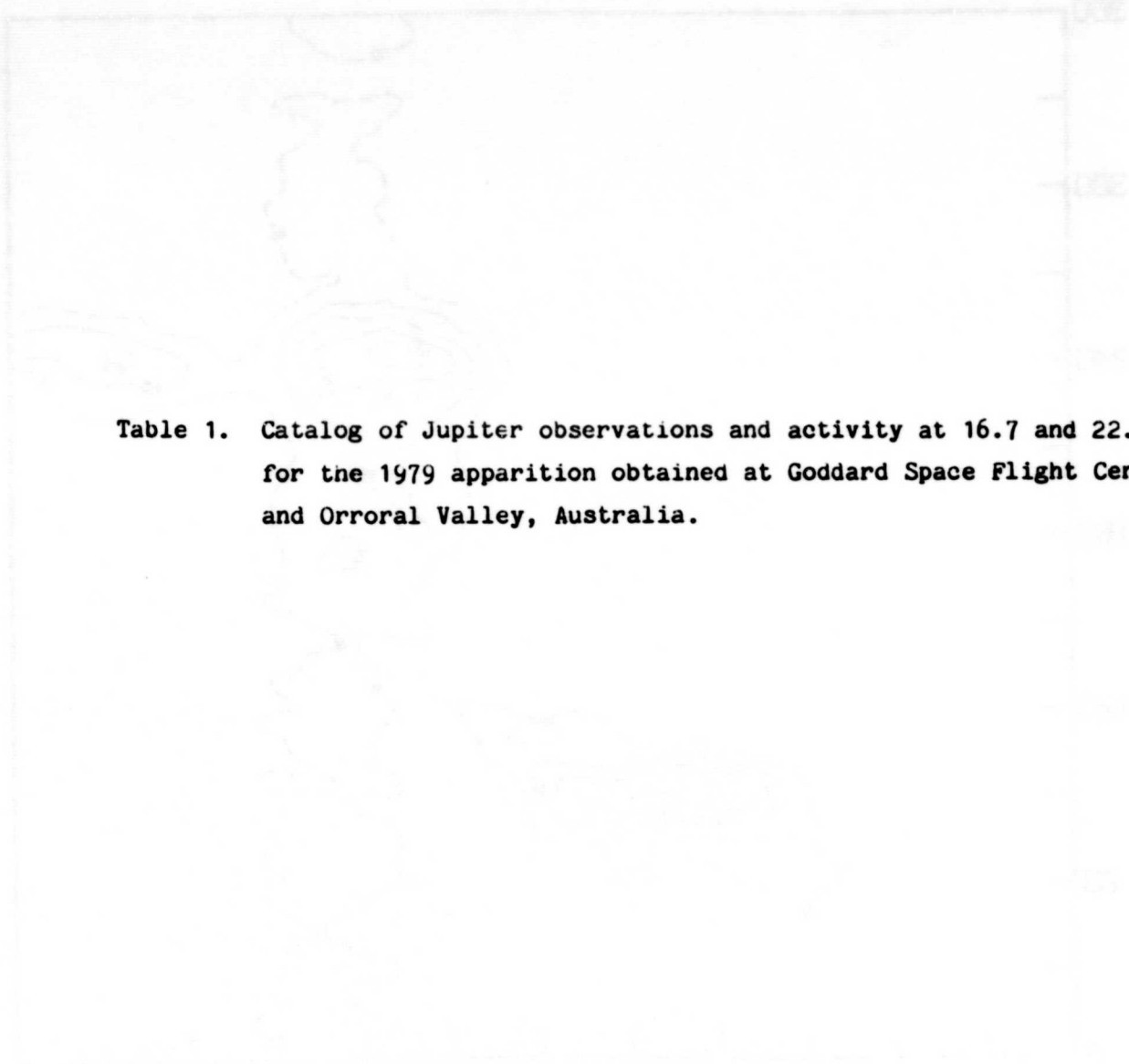


Table 1. Catalog of Jupiter observations and activity at 16.7 and 22.2 MHz for the 1979 apparition obtained at Goddard Space Flight Center and Orroral Valley, Australia.

