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CATALOGUE OF LATE-TYPE STARS WITH OH, H_2O OR SiO MASER EMISSION

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A catalogue of more than 300 objects showing maser line radio emission from OH, H_2O and/or SiO molecules has been compiled. About two thirds of the objects have been identified with optical or infrared optics, mostly M-supergiants, Mira or semiregular variables. The catalogue contains optical data such as spectral type, period and magnitude, radio flux densities and velocities and infrared flux densities in the region between 0.7 and 20 μm.

Key words: OH/IR, H_2O/IR and SiO/IR stars – long-period-variables – infrared stars

1. INTRODUCTION

Since the discovery of OH maser emission from extremely red stellar objects by Wilson and Barrett (1968), about 300 stellar objects with OH, H_2O or SiO line emission have been found. The OH emission occurs typically at two velocities, with separations ranging from 5 to 60 km s^{-1}. The H_2O and SiO emission does not show such a regular pattern, but considerable symmetry.

The 129 OH/IR objects which are identified mostly as M-type Mira variables, semiregular variables or M-supergiants, are divided into two classes: Type I OH/IR sources, if the mainline emission at 1665 and 1667 MHz is strongest, and Type II OH/IR sources, if the emission at 1612 MHz is strongest. They are usually bright infrared sources, especially the Type II sources which show an infrared excess longward of 3 μm. Total radio and infrared flux densities vary in time almost simultaneously with the optical variation (Harvey *et al.*, 1974).

About 190 objects not previously identified in the optical or infrared seem to have similar physical properties to the OH/IR sources. They are classified, with a few exceptions, as Type II OH/IR sources only because of their typical double peaked velocity pattern (Winnberg *et al.*, 1973). Later 42 of these objects were identified in the infrared (Schultz *et al.*, 1976; Evans and Beckwith, 1977; Glass, 1978). Infrared spectra typical of late type stars observed by Allen *et al.* (1977) confirm the classification as Type II OH/IR sources. OH emission is often accompanied by H_2O emission at 22 GHz. In some cases, late type stars or infrared sources show H_2O emission, although no OH emission has been detected.

Finally 56 late-type infrared stars show SiO maser emission at 43 GHz due to the $v=1$, $J=1$–0 transition (Snyder and Buhl, 1975) and at 86 GHz due to the $v=1$, $J=2$–1 transition (Kaifu, Snyder and Buhl, 1975). Of these, 43 (77%) are also OH or H_2O emitters.

The data for this group of OH, H_2O or SiO emitting stellar objects are scattered throughout the literature, prompting the compilation of the present catalogue which contains as much information as possible about the individual objects.

The literature search was made up to September 1, 1978; in addition four unpublished papers are included in Table VIII.

2. THE CATALOGUE

The catalogued objects are divided into six groups (Table I–VI).

I. "M-supergiant stars": 7 OH and H_2O emitters classified as M-supergiants on the basis of their optical spectra.

II. "Type I OH/IR stars": 44 OH emitters which are strongest at 1665/1667 MHz and have optical or infrared identification.

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III. "Type II OH/IR stars": 78 OH emitters which are strongest at 1612 MHz and have optical or infrared identification.

IV. "H_2O/IR stars without detected OH emission": 21 objects emitting at 22 GHz and undetected at 1612, 1665 or 1667 MHz.

V. "SiO/IR stars": 56 objects emitting at 43 and/or 86 GHz.

VI. "Objects undetected in the optical or infrared": 145 objects classified as OH/IR stars because of their double peaked velocity pattern.

Tables I–V are divided into three parts, comprising the optical, radio and infrared properties. In Table VI only the radio data is given.

The first part, "optical properties", contains a running number at the beginning and end of each line, the names of the star, including the IRC-number from the Two-Micron Sky Survey (Neugebauer and Leighton, 1969) or the CRL-number from the AFCRL Infrared Sky Survey (Walker and Price, 1975), the coordinates at epoch 1950.0, the distance in parsecs, the type of star, the stellar photographic magnitude at maximum and minimum brightness, the spectral classification, the period in days and remarks. Data for the last five columns, except "remarks" which also includes comments on radio and infrared properties, are taken generally from the Catalogue of Variable Stars (Kukarkin *et al.*, 1969), otherwise from the cited literature at the end of the catalogue. The letters M, S or SR in the column "Type" denote M or S-type Mira variable or semiregular variable. The symbol "(" in the column "magnitude" signifies that the variable at minimum can be fainter than the magnitude given after this symbol.

The second part, "radio properties", contains the names of the star, the peak flux densities in f.u. (10^{-26} Wm^{-2} Hz^{-1}) and LSR-velocities in $km\,s^{-1}$ for both features at 1612 and 1665/67 MHz and for the principal H_2O feature. If the radio spectrum is more complicated, data from additional features are listed in a second line. If it was possible to choose between different measurements, the one with the strongest peak flux was taken. It should be noted that radio and infrared flux densities show remarkable variations. "–––" or "det" denotes no detection or missing numerical data. "+" below the column "SiO" means that the object is also listed in Table V (SiO/IR stars), "–" means that no SiO emission was found. In Table V the peak flux densities and LSR-velocities are those of the emission at 43 and 86 GHz.

The last part, "infrared properties", contains the name, I and K colours form the Two-Micron Sky Survey, negative logarithmic flux densities in W cm^{-2} μm^{-1} for twelve colours and a code number designating the calibration system. The I (104) colour was measured with a narrow-band photometric system described by Lockwood and Wing (1971). This clear region at 1.04 μm was recommended by Wing (1967) for the purpose of measuring the continuum radiation. The remaining eleven colours measured with broad-band photometry have the following central wavelengths, depending on the photometric system used: $R=0.7$ μm, $I=0.9$ μm, $J=1.25$–1.3 μm, $H=1.65$ μm, $K=2.2$–2.3 μm, $L=3.4$–3.6 μm, $M=4.8$–5.0 μm, 8.4=8.4–8.7 μm, $N=10.0$–10.2 μm, 11.0=10.7–11.2 μm, $Q=19.5$–20.0 μm. The flux densities were computed from the colours using the calibration system referenced in the column CAL and enumerated as follows: 1) Johnson (1966) and Dyck *et al.* (1974), 2) Hyland *et al.* (1972), 3) Wilson *et al.* (1972), 4) Gillett *et al.* (1971), 5) Schultz *et al.* (1976), 6) Beckwith *et al.* (1976) and 7) Strecker and Ney (1974). If more than one measurement in the infrared was available, the one with the greatest number of measured colours was taken.

The catalogue ends with a reference list (Table VII) containing all objects followed by code numbers and a list containing the literature belonging to each code number (Table VIII). The literature cited for each object contains all data used.