16.7 NEZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HRRM	OBSERVATIONS		10 PHASE	TIME(UT) HHMM - HRRM	ACTIVITY		10 PHASE
		CML III (1965.0)	CML III (1965.0)			CML III (1965.0)	CML III (1965.0)	
78/11/3	700 - 1155	155.0 - 333.3	275.3 - 317.1	1025 - 1055	102.2 - 120.4	84.4 - 88.6		
78/11/9	750 - 935	8.5 - 72.0	62.6 - 77.3	810 - 915	171.2 - 210.5	269.3 - 278.5		
78/11/9	1005 - 1055	90.2 - 120.4	81.6 - 88.6	940 - 1100	225.6 - 274.0	282.1 - 293.4		
78/11/10	635 - 1100	113.8 - 274.0	255.8 - 293.4	915 - 945	151.6 - 169.8	325.6 - 329.8		
78/11/11	630 - 745	261.3 - 306.6	98.0 - 108.5	1155 - 1220	189.5 - 204.6	34.7 - 38.2		
78/11/11	910 - 1105	358.0 - 67.6	120.5 - 136.7	825 - 855	213.1 - 231.2	208.3 - 212.6		
78/11/12	625 - 1120	48.8 - 227.2	301.5 - 343.2	1045 - 1150	297.8 - 337.0	228.3 - 237.5		
78/11/13	925 - 1100	308.2 - 5.7	169.6 - 183.1	705 - 740	315.3 - 336.5	40.6 - 45.6		
78/11/13	1105 - 1135	8.7 - 26.8	183.8 - 188.1	1030 - 1110	79.3 - 103.4	69.4 - 75.0		
78/11/14	620 - 1220	347.0 - 204.6	347.7 - 38.2	955 - 1030	208.7 - 229.8	268.4 - 273.4		
78/11/15	615 - 1035	134.5 - 291.7	189.8 - 226.8	1045 - 1120	238.9 - 260.1	275.5 - 280.5		
78/11/15	1045 - 1150	297.8 - 337.0	228.3 - 237.5	605 - 910	220.2 - 332.1	78.8 - 104.8		
78/11/16	610 - 1110	282.1 - 103.4	32.9 - 75.0	755 - 1045	227.9 - 330.7	141.2 - 165.3		
78/11/17	605 - 1120	69.6 - 260.1	235.7 - 280.5	955 - 1125	241.6 - 296.1	205.4 - 218.3		
78/11/18	605 - 1120	220.2 - 50.7	78.8 - 123.2	635 - 645	212.5 - 218.6	67.6 - 69.0		
78/11/19	600 - 1125	7.0 - 204.3	282.3 - 328.2	715 - 730	236.7 - 245.8	73.2 - 75.3		
78/11/20	555 - 1120	155.4 - 351.8	124.2 - 170.2	915 - 1015	309.3 - 345.5	90.0 - 98.5		
78/11/21	550 - 1105	302.9 - 133.4	327.9 - 12.2	1120 - 1150	24.8 - 43.0	107.6 - 111.9		
78/11/22	550 - 1150	93.5 - 311.2	170.6 - 221.8	1055 - 1130	160.3 - 181.5	308.5 - 313.4		
78/11/23	545 - 1150	241.1 - 101.8	13.9 - 65.1	830 - 855	223.3 - 238.4	130.6 - 134.1		
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					
78/11/26	530 - 1130	323.8 - 181.5	262.4 - 313.4					
78/11/27	630 - 1030	150.7 - 295.8	113.6 - 147.6					