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Table I M-Supergiant stars

I. OPTICAL PROPERTIES

	NAME(S)		RA.	DEC.	DISTANCE	TYPE	MAGNITUDE		SPE.TYPE	PERIOD	REMARKS	
1	S PER	IRC 60088	02 19 16	58 21.3		SR	7.9	11.1	M3E-M4E	650		1
2	VY CMA	IRC-30087	07 20 55	-25 40.2	400	-	6.5	9.4	M5 PEC	----		2
3	AH SCO	IRC-30282	17 08 02	-32 15.9	2600	SR	8.1	12.0	M3E	714		3
4	VX SGR	IRC-20431	18 05 03	-22 14.0	500	SR	6.5	12.5	M4E-M9E	732		4
5	NML CYG	IRC 40448	20 44 34	39 55.9	500							5
6	MY CEP	IRC 60375	22 52 31	60 33.3		SR	14.4		M7			6
7	PZ CAS	IRC 60417	23 41 41	61 31.0	2700	SR	9.8	12.7	M3	900		7

II. RADIO PROPERTIES

PEAK FLUX DENSITY AND VELOCITY

	NAME(S)		OH# 1612 MHZ				I	OH# 1665/67 MHZ				I	H2O# 22 GHZ		SIO	
1	S PER	IRC 60088	1.1	-53	0.6	-24	I	2.5	-51	1.1	-29	I	106.0	-45	+	1
							I					I	11.4	-27		
							I					I	106.0	-38		
							I					I	14.0	-31		
2	VY CMA	IRC-30087	230.0	-12	140.0	53	I	160.0	-2	60.0	6	I	540.0	-4	+	2
			240.0	-6			I	70.0	2	120.0	5	I	300.0	14		
							I					I	310.0	19		
							I					I	100.0	36		
3	AH SCO	IRC-30282	---	---	---	---	I	0.5	17	2.7	-19	I	240.0	+2	+	3
							I	0.8	4	1.8	-14	I				
4	VX SGR	IRC-20431	26.7	-17	28.0	29	I			10.0	12	I	87.0	-4	+	4
							I					I	213.0	0		
							I					I	73.0	11		
5	NML CYG	IRC 40448	380.0	-25	190.0	21	I	15.0	-21			I	80.0	-19	+	5
			520.0	-24	220.0	-18	I					I	DET	16		
6	MY CEP	IRC 60375	---	---	---	---	I	0.3	-62	0.3	-48	I	4.6	-57	-	6
							I					I	10.6	-52		
							I					I	3.0	-44		
7	PZ CAS	IRC 60417	1.8	-65	2.3	-12	I					I	4.8	-40	-	7
							I					I	4.8	-46		

III. INFRARED PROPERTIES

- LOG FLUX DENSITY

	NAME	I	K	I(104)	R	I	J	H	K	L	M	8.4	N	11.0	Q	CAL	
1	S PER	5.70	1.31		14.54	13.84	13.72		13.99	14.34	14.61		15.21			1	1
2	VY CMA	4.87	-0.69		13.77		12.55	12.29	12.30	12.33	13.42		13.28		13.77	1	2
3	AH SCO	4.31	0.32						13.65							1	3
4	VX SGR	4.39	-0.37				12.92	13.00	13.18	13.37	13.61		14.16			2	4
5	IRC 40448	8.79	0.62	15.05			15.74	14.56	14.04	13.65	13.45		13.50			1	5
6	MY CEP	7.24	1.86		12.58	12.20	12.26			12.75	13.27		13.85			1	6
7	PZ CAS	5.16	0.98														7

Table II Type I OH/IR stars

I. OPTICAL PROPERTIES

	NAME(S)		RA.	DEC.	DISTANCE	TYPE	MAGNITUDE		SPE.TYPE	PERIOD	REMARKS	
8	Y CAS	IRC 60001	00 00 45	55 24.4	955	M	8.9	15.3	M6E-M8E	414		8
9	O CET	IRC 00030	02 16 49	-03 12.2	250	M	2.0	10.1	M5E-M9E	332	MIRA	9
10	R HOR		02 52 12	-50 05.6	265	M	4.7	14.3	M5E-M7E	404		10
11	W ERI	IRC-30033	04 09 26	-25 15.4	693	M	7.5	14.5	M7E	376		11
12	R TAU	IRC 10060	04 25 36	10 03.5	594	M	8.1	14.7	M5E-M7E	324		12
13		IRC 20082	04 26 07	24 37.6					M7-M7.9			13
14	RX TAU	IRC 10066	04 35 30	08 13.6		M	9.1	14.8	M7E	335		14
15	S PIG		05 09 38	-48 34.0	473	M	7.2	14.0	M7E-M8E	427		15
16	RU AUR	IRC 40135	05 35 42	37 36.6	777	M	9.0	16.0	M8E	468		16
17	AW TAU		05 44 19	27 6.3	1659	M	13.2	(15.8	M9	690	(1)	17
18	U LYN	IRC 60172	06 36 18	59 57.4	1018	M	8.8	15.0	M8E	436		18
19	FX MON	IRC 10135	06 42 18	09 05.6		M	12.8	18.0	M6.5	427		19
20	Z PUP	IRC-20133	07 38 29	-20 32.8	540	M	7.2	14.6	M4E-M9E	580	(2)	20
21	231.8+4.2		07 39 59	-14 36.2	1750						(3)	21
22	AU GEM	IRC 30195	07 42 16	30 55.9	2703	M	12.3	(16.5	M10	424		22
23	X HYA	IRC-10222	09 33 07	-14 28.0		M	8.0	13.6	M7E-M8E	301		23
24	R LMI	IRC 30215	09 42 35	34 44.6	350	M	6.3	13.2	M6E-M9E	372		24
25	R LEO	IRC 10215	09 44 52	11 39.8	232	M	4.4	11.3	M6E-M9E	313		25
26	W VEL		10 13 23	-54 13.8	569	M	6.3	14.0	M8E	395		26
27	W LEO	IRC 10234	10 58 59	13 58.9	1224	M	8.9	14.8	M6E-M8.8	385		27
28	R COM	IRC 20237	12 01 41	19 03.4		M	7.3	14.6	M5E-M7E	362		28
29	U CVN	IRC 40238	12 44 57	38 38.4	1030	M	8.8	(12.5	M7E	346	(4)	29
30	RT VIR	IRC 10262	13 00 05	05 27.1		SR	9.0	10.3	M8	155		30
31	W HYA	IRC-30207	13 46 13	-28 07.1	100	SR	7.7	11.6	M8E-M9E	398		31
32	RU HYA	IRC-30215	14 08 42	-26 38.4	741	M	7.2	14.3	M6E	333		32
33	Y LUP		14 55 58	-54 45.1		M	8.2	15.2	M7E	402	(5)	33
34	S SER	IRC 10290	15 19 20	14 29.2		M	7.7	14.1	M5E-M6E	369		34
35	S CRB	IRC 30272	15 19 21	31 32.8	375	M	5.8	14.0	M6E-M8E	360		35
36	U HER	IRC 20296	16 23 35	19 00.3	457	M	6.5	13.4	M6E-M9E	406		36
37	RX OPH	IRC 10314	16 50 22	05 28.9		M	9.8	(13.0	M7E	322		37
38	RW SCO	ORL 1937	17 11 36	-33 22.6	800	M	8.8	15.0	M5E	390		38
39	RT OPH	IRC 10342	17 54 11	11 10.5	1091	M	8.6	15.5	M7E	426		39
40		IRC-20424	18 00 56	-20 19.5	560							40
41		IRC-10414	18 20 28	-13 44.1					M8		(6)	41
42	V LYR	IRC 30360	19 07 07	29 34.7	488	M	8.8	15.0	M7E	374		42
43	RT AQL	IRC 10433	19 35 36	11 36.3	532	M	7.8	14.5	M6E-M8E	331		43
44	GY AQL	IRC-10524	19 47 20	-07 44.3		SR	10.0	(16.0	M6E	204		44
45	RR SGR	IRC-30419	19 52 50	-29 19.4	370	M	5.6	14.0	M5E-M6E	334		45
46	UU PEG	IRC 10498	21 28 38	18 56.3		M	11.1	(14.0	M7E	456	(6)	46
47	TW PEG	IRC 30481	22 01 41	28 06.5		SR	7.0	9.2	M6-M7	956	(7)	47
48	RV PEG	IRC 30492	22 23 20	38 13.1	1175	M	9.0	14.5	M6E	389		48
49		IRC 10523	22 51 40	08 37.9					M8			49
50	R PEG	IRC 10527	23 04 08	18 16.4	480	M	6.9	13.8	M6E-M9E	378		50
51	R CAS	IRC 50484	23 55 53	51 06.6	359	M	4.7	13.1	M6E-M10E	431		51