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

16.7 MHz CODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	OBSERVATIONS		10 PHASE		ACTIVITY CML III (1965.0)	10 PHASE
	TIME(UT) HHMM - HHMM	CML III (1965.0)	TIME(UT) HHMM - HHMM	CML III (1965.0)		
78/12/13	425 - 530	325.3 - 4.6	112.5 - 121.7	274.4 - 286.5	293.2 - 296.0	
78/12/13	715 - 755	68.0 - 92.2	136.6 - 142.3	304.6 - 17.2	300.3 - 317.2	
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	325.3 - 337.3	112.5 - 115.4	
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	229.5 - 259.8	43.8 - 50.8	
78/12/17	405 - 525	195.8 - 244.1	204.4 - 215.8	271.9 - 293.0	53.6 - 58.5	
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	286.5 - 319.7	225.8 - 233.6	
78/12/18	1000 - 1020	201.1 - 213.2	97.7 - 100.6	359.0 - 32.3	242.9 - 250.7	
78/12/19	400 - 510	134.1 - 173.4	251.2 - 261.2	71.1 - 119.5	67.4 - 78.7	
78/12/19	550 - 615	200.6 - 215.7	266.8 - 270.4	134.6 - 170.8	82.2 - 90.7	
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	236.9 - 273.1	275.3 - 283.8	
78/12/20	605 - 800	0.3 - 69.8	111.5 - 127.9	288.3 - 315.5	287.4 - 293.7	
78/12/20	810 - 1000	75.9 - 142.4	129.3 - 145.0	327.6 - 333.6	296.6 - 298.0	
78/12/21	350 - 830	69.4 - 238.7	297.1 - 336.5	308.9 - 348.2	99.6 - 108.8	
78/12/21	850 - 955	250.7 - 290.0	339.3 - 348.4	3.3 - 9.4	112.4 - 113.8	
78/12/22	345 - 950	217.0 - 77.7	139.1 - 191.0	9.4 - 15.4	113.8 - 115.2	
78/12/23	340 - 945	4.6 - 225.3	342.6 - 33.8	250.7 - 259.8	339.3 - 341.4	
78/12/24	335 - 940	152.3 - 13.0	185.1 - 237.1	334.9 - 347.0	166.8 - 169.7	
				264.1 - 279.3	211.5 - 215.1	
				312.5 - 345.8	222.9 - 230.7	

ORIGINAL PAGE IS
OF POOR QUALITY

16.7 MHZ GODDARD SPACE FLIGHT CENTER

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

16.7 MEZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	OBSERVATIONS CML III (1965.0)		I0 PHASE		TIME(UT) HHMM - HHMM		ACTIVITY CML III (1965.0)		I0 PHASE	
	TIME(UT) HHMM - HHMM									
79/ 1/ 8	230 - 550	213.2 - 334.1	350.2 - 18.3		720 - 800	237.8 - 262.0	187.5 - 193.2			
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		735 - 940	188.2 - 263.8	237.2 - 254.9			
79/ 1/10	225 - 725	151.5 - 332.9	36.4 - 78.6		515 - 620	254.3 - 293.6	60.3 - 69.4			
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		235 - 405	308.2 - 2.6	242.0 - 254.8			
79/ 1/12	215 - 610	86.8 - 228.9	82.0 - 115.2		440 - 515	23.8 - 45.0	259.8 - 264.7			
79/ 1/12	640 - 820	247.0 - 307.5	119.5 - 133.7		215 - 415	86.8 - 159.4	82.0 - 98.9			
79/ 1/13	210 - 605	234.5 - 16.6	285.8 - 318.9		505 - 610	189.6 - 228.9	106.0 - 115.2			
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		700 - 730	200.5 - 218.6	169.9 - 174.1			
79/ 1/14	205 - 255	22.1 - 52.4	127.9 - 135.0		320 - 405	218.1 - 245.4	342.7 - 349.0			
79/ 1/14	340 - 810	79.6 - 242.8	141.4 - 179.8		440 - 600	266.5 - 314.9	353.9 - 5.1			
79/ 1/15	235 - 805	190.9 - 30.5	336.3 - 22.6		715 - 725	150.9 - 157.0	219.6 - 221.0			
79/ 1/16	155 - 220	317.4 - 332.6	174.0 - 177.6		510 - 525	226.0 - 235.1	45.0 - 47.1			
79/ 1/16	245 - 800	347.7 - 178.1	181.2 - 226.0		550 - 645	250.2 - 283.5	50.6 - 58.3			
79/ 1/17	150 - 205	105.1 - 114.2	16.9 - 19.0		350 - 405	328.3 - 337.4	238.0 - 240.1			
79/ 1/17	220 - 755	123.2 - 325.8	21.1 - 68.2		420 - 530	346.5 - 28.8	242.2 - 252.2			
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							