NOTES: (1) P.F. BOWERS DETECTED THREE OH-PEAKS (86)
(2) THIRD OH-PEAK AT 2 KM/S DETECTED (19)
(3) OH/IR CLASSIFICATION UNCERTAIN
(4) THIRD OH-PEAK AT -28 KM/S DETECTED (44)
(5) = OH 320.7+3.4, OPTICAL IDENTIFICATION UNCERTAIN (39)
(6) COMPLEX H2O-SPECTRUM (88)
(7) TW PEG IS PROBABLY A SR-TYPE SUPERGIANT

Table II *(continued)*

II. RADIO PROPERTIES

PEAK FLUX DENSITY AND VELOCITY

	NAME(S)		OH# 1612 MHZ				I	OH# 1665/67 MHZ				I	H2O# 22 GHZ		SIO	
8	Y CAS	IRC 60001	---	---	---	---	I	5.9	-22	4.1	-13	I	3.8	-17	+	8
9	O CET	IRC 00030	---	---	---	---	I			4.8	46	I	22.0	47	+	9
10	R HOR						I	3.3	34	3.3	36	I	16.0	36	+	10
11	W ERI	IRC-30033	---	---	---	---	I	1.8	-1	2.5	4	I	49.0	0	+	11
12	R TAU	IRC 10060	---	---	---	---	I	0.2	11	0.3	16	I	7.6	11	+	12
13		IRC 20082	---	---	---	---	I	0.7	6			I	---	---	-	13
14	RX TAU	IRC 10066	---	---	---	---	I	0.2	-48	0.1	-45	I	10.1	-44		14
15	S PIG						I	1.1	-6			I			-	15
16	RU AUR	IRC 40135	---	---	---	---	I	0.2	-32			I	---	---		16
17	AW TAU		---	---	---	---	I	0.2	-12	0.1	-3	I	DET			17
18	U LYN	IRC 60172	---	---	---	---	I	0.2	-18	0.6	-16	I	32.9	-10		18
							I					I	29.8	-9		
19	FX MON	IRC 10135	---	---	---	---	I	0.4	31			I				19
20	Z PUP	IRC-20133	---	---	---	---	I	0.2	-2	0.2	11	I	34.2	5	+	20
21	231.8+4.2						I	9.1	20			I	8.1	25	-	21
22	AU GEM	IRC 30195	---	---	---	---	I	0.1	0	0.2	13	I				22
23	X HYA	IRC-10222	---	---	---	---	I	0.1	28			I	138.0	28	-	23
24	R LMI	IRC 30215	---	---	---	---	I	0.4	-3	0.6	5	I	30.0	19	+	24
25	R LEO	IRC 10215	---	---	---	---	I	0.3	3	---	---	I	7.6	-1	+	25
26	W VEL						I	0.4	-12	0.5	-5	I			-	26
27	W LEO	IRC 10234	---	---	---	---	I	0.2	50			I	---	---	-	27
28	R COM	IRC 20237	---	---	---	---	I	0.1	-7	0.1	-1	I			-	28
29	U CVN	IRC 40238	---	---	---	---	I	1.8	-42	3.1	-20	I	8.6	-23	-	29
30	RT VIR	IRC 10262	---	---	---	---	I	0.3	11	0.4	23	I	16.1	15	-	30
31	W HYA	IRC-30207	---	---	---	---	I	13.0	37	2.0	43	I	DET	39	+	31
							I					I	238.0	42		
32	RU HYA	IRC-30215	DET	---	---	---	I	0.4	-7	0.2	0	I	168.0	-3	-	32
33	Y LUP						I	0.8	10	1.1	18	I	---	---	-	33
34	S SER	IRC 10290	---	---	---	---	I	0.2	21	0.1	25	I	24.2	22	-	34
35	S CRB	IRC 30272	1.8	-3	0.9	4	I	---	---	2.0	3	I	57.0	3	+	35
36	U HER	IRC 20296	---	---	---	---	I	3.5	-19	2.0	-11	I	330.0	-15	+	36
37	RX OPH	IRC 10314	---	---	---	---	I	0.1	-52	0.2	-46	I				37
38	RW SCO	ORL 1937	1.0	-75	1.1	-65	I	2.8	-74	1.4	-66	I	64.0	-71	+	38
39	RT OPH	IRC 10342	---	---	---	---	I	0.1	-25	0.4	-15	I				39
40		IRC-20424	---	---	1.7	26	I	4.8	1	1.5	18	I	DET	6	+	40
							I					I	160.0	19		
41		IRC-10414	---	---	---	---	I	2.5	28	18.0	47	I	158.3	45		41
42	V LYR	IRC 30360	---	---	---	---	I	0.8	-18	0.3	-4	I	---	---	-	42
43	RT AQL	IRC 10433	---	---	---	---	I	0.5	-33	0.3	-28	I	33.3	-38	+	43
44	GY AQL	IRC-10524	---	---	---	---	I	0.2	28	0.1	39	I	---	---	+	44
45	RR SGR	IRC-30419	---	---	---	---	I	0.3	99	0.1	106	I	20.8	85	-	45
46	UU PEG	IRC 10498					I	0.3	23	0.2	35	I	95.1	22		46
47	TW PEG	IRC 30481	---	---	---	---	I	DET				I	6.0	-19	-	47
							I					I	714.0	-8		
48	RV PEG	IRC 30492	---	---	---	---	I	0.5	-31	0.6	-21	I	---	---	-	48
49		IRC 10523	0.3	-9	0.1	11	I	0.6	4			I			+	49
50	R PEG	IRC 10527	---	---	---	---	I	1.7	20	0.6	29	I	78.0	24	+	50
51	R CAS	IRC 50484	---	---	---	---	I	2.2	23	5.1	31	I	96.0	26	+	51

III. INFRARED PROPERTIES

- LOG FLUX DENSITY

	NAME	I	K	I(104)	R	I	J	H	K	L	M	8.4	N	11.0	Q	CAL	
8	Y CAS	6.66	1.27	13.41		13.74	13.41	13.47	13.74	14.18	14.63		15.29			1	8
9	O CET			11.70	12.17	11.73	11.73		12.18	12.61						1	9
10	R HOR							13.01	13.18	13.64	14.22		15.16			3	10
11	W ERI	7.09	1.89	13.88													11
12	R TAU	5.07	1.15	13.30													12
13	IRC 20082	10.19	2.98	15.04					14.64	15.15	15.46			16.81		7	13
14	RX TAU	7.10	1.45	13.48													14
15	S PIG																15
16	RU AUR	8.32	1.39	13.37													16
17	AW TAU																17
18	U LYN	5.95	1.12	13.88													18
19	FX MON	7.97	2.72														19
20	Z PUP	7.48	1.77	13.53													20
21	231.8+4.2							DET	DET	DET	DET		DET		DET		21
22	AU GEM	8.12	2.52														22
23	X HYA	5.70	1.04	13.21													23
24	R LMI	4.84	0.62	12.39						13.69	14.86	15.68		15.85		4	24
25	R LEO			11.91				11.76	11.12	12.58	13.17		14.00			1	25
26	W VEL																26
27	W LEO	8.35	2.59	13.84													27
28	R COM	6.41	2.14	13.77													28
29	U CVN	7.94	2.84														29
30	RT VIR	3.41	-0.97	12.73													30
31	W HYA						11.81	10.27	12.13	12.64	13.14		13.96		14.94	3	31
32	RU HYA	5.34	1.56	13.51													32
33	Y LUP																33
34	S SER	6.59	1.53	13.54													34
35	S CRB	3.67	-0.20	12.90			12.97	13.09	13.34	13.80	14.26		14.84			3	35
36	U HER	3.87	-0.31	12.75			12.97	13.05	13.30	13.80	14.22		14.96		15.94	3	36
37	RX OPH	7.15	2.66														37
38	RW SCO			13.46					14.01	14.25						1	38
39	RT OPH	6.64	1.50	13.52													39
40	IRC-20424	7.21	0.90				13.93	13.77	13.86	14.08	14.42		14.88			3	40
41	IRC-10414	5.97	0.78														41
42	V LYR	7.30	2.37	13.88													42
43	RT AQL	6.54	1.40	13.38													43
44	GY AQL	4.50	-0.07														44
45	RR SGR	5.71	0.75	13.09													45
46	UU PEG	7.05	1.53														46
47	TW PEG	3.35	-0.63							13.81				15.16		4	47
48	RV PEG	7.46	2.12	13.79													48
49	IRC 10523	6.73	1.53	13.80		14.38	13.70	13.76	14.00	14.40	14.78		15.18			1	49
50	R PEG	4.61	0.33	12.94	13.77	13.02	12.98		13.38	13.83						1	50
51	R CAS	3.02	-1.84	12.77		13.40	12.53	12.54	12.77	13.19	13.62		14.22			1	51

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Table III Type II OH/IR stars