16.7 MEZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	OBSERVATIONS CML III (1965.0)		10 PHASE		ACTIVITY CML III (1965.0)	10 PHASE
	TIME(UT) HHMM - HHMM		TIME(UT) HHMM - HHMM			
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			
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	220 - 310	307.3 - 337.5	162.9 - 170.0
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	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/ 1/27	120 - 145	153.7 - 168.8	249.4 - 253.0	340 - 430	87.7 - 117.9	64.7 - 71.8
79/ 1/27	155 - 710	174.8 - 5.3	254.4 - 298.9	510 - 625	142.1 - 187.4	77.4 - 88.0
79/ 1/28	135 - 250	313.4 - 358.8	94.3 - 104.9	330 - 410	232.3 - 256.5	267.8 - 273.5
79/ 1/28	300 - 355	4.8 - 38.1	106.3 - 114.1	430 - 520	268.6 - 298.8	276.3 - 283.4
79/ 1/28	410 - 705	47.1 - 152.9	116.3 - 141.1	600 - 645	323.0 - 350.2	289.0 - 295.4
79/ 1/29	220 - 300	131.3 - 155.5	305.1 - 310.7	330 - 355	22.9 - 38.1	110.6 - 114.1
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	615 - 645	156.0 - 174.1	72.0 - 76.2
79/ 2/ 2	600 - 645	146.9 - 174.1	69.9 - 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 - 133.5	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			
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	500 - 600	143.9 - 180.1	359.8 - 8.2

16.7 MEZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	OBSERVATIONS		IO PHASE		TIME(UT)		ACTIVITY		IO PHASE	
	CML III (1965.0)				HEMM - HHMM		CML III (1965.0)			
79/ 2/ 9	354.4	- 106.3	25.6	- 51.6	300	- 350	221.9	- 252.2	186.7	- 193.8
79/ 2/ 9	112.3	- 127.5	53.0	- 56.6	600	- 655	330.8	- 4.0	212.3	- 220.1
79/ 2/ 9	142.6	- 166.8	60.1	- 65.7						
79/ 2/10	178.3	- 229.7	237.7	- 249.7						
79/ 2/10	241.8	- 338.5	252.6	- 275.2						
79/ 2/11	322.9	- 65.7	79.0	- 103.1	430	- 450	217.6	- 229.7	246.9	- 249.7
79/ 2/12	119.6	- 134.7	284.9	- 288.4	510	- 545	241.8	- 263.0	252.6	- 257.5
79/ 2/12	158.9	- 210.3	294.0	- 306.0	605	- 620	275.1	- 284.1	260.4	- 262.5
79/ 2/13	333.7	- 52.3	142.7	- 161.3						
79/ 2/13	61.4	- 70.4	163.4	- 165.5						
79/ 2/14	85.0	- 157.6	337.4	- 354.2						
79/ 2/14	190.8	- 254.3	1.9	- 16.7	500	- 845	227.1	- 254.3	10.3	- 16.7
79/ 2/15	196.3	- 284.0	171.8	- 192.4						
79/ 2/15	323.3	- 5.6	201.7	- 211.7	415	- 510	241.7	- 274.9	182.5	- 190.3
79/ 2/17	216.1	- 237.3	237.7	- 242.7	510	- 540	216.1	- 234.3	237.7	- 242.0
79/ 2/18	312.3	- 0.7	67.7	- 79.0	405	- 430	327.4	- 342.6	71.2	- 74.8
79/ 2/19	166.4	- 178.5	287.0	- 289.8						
79/ 2/19	196.6	- 208.7	294.0	- 296.8						
79/ 2/21	86.4	- 146.9	328.9	- 342.9						
79/ 2/23	333.2	- 348.3	3.0	- 6.5						
79/ 2/23	357.4	- 45.8	8.6	- 19.9						
79/ 2/24	129.8	- 199.4	208.5	- 224.9						
79/ 2/24	244.7	- 259.8	235.5	- 239.0						
79/ 2/25	313.7	- 359.0	59.1	- 69.7						
79/ 2/25	11.1	- 38.3	72.5	- 78.9						
79/ 2/28	314.7	- 341.9	289.4	- 295.7						
79/ 2/28	21.2	- 30.3	304.8	- 306.9						
79/ 2/28	42.4	- 60.5	309.7	- 313.9						
79/ 3/ 1	189.9	- 214.1	152.3	- 158.0						
79/ 3/ 4	245.3	- 305.7	34.1	- 48.2	315	- 455	245.3	- 305.7	34.1	- 48.2

22.2 MHz GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS		10 PHASE		ACTIVITY CML III (1965.0)	10 PHASE
		CML III (1965.0)					
78/11/15	615 - 1150	134.5 - 337.0	189.8 - 237.5	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				
78/11/18	605 - 1105	220.2 - 41.6	78.8 - 121.0				
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				
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				
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				
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				
78/11/30	515 - 1115	197.2 - 54.9	354.3 - 44.8				
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				
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				
78/12/ 7	450 - 1050	156.5 - 14.2	335.6 - 26.1				
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				
				825 - 905	208.3 - 214.0		
				955 - 1010	268.4 - 270.6		
				1050 - 1105	276.3 - 278.4		
				820 - 915	97.8 - 105.5		
				910 - 1015	199.0 - 208.3		
				900 - 950	87.9 - 95.0		
				1100 - 1130	104.8 - 109.0		
				640 - 710	115.1 - 119.3		
				810 - 820	127.8 - 129.2		
				1015 - 1055	192.8 - 198.4		
				625 - 655	4.2 - 8.4		
				800 - 830	17.5 - 21.7		
				550 - 655	92.7 - 101.8		
				1015 - 1035	177.4 - 180.2		
				625 - 805	348.9 - 3.0		
				820 - 835	51.8 - 53.9		
				850 - 935	56.0 - 62.3		

16.7 MEZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS CML III (1965.0)	IO PHASE		ACTIVITY CML III (1965.0)	IO PHASE	
			HEMM - HHMM	HEMM - HHMM		HEMM - HHMM	HEMM - HHMM
79/ 2/ 9	230 - 535	354.4 - 106.3	25.6 - 51.6		300 - 350	221.9 - 252.2	186.7 - 193.8
79/ 2/ 9	545 - 610	112.3 - 127.5	53.0 - 56.6		600 - 655	330.8 - 4.0	212.3 - 220.1
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		430 - 450	217.6 - 229.7	246.9 - 249.7
79/ 2/12	325 - 350	119.6 - 134.7	284.9 - 288.4		510 - 545	241.8 - 263.0	252.6 - 257.5
79/ 2/12	430 - 555	158.9 - 210.3	294.0 - 306.0		605 - 620	275.1 - 284.1	260.4 - 262.5
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		500 - 845	227.1 - 254.3	10.3 - 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		415 - 510	241.7 - 274.9	182.5 - 190.3
79/ 2/18	340 - 500	312.3 - 0.7	67.7 - 79.0		510 - 540	216.1 - 234.3	237.7 - 242.0
79/ 2/19	525 - 545	166.4 - 178.5	287.0 - 289.8		405 - 430	327.4 - 342.6	71.2 - 74.8
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		315 - 455	245.3 - 305.7	34.1 - 48.2