I. OPTICAL PROPERTIES

	NAME(S)		RA.	DEC.	DISTANCE	TYPE	MAGNITUDE	SPE.TYPE	PERIOD	REMARKS
52	WX PSC	IRC 10011	01 03 48	12 19.8	510	M			650	CIT 3
53	127.8+0.0	CRL 230	01 31 07	62 11.5						
54	RU ARI		02 42 01	12 06.5		M	11.4 (15.2	M10	854	
55	IK TAU	IRC 10050	03 50 46	11 15.7	270	M	11.9 16.5	M6E-M10E	460	WML TAU
56	NV AUR	IRC 50137	05 07 20	52 48.9	820	M		M10	620	
57	U ORI	IRC 20127	05 52 51	20 10.1	280	M	5.3 12.6	M6E-M9E	372	
58		IRC 40156	06 29 45	40 44.9	1400					
59		IRC 60169	06 30 02	60 58.9				M8		
60		CRL 1074	07 05 29	-10 39.3						
61		CRL 1099	07 15 16	-34 44.2				M6-7.5		
62	SS PUP	CRL 1192	07 44 34	-26 13.2	2000	M	12.5 16.0	M6	391	
63	235.3+18.1	CRL 1274	08 35 44	-10 13.7	3000			M7E		
64		IRC-20197	09 42 56	-21 48.1	740			M9	620	
65	V ANT		10 18 55	-34 32.5	1227	M	9.2 (12.5	M7E	303	
66	R CRT	IRC-20222	10 58 09	-18 03.6	294	SR	9.8 11.2	M4	160	
67	T VIR	IRC-10264	12 12 02	-05 45.5	1218	M	9.0 14.8	M6E	339	
68	T COM		12 56 12	23 24.6		M	11.5 (14.0	M2-M8-9E	406	
69	334.7+50.0	CRL 1686	14 08 39	-07 30.7	2000			M6		
70	RS VIR	IRC 00243	14 24 46	04 54.1	613	M	7.8 14.4	M6E-M7E	353	
71	WX SER	IRC 20281	15 25 32	19 44.1	970	M	12.0 (16.0	M8E	425	CIT 7
72	327.4-0.1		15 47 39	-54 00.0						
73	327.4-0.6		15 50 16	-54 24.4						
74	328.2+0.0		15 51 33	-53 23.8						
75	328.4-0.2		15 53 32	-53 29.0						
76	328.7-0.2		15 55 19	-53 16.7						
77	FS LIB	IRC-10329	15 57 36	-12 12.6	7980	M	15.1 (20.2		415	
78	330.4+0.1		16 02 01	-51 57.9						
79	345.0+15.7	CRL 1822	16 03 00	-30 41.4	6000					
80	331.6-0.3		16 09 40	-51 22.3						
81		IRC 30292	16 25 59	34 54.6	1400			M9		
82	337.5+0.1		16 33 26	-46 54.7						
83	337.3+0.3		16 34 03	-46 34.9						
84	338.0-0.1		16 36 19	-46 44.1						
85	338.5+0.1		16 37 30	-46 13.9						
86	338.5-0.2		16 38 20	-46 26.7						
87	358.2+0.5	CRL 1992	17 36 03	-30 12.8	3000					(1)
88	5.0+1.5		17 48 25	-23 50.6						
89		IRC-10381	17 48 28	-08 00.7	1150			M9		
90	2.6-3.4	CRL 2019	17 50 11	-26 56.0	3000			M8-9		
91	VV SGR	IRC-20403	17 54 06	-19 19.9	1453	M	12.1 (14.8	M6E	401	
92	5.0-3.8	CRL 2086	18 08 20	-26 30.3	3000			M6		
93	17.6+0.2	CRL 2136	18 19 37	-13 31.7	5000					
94	20.2-0.1		18 25 27	-11 21.3						
95	21.5+0.5		18 25 44	-10 00.1						(2)
96	20.7+0.1		18 25 44	-10 54.3						
97	19.2-1.0		18 26 44	-12 40.2						
98	23.7+1.2		18 27 25	-07 40.0						
99	22.0+0.0	CRL 2174	18 28 26	-09 46.9	9000					
100		IRC-10434	18 30 30	-07 29.0	1400					
101	22.8-0.3		18 30 42	-09 06.2	9000			M6.5		(3)
102	26.5+3.6	CRL 2205	18 34 52	-05 26.6						
103	/1111 OPH	IRC 10365	18 34 59	10 23.0	500	M	16.0 (19.0	M9		
104		IRC-10450	18 37 35	-05 45.8	1300					
105	26.2-0.6		18 38 34	-06 17.3						
106	28.7-3.6		18 43 11	-04 04.0						
107	30.7+0.4		18 43 17	-01 50.7						
108	RW LYR	IRC 40328	18 43 39	43 34.9	2376	M	10.3 15.8	M7E	504	
109	26.4-2.0		18 43 45	-06 44.4						
110	30.1-0.2		18 44 33	-02 38.9						
111	30.1-0.7		18 46 04	-02 53.9						
112	31.7-0.8		18 49 25	-01 33.5						
113	32.8-0.3		18 49 48	-00 17.8						
114	39.7+1.5	CRL 2290	18 56 04	06 38.8	3000					
115	R AQL	IRC 10406	19 03 58	08 9.2	300	M	5.7 12.0	M5E-M8E	293	
116		IRC-20540	19 05 56	-22 19.2	1050				530	
117	45.5+0.1		19 11 58	11 05.4						
118		CRL 2370	19 17 51	-26 20.3				M9		
119	22.7-17.9	CRL 2425	19 36 09	-16 58.8	1500			M7		
120	RR AQL	IRC 00458	19 54 58	-02 01.2	758	M	7.8 14.5	M6E-M7E	394	
121	Z CYG	IRC 50314	20 00 00	49 54.1	879	SR	10.8 13.5	M0	264	
122	SY AQL	IRC 10450	20 04 43	12 48.2	964	M	8.3 15.4	M5	356	
123		IRC-10529	20 07 46	-06 24.7	620				680	
124	U MIC		20 25 55	-40 35.1	883	M	7.0 14.4	M6E	334	
125	BR DEL		20 44 04	04 12.2	1117	M	10.0 (12.5	M8E	337	
126	UX CYG	IRC 30464	20 53 00	30 13.4	900	M	9.8 16.5	M4E-M6E	578	
127	V MIC		21 20 37	-40 55.2	1480	M	9.4 14.0	M6E	381	
128		IRC 40483	21 25 23	36 29.0	1100			M9		
129		CRL 2885	22 17 43	59 36.3						

NOTES: (1) POSSIBLE OPT.ID. BY LEBOFSKY,M.J.,KLEINMANN,S.G.,1976,ASTR.J.,81,534
(2) COINCIDENCE OF RADIO- AND INFRARED-EMISSION SOURCE NOT CONFIRMED
(3) PROBABLY CRL 2188