22.2 MEZ GODDARD SPACE FLIGHT CENTER

DATE YY/MM/DD	TIME(UT) HHMM - HHMM	OBSERVATIONS		10 PHASE		TIME(UT) HHMM - HHMM	ACTIVITY CML III (1965.0)	10 PHASE
		CML III (1965.0)						
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			955 - 1010	208.7 - 217.8	268.4 - 270.6
78/11/17	605 - 1105	69.6 - 251.0	235.7 - 278.4			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			910 - 1015	214.4 - 253.7	199.0 - 208.3
78/11/20	555 - 1105	155.4 - 342.8	124.2 - 168.1			900 - 950	300.2 - 330.4	87.9 - 95.0
78/11/20	1115 - 1140	348.8 - 3.9	169.5 - 173.1			1100 - 1130	12.7 - 30.9	104.8 - 109.0
78/11/21	550 - 1105	302.9 - 133.4	327.9 - 12.2			640 - 710	156.8 - 174.9	115.1 - 119.3
78/11/22	550 - 1120	93.5 - 293.0	170.6 - 217.5			810 - 820	211.2 - 217.2	127.8 - 129.2
78/11/23	545 - 1125	241.1 - 86.7	13.9 - 61.6			1015 - 1055	228.0 - 252.2	192.8 - 198.4
78/11/24	540 - 1100	28.7 - 222.1	216.5 - 262.1			625 - 655	239.5 - 257.7	4.2 - 8.4
78/11/24	1120 - 1140	234.2 - 246.3	264.9 - 267.7			800 - 830	297.0 - 315.1	17.5 - 21.7
78/11/25	535 - 1130	176.3 - 30.9	59.1 - 109.0			550 - 655	100.9 - 140.2	92.7 - 101.8
78/11/26	530 - 1115	323.8 - 172.4	262.4 - 311.3			1015 - 1035	202.4 - 214.5	177.4 - 180.2
78/11/27	530 - 1125	114.4 - 329.1	105.2 - 155.4			625 - 805	213.9 - 274.4	348.9 - 3.0
78/11/28	525 - 1110	262.0 - 110.6	308.9 - 357.5			820 - 835	224.8 - 233.8	51.8 - 53.9
78/11/29	520 - 1110	49.6 - 261.2	150.8 - 200.6			850 - 935	242.9 - 270.1	56.0 - 62.3
78/11/30	515 - 1115	197.2 - 54.9	354.3 - 44.8					
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					
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					
78/12/ 7	450 - 1050	156.5 - 14.2	335.6 - 26.1					
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					

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/ 3	255 - 640	194.9 - 330.9	55.2 - 86.9	655 - 715	189.3 - 201.4	246.3 - 249.1
79/ 1/ 3	655 - 855	340.0 - 52.5	89.0 - 106.0	520 - 550	282.5 - 300.7	75.6 - 79.9
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	435 - 450	196.7 - 205.8	116.5 - 118.6
79/ 1/ 7	235 - 840	65.5 - 286.2	146.9 - 198.9	535 - 555	233.0 - 245.1	125.0 - 127.8
79/ 1/ 8	245 - 325	222.2 - 246.4	352.3 - 357.9	635 - 715	210.6 - 234.8	181.1 - 186.8
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	750 - 850	197.3 - 233.6	239.3 - 247.8
79/ 1/11	220 - 820	299.1 - 156.8	239.9 - 290.9	900 - 930	239.6 - 257.8	249.3 - 253.5
79/ 1/12	220 - 820	89.8 - 307.5	82.7 - 133.7	520 - 530	257.3 - 263.3	61.0 - 62.4
79/ 1/13	210 - 815	234.5 - 95.2	285.8 - 337.2	220 - 350	299.1 - 353.6	239.9 - 252.7
79/ 1/14	205 - 345	22.1 - 82.6	127.9 - 142.1	225 - 405	92.9 - 153.3	83.4 - 97.5
79/ 1/14	400 - 650	91.7 - 194.4	144.2 - 168.4	505 - 530	189.6 - 204.7	106.0 - 109.6
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	315 - 345	215.1 - 233.3	342.0 - 346.2
79/ 1/16	255 - 800	353.7 - 178.1	182.6 - 226.0	450 - 520	272.6 - 290.7	355.3 - 359.5
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	510 - 520	226.0 - 232.1	45.0 - 46.4
79/ 1/18	145 - 750	252.7 - 113.4	220.2 - 272.0	555 - 605	253.2 - 259.3	51.3 - 52.7
79/ 1/19	140 - 430	40.4 - 143.2	62.4 - 86.4	340 - 350	322.3 - 328.3	236.6 - 238.0
79/ 1/19	500 - 745	161.3 - 261.1	90.7 - 114.0	420 - 455	346.5 - 7.6	242.2 - 247.2
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	325 - 345	103.9 - 116.0	77.2 - 80.1
79/ 1/22	130 - 735	126.4 - 347.1	312.6 - 3.9	410 - 430	131.1 - 143.2	83.6 - 86.4

DATE		TIME(UT)		OBSERVATIONS		22.2 MEZ CODDARD SPACE FLIGHT CENTER		ACTIVITY	
YY/MM/DD	HHMM - HHMM	HHMM - HHMM	HHMM - HHMM	CML III	(1965.0)	10 PHASE	TIME(UT)	CML III	10 PHASE
				(1965.0)			HHMM - HHMM	(1965.0)	
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
79/ 1/26	125 - 515	6.0 - 145.1	45.7 - 78.2				345 - 435	300.0 - 330.2	222.6 - 229.7
79/ 1/26	525 - 715	151.1 - 217.7	79.6 - 95.1				335 - 415	84.6 - 108.8	64.0 - 69.7
79/ 1/27	150 - 710	171.8 - 5.3	253.7 - 298.9				525 - 545	151.1 - 163.2	79.6 - 82.4
79/ 1/28	120 - 705	304.3 - 152.9	92.2 - 141.1				605 - 615	175.3 - 181.4	89.2 - 86.6
79/ 1/29	220 - 655	131.3 - 297.5	305.1 - 343.7						
79/ 1/30	130 - 500	251.7 - 18.7	141.0 - 170.9				500 - 510	228.0 - 234.1	327.6 - 329.0
79/ 1/30	510 - 655	24.7 - 88.2	172.4 - 187.3				525 - 550	243.1 - 258.2	331.1 - 334.6
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

ACTIVITY
CHL III
(1965.0)

OBSERVATIONS
CHL III
(1965.0)