II. RADIO PROPERTIES

PEAK FLUX DENSITY AND VELOCITY

	NAME(S)		OH# 1612 MHZ			I	OH# 1665/67 MHZ				I	H2O# 22 GHZ		SIO
52	WX PSC	IRC 10011	37.0	-9	35.0	27	I	3.0	-10	3.0	27	I	6.7	22	+
53	127.8+0.0	CRL 230	32.0	-66	14.0	-44	I			4.5	-44	I			
54	RU ARI		0.3	16	0.9	24	I					I			
55	IK TAU	IRC 10050	2.5	17	3.0	51	I	2.5	16	---	---	I	90.8	19	+
							I					I	DET	40	
56	NV AUR	IRC 50137	4.0	-14	12.0	19	I	---	---	0.7	19	I	32.3	-11	+
57	U ORI	IRC 20127	6.5	-46	16.0	-42	I	2.0	-42	6.0	-36	I	88.0	-37	+
58		IRC 40156	4.6	-28	2.1	-4	I	---	---	1.3	-5	I			
59		IRC 60169	1.2	-36	0.4	-11	I	0.4	-87	0.5	-9	I	8.2	-30	+
							I					I	54.1	-18	
60		CRL 1074	0.4	39	0.2	65	I	8.1	43			I	DET		
61		CRL 1099					I	0.2	-7			I	DET		
62	SS PUP	CRL 1192	1.9	78	1.0	87	I	0.5	78			I	DET		
63	235.3+18.1	CRL 1274	1.4	-4	2.3	39	I			0.5	39	I	DET	45	
64		IRC-20197	7.0	27	5.0	52	I	0.7	27	---	---	I	7.7	46	-
65	V ANT			-22		-11	I					I	28.8	-18	+
66	R CRT	IRC-20222	2.0	2		22	I	2.0	2	---	---	I	390.8	11	-
67	T VIR	IRC-10264	0.3	4	0.2	11	I	0.1	4	0.1	9	I			
68	T COM		0.2	9	0.5	23	I					I	18.4	25	
							I					I	16.4	28	
69	334.7+50.0	CRL 1686	2.5	-41	1.9	-13	I	---	---	---	---	I			
70	RS VIR	IRC 00243	1.5	-17	7.0	-10	I	0.9	-17	2.3	-10	I	278.0	-14	-
71	WX SER	IRC 20281	3.0	-2	2.0	13	I	3.0	0	---	---	I	15.2	8	+
72	327.4-0.1		3.8	-106	2.8	-61	I					I			-
73	327.4-0.6		5.0	-22	19.0	6	I					I			
74	328.2+0.0		104.0	-79	236.0	-39	I					I			-
75	328.4-0.2		4.9	-68	8.9	-30	I					I			-
76	328.7-0.2		2.3	-40	5.0	-19	I					I			-
77	FS LIB	IRC-10329	0.2	-13	0.2	6	I	0.1	-13			I	---	---	
78	330.4+0.1		2.6	-57	1.8	-28	I					I			-
79	345.0+15.7	CRL 1822	18.0	-16	10.5	10	I	---	---	---	---	I			
80	331.6-0.3		2.0	-44	8.9	-25	I					I			-
81		IRC 30292	3.0	42	1.0	68	I	---	---	---	---	I	14.0	46	-
							I					I	DET	65	
82	337.5+0.1		7.1	-144	1.7	-92	I					I			-
83	337.9+0.3		4.3	-78	1.0	-39	I					I			-
84	338.0-0.1		9.0	-87	3.0	-47	I					I			-
85	338.5+0.1		6.7	-142	5.4	-118	I					I			-
86	338.5-0.2		0.7	-128	1.3	-74	I					I			-
87	358.2+0.5	CRL 1992	22.4	-18	16.5	22	I	0.3	-18	0.8	22	I			
88	5.0+1.5		5.0	107	4.0	135	I					I			
89		IRC-10381	---	---	2.5	-15	I	---	---	---	---	I	---	---	-
90	2.6-3.4	CRL 2019	15.6	-27	18.3	19	I	---	---	---	---	I	DET		
91	VV SGR	IRC-20403	0.4	56	0.1	64	I	0.2	57	0.2	60	I			
92	5.0-3.8	CRL 2086	0.8		2.1	44	I					I			
93	17.6+0.2	CRL 2136	0.3	22	0.3	40	I					I	DET		
94	20.2-0.1		6.0	11	5.8	43	I					I			
95	21.5+0.5		8.0	97	12.0	134	I					I			-
96	20.7+0.1		13.0	118	5.0	155	I	2.5	118	1.5	156	I			
97	19.2-1.0		6.0	37	16.0	58	I					I			
98	23.7+1.2		5.0	-14	4.9	15	I					I			
99	22.0+0.0	CRL 2174	1.3	108	1.0	152	I					I			
100		IRC-10434	0.7	47	4.3	74	I	---	---	0.8	71	I			-
101	22.8-0.3		1.4	77	2.7	109	I					I			
102	26.5+3.6	CRL 2205	210.0	13	420.0	41	I	8.0	13	6.0	40	I			-
103	/1111 OPH	IRC 10365	1.5	-47			I	---	---	---	---	I	43.0	-40	+
104		IRC-10450	---	---	3.4	-27	I	---	---	---	---	I	---	---	-
105	26.2-0.6		23.0	50	13.0	93	I					I			
106	28.7-0.6		8.5	29	7.8	64	I					I			
107	30.7+0.4		16.0	49	11.0	84	I			0.5	84	I			
108	RW LYR	IRC 40328	0.5	-28	0.4	-14	I	DET	-24			I	---	---	
109	26.4-2.0		8.2	16	13.9	40	I					I			
110	30.1-0.2		14.0	34	12.0	68	I					I	3.5	36	-
111	30.1-0.7		58.0	81	43.0	120	I			6.0	120	I	6.4	87	-
112	31.7-0.8		4.9	66	6.2	92	I					I			
113	32.8-0.3		29.0	46	22.0	76	I	1.4	45	1.2	76	I	11.4	48	-
114	39.7+1.5	CRL 2290	49.8	4	74.1	36	I			0.6	38	I			
115	R AQL	IRC 10406	4.0	43	8.0	54	I	7.5	43	5.0	53	I	110.0	49	+
116		IRC-20540	12.0	8	6.0	35	I	---	---	---	---	I	58.8	11	+
117	45.5+0.1		9.0	18	12.0	52	I					I	---	---	-
118		CRL 2370	7.2	-12	7.2	22	I			0.3	23	I			
119	22.7-17.9	CRL 2425	2.7	51	3.8	66	I					I	DET		
120	RR AQL	IRC 00458	3.0	23	5.0	32	I	2.0	24	---	---	I	37.8	26	+
							I					I	DET	29	
121	Z CYG	IRC 50314	4.0	-156	0.8	-152	I					I	29.5	-148	-
122	SY AQL	IRC 10450	0.6	-58	0.9	-51	I			0.2	-51	I	13.3	-49	-
123		IRC-10529	35.0	-32	2.0	-7	I	8.0	-32	---	---	I	---	---	+
124	U MIC		0.6	-62	0.5	-56	I	0.4	-56	0.3	-12	I	16.0	-59	-
125	BR DEL		0.7	-55	0.4	-50	I	---	---	---	---	I			
126	UX CYG	IRC 30464	3.1	-12			I	1.3	-8	1.0	17	I	3.8	2	+
127	V MIC		9.2	-4	4.8	7	I			1.9	6	I	7.0	0	-
128		IRC 40483	2.0	30	3.5	58	I	---	---	---	---	I	---	---	
129		CRL 2885	41.0	-40	39.0	-10	I	0.4	-40	0.4	-11	I			

III. INFRARED PROPERTIES

- LOG FLUX DENSITY

	NAME	I	K	I(104)	R	I	J	H	K	L	M	8.4	N	11.0	Q	CAL
52	WX PSC	9.23	1.63	15.95			15.18	14.61	14.20	13.98	13.92		14.39			1
53	CRL 230								14.36	13.09	12.84			13.43		
54	RU ARI															
55	IK TAU	5.54	-1.24	12.98			12.83	12.79	12.98	13.33	13.58		14.11		14.87	1
56	NV AUR	9.29	2.72				15.57	14.76	14.42	14.29	14.34		14.75		15.47	2
57	U ORI	4.91	-0.49	12.59			12.65	12.77	13.02	13.52	13.94		14.76		15.74	3
58	IRC 40156	9.56	2.73				14.98	14.43	14.46	14.70			15.39			2
59	IRC 60169	7.58	1.32	13.83		14.47		13.52	13.70	14.05			14.86			1
60	CRL 1074															
61	CRL 1099						13.91	13.93	14.17	14.37						1
62	SS PUP						14.35	14.38	14.49	14.49						1
63	CRL 1274						15.59	15.18	14.93	14.81						1
64	IRC-20197	7.63	1.46				14.32	14.12	14.20	14.53	14.75		15.07		14.87	2
65	V ANT															
66	R CRT	6.04	1.23													
67	T VIR	6.28	2.77	14.07												
68	T COM															
69	CRL 1686						14.35	14.30	14.45	14.65						1
70	RS VIR	6.44	1.48	13.30						14.46	14.84	15.40		15.56		4
71	WX SER	8.02	1.94	14.72			14.45	14.26	14.32	14.60	14.85		15.23			2
72	327.4-0.1							16.65	16.09	15.69						1
73	327.4-0.6						15.93	15.43	15.14	14.93						1
74	328.2+0.0						16.26	16.37	16.72							1
75	328.4-0.2						17.00	16.28	15.84	15.51						1
76	328.7-0.2							17.28	16.61	16.14						1
77	FS LIB	8.35	2.68	14.51												1
78	330.4+0.1						16.61	16.56	16.90							1
79	CRL 1822								16.37	15.49						1
80	331.6-0.3						16.54	16.14	15.93	15.76						1
81	IRC 30292	9.44	3.10	15.16		15.89	14.86	14.64	14.67	14.90	15.10		15.57			1
82	337.5+0.1							17.17	16.91	17.06						1
83	337.3+0.3						13.91	13.82	14.01	14.28						1
84	338.0-0.1							16.66	16.74	17.06						1
85	338.5+0.1							16.71	16.84	17.25						1
86	338.5-0.2						16.71	16.18	16.16	16.48						1
87	CRL 1992						15.67	14.90	14.55	14.41						1
88	5.0+1.5									16.29						5
89	IRC-10381	9.17	2.29				14.41	14.25	14.34	14.62	14.92		15.44			2

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Table III *(continued)*

- LOG FLUX DENSITY

	NAME	I	K	I(104)	R	I	J	H	K	L	M	8.4	N	11.0	Q	CAL	
90	IRL 2019						15.19	14.66	14.45	14.45						1	90
91	VV SGR	6.09	1.97														91
92	IRL 2086								15.29	15.05						1	92
93	IRL 2136						18.07	17.22	16.33	15.37						1	93
94	20.2-0.1									15.91						5	94
95	21.5+0.5									16.81		15.84	16.20	16.33	16.73	16.52	6	95
96	20.7+0.1									16.13							5	96
97	19.2-1.0									16.03							5	97
98	23.7+1.2									15.69							5	98
99	IRL 2174							16.18	15.81	15.53							1	99
100	IRC-10436	8.83	2.47				14.43	14.23	14.41	14.86			15.71				2	100
101	22.9-0.3						15.03	14.98	15.17	15.49							1	101
102	IRL 2205								16.89	14.87	14.56	14.85	15.03	15.37	15.27		6	102
103	IRC 10365	6.85	0.77				13.55	13.53	13.65	14.00	14.43		14.97				2	103
104	IRC-10450	9.33	2.94				14.27	14.16	14.29	14.50			15.42				2	104
105	26.2-0.6									16.06							5	105
106	28.7-0.6									15.28				15.76			5	106
107	30.7+0.4									15.76				16.05			5	107
108	RW LYR	6.88	2.03															108
109	26.4-2.0									15.26				15.83			5	109
110	30.1-0.2								15.76	15.22		15.25	15.65	15.78	15.28	16.25	6	110
111	30.1-0.7									16.59		15.77	15.80	15.91	16.88	16.13	6	111
112	31.7-0.8									15.63							5	112
113	32.8-0.3									15.78		15.21	15.48	15.70	16.17	15.82	6	113
114	IRL 2290							16.66	15.65	14.89							1	114
115	R AQL	4.47	-0.57	12.58			12.62	12.74	13.02	13.58		13.96		14.91			2	115
116	IRC-20540	6.27	2.22				14.70	14.46	14.44	14.60		14.99		15.44			2	116
117	45.5+0.1								15.95	15.54		15.71	15.94	16.05	16.17	16.55	6	117
118	IRL 2370						15.11	14.73	14.69	14.81							1	118
119	IRL 2425						14.11	14.18	14.37	14.77							1	119
120	RX AQL	5.39	0.66	13.42			13.02	13.11	13.35	13.79		14.18		14.95			2	120
121	Z CYG		2.44															121
122	SY AQL	7.79	2.70	13.86														122
123	IRC-10529	9.42	2.65				15.58	14.90	14.48	14.16		14.17		14.62			2	123
124	U MIC								14.29								1	124
125	BR DEL																	125
126	UX CYG	6.92	1.69				14.26	14.17	14.30	14.64		14.97		15.72			2	126
127	V MIC								14.13	14.50		14.81		15.31			1	127
128	IRC 40483	11.34	2.97				14.63	14.45	14.42	14.54		14.74		15.13			2	128
129	IRL 2885																	129

Table IV H20/IR stars without detected OH-emission

I. OPTICAL PROPERTIES

	NAME(S)		RA.	DEC.	DISTANCE	TYPE	MAGNITUDE		SPE.TYPE	PERIOD	REMARKS	
130	S SCL	IRC-30006	00 12 49	-32 19.1		M	6.1	13.6	M3E-M8E	366		130
131	HD 11979	IRC 50049	01 55 35	45 11.7								131
132	R DOR		04 36 10	-62 10.5	234	SR	5.9	6.9	M7	338		132
133	U AUR	IRC 30126	05 38 55	32 01.1		M	7.5	15.5	M7E-M9E	408		133
134	V CAM	IRC 70067	05 55 58	74 30.4		M	8.5	16.0	M7E	522		134
135	L2 PUP		07 12 01	-44 33.4	64	SR	2.6	6.0	M5E-M6E	141		135
136	R CAR	CRL 4095	09 38 58	-62 34.1	144	M	3.9	10.0	M4E-M8E	309		136
137	V LEO		09 57 18	21 31.7		M	6.4	14.6	M5E	273		137
138		IRC-30182	11 46 13	-26 28.6							(1)	138
139	S CRT	IRC-10259	11 50 12	-07 19.0		SR	10.7	12.3	M6E-M7E	155		139
140	V CVN	IRC 50226	13 17 17	45 47.4		SR	6.8	8.8	M4E-M6E	192		140
141	S VIR	IRC-10290	13 30 23	-06 56.4	477	M	6.3	13.2	M6E-M7E	378		141
142	Z BOO		14 04 04	13 43.3		M	8.2	15.0	M5E-M6E	281		142
143	R CEN	CRL 4191	14 12 57	-59 40.9		M	5.4	11.8	M4E-M7E	548		143
144	RX BOO	IRC 30257	14 21 58	25 55.9		SR	8.6	11.3	M7E-M8E			144
145	R SER	IRC 20285	15 48 23	15 17.1		M	5.2	14.4	M6E-M9E	356		145
146		IRC 10322	17 11 56	08 59.3					M8-9.5			146
147		IRC-30308	17 35 27	-31 55.8					M7.8-8.7		(2)	147
148		IRC-20427	18 02 38	-21 14.0					M1			148
149	KY CYG	IRC 40415	20 24 06	38 11.3		IR	13.3	14.6	M4			149
150	SV PEG	IRC 40501	22 03 31	35 06.7		SR	9.2	11.0	M7	145		150