10 PHASE

10 PHASE

TIME(UT)
HHMM - HHMM

DATE
YY/MM/DD

DATE	TIME(UT)	OBSERVATIONS	10 PHASE	TIME(UT)	ACTIVITY
YY/MM/DD	HHMM - HHMM	CHL III (1965.0)	10 PHASE	HHMM - HHMM	CHL III (1965.0)
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
79/ 2/17	625 - 735	261.5 - 303.8	248.3 - 258.2		232.8 - 245.5
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	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
79/ 2/23	330 - 555	339.3 - 66.9	4.4 - 24.8	535 - 555	54.8 - 66.9
79/ 2/24	330 - 705	129.8 - 259.8	208.5 - 239.0	530 - 705	22.0 - 24.8
79/ 2/25	425 - 700	313.7 - 47.4	59.1 - 81.0		225.6 - 239.0
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
79/ 3/ 3	610 - 635	200.5 - 215.6	216.1 - 219.7	610 - 635	216.1 - 219.7
79/ 3/ 4	300 - 500	236.2 - 308.8	32.0 - 48.9	300 - 430	236.2 - 290.6
79/ 3/ 5	305 - 535	29.8 - 120.5	237.1 - 258.3		32.0 - 44.7
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 MEZ 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	1830 - 1915	200.4 - 227.6	200.4 - 206.8
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			
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/ 8	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	OBSERVATIONS		IO PHASE		ACTIVITY CML III (1965.0)	IO PHASE
	CML III (1965.0)	TIME(UT) HHMM - HHMM	IO PHASE	TIME(UT) HHMM - HHMM		
78/12/25	272.5 - 287.6	1240 - 1305	105.4 - 108.9	1645 - 1710	119.3 - 134.4	92.9 - 96.4
78/12/25	320.9 - 93.9	1400 - 1740	116.7 - 147.9			
78/12/25	106.0 - 127.1	1800 - 1835	150.8 - 155.8			
78/12/25	139.2 - 248.1	1855 - 2155	158.6 - 184.2			
78/12/26	144.8 - 56.9	1455 - 2225	328.9 - 32.0			
78/12/27	153.4 - 210.8	1100 - 1235	138.5 - 152.0			
78/12/27	298.5 - 2220	1500 - 2220	172.7 - 235.4			
78/12/28	22.6 - 294.7	1310 - 2040	1.0 - 64.2			
79/1/4	27.6 - 112.3	1400 - 1620	353.3 - 13.0			
79/1/4	121.3 - 260.4	1635 - 2025	15.1 - 47.4			
79/1/23	19.6 - 128.4	1415 - 1715	264.6 - 290.0	1920 - 1940	221.1 - 233.2	38.2 - 41.0
79/1/24	58.4 - 97.7	1110 - 1215	81.1 - 90.3			
79/1/24	161.2 - 188.4	1400 - 1445	105.2 - 111.5			
79/1/24	200.5 - 279.1	1505 - 1715	114.4 - 132.9			
79/1/25	336.0 - 66.7	1440 - 1710	315.2 - 336.3	1600 - 1710	233.7 - 276.1	122.2 - 132.1
79/1/26	108.6 - 290.0	1410 - 1910	154.1 - 196.8			
79/1/27	241.1 - 77.6	1340 - 1905	353.7 - 39.3			
79/1/28	104.3 - 231.3	1540 - 1910	214.5 - 244.4			
79/1/29	267.1 - 21.9	1600 - 1910	60.3 - 87.1			
79/1/30	75.9 - 172.6	1630 - 1910	269.0 - 291.6			
79/1/31	147.9 - 169.1	1420 - 1455	93.3 - 98.3			
79/1/31	178.2 - 196.3	1510 - 1540	100.4 - 104.7	1425 - 1455	150.9 - 169.1	94.0 - 98.3
79/1/31	205.4 - 323.3	1555 - 1910	106.8 - 134.5			
79/2/1	8.1 - 113.9	1615 - 1910	313.9 - 338.5			
79/2/2	155.7 - 270.6	1610 - 1920	156.4 - 183.5			
79/2/3	294.3 - 61.3	1550 - 1920	357.3 - 26.8			
79/2/4	66.8 - 211.9	1520 - 1920	196.9 - 231.1			
79/2/5	14.9 - 36.1	945 - 1020	352.9 - 357.9			
79/2/5	102.6 - 129.8	1210 - 1255	13.3 - 19.6			
79/2/5	141.9 - 226.5	1315 - 1535	22.4 - 42.1			
79/2/5	235.6 - 2.6	1550 - 1920	44.2 - 73.8			
79/2/6	50.4 - 153.2	1630 - 1920	254.3 - 278.3			