NOTES: (1) H20-DETECTION NOT CONFIRMED
(2) OH-EMISSION DETECTED, POSSIBLE M-SUPERGIANT (87)

II. RADIO PROPERTIES

PEAK FLUX DENSITY AND VELOCITY

	NAME(S)		OH: 1612 MHZ				I	OH: 1665/67 MHZ				I	H20: 22 GHZ		SIO	
130	S SCL	IRC-30006					I	---	---	---	---	I	23.0	-2	-	130
							I					I	18.0	9		
131	HD 11979	IRC 50049	---	---	---	---	I	---	---	---	---	I	4.1	4		131
132	R DOR						I					I	315.0	6	+	132
133	U AUR	IRC 30126	---	---	---	---	I	---	---	---	---	I	5.4	6		133
134	V CAM	IRC 70067	---	---	---	---	I					I	2.9	8		134
							I					I	3.8	2		
135	L2 PUP		---	---	---	---	I					I	49.0	29	+	135
							I					I	90.0	36		
136	R CAR	CRL 4095	---	---	---	---	I	---	---	---	---	I	20.0	8	+	136
137	V LEO						I					I	16.0	-27		137
138		IRC-30182					I					I	50.0	20	-	138
139	S CRT	IRC-10259					I	---	---	---	---	I	85.4	38		139
							I					I	62.6	48		
140	V CVN	IRC 50226					I					I	15.3	-1	-	140
141	S VIR	IRC-10290	---	---	---	---	I	---	---	---	---	I	18.0	15	+	141
							I					I	13.0	12		
142	Z BOO		---	---	---	---	I	---	---	---	---	I	11.0	48		142
143	R CEN	CRL 4191					I					I	51.0	-27	-	143
							I					I	42.0	-38		
144	RX BOO	IRC 30257	---	---	---	---	I	---	---	---	---	I	60.0	5	+	144
145	R SER	IRC 20285	---	---	---	---	I	---	---	---	---	I	22.0	24	-	145
146		IRC 10322	---	---	---	---	I					I	17.0	7	+	146
147		IRC-30308					I					I	DET	-14	+	147
148		IRC-20427	DET				I					I	87.2	17		148
149	KY CYG	IRC 40415	---	---	---	---	I					I	22.6	0		149
150	SV PEG	IRC 40501	---	---	---	---	I					I	58.9	2	-	150

III. INFRARED PROPERTIES

- LOG FLUX DENSITY

	NAME	I	K	I(104)	R	I	J	H	K	L	M	8.4	N	11.0	Q	CAL	
130	S SCL	3.64	0.39	13.87													130
131	IRC 50049	2.93	-1.11														131
132	R DOR				12.45	11.52										1	132
133	U AUR	4.96	0.98	13.26													133
134	V CAM	7.67	1.49	13.34													134
135	L2 PUP				12.59	12.00										1	135
136	R CAR				13.05	12.37										1	136
137	V LEO			14.22													137
138	IRC-30182	2.57	-8.31														138
139	S CRT	4.64	0.73														139
140	V CVN	4.52	1.10	13.33						14.46		14.95	15.49		15.45	4	140
141	S VIR	5.70	0.57	13.87													141
142	Z BOO			14.27													142
143	R CEN																143
144	RX BOO	2.77	-1.85	12.39						13.25		13.92	14.49		14.62	4	144
145	R SER	4.30	-0.01	13.00						14.22		14.69	15.38		15.56	4	145
146	IRC 10322	7.53	1.22														146
147	IRC-30308	9.45	2.71	15.35			14.96	14.52	14.56	14.71		14.98	15.34		15.29	7	147
148	IRC-20427	7.37	2.58														148
149	KY CYG	6.00	0.28														149
150	SV PEG	3.90	-0.55														150

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Table V SIO/IR stars

I. OPTICAL PROPERTIES

	NAME(S)		RA.	DEC.	DISTANCE	TYPE	MAGNITUDE		SPE.TYPE	PERIOD	REMARKS	
151	Y CAS	IRC 60081	00 08 45	55 24.4	955	M	8.9	15.3	M6E-M8E	414		151
152	WX PSC	IRC 10011	01 03 48	12 19.8	510	M				658	CIT 3	152
153	W AND	IRC 40037	02 14 23	44 04.5		M	6.7	14.5	S6E-M7E	397		153
154	O CET	IRC 00030	02 16 49	-03 12.2	250	M	2.0	10.1	M5E-M9E	332	MIRA	154
155	S PER	IRC 60086	02 19 16	58 21.3		SR	7.9	11.1	M3E-M4E	658		155
156	R HOR		02 52 12	-50 07.6	265	M	4.7	14.3	M5E-M7E	484		156
157	IK TAU	IRC 10050	03 58 46	11 15.7	270	M	11.9	16.5	M6E-M10E	460	NML TAU	157
158	W ERI	IRC-30033	04 09 26	-25 15.4	693	M	7.5	14.5	M7E	876		158
159	R TAU	IRC 10060	04 25 36	18 03.5	594	M	8.1	14.7	M5E-M7E	324		159
160	R DOR		04 36 10	-62 10.5	234	SR	5.9	6.9	M7	338		160
161	R CAE	GRL 617	04 38 46	-38 19.9	440	M	6.7	13.7	M6E	391		161
162	TX CAM	IRC 60150	04 56 44	56 06.9		M	11.6	16.2	M8	557		162
163	T LEP	IRC-20066	05 02 43	-21 58.4	306	M	7.4	13.5	M6E-M8E	368		163
164	NV AUR	IRC 50137	05 07 20	52 48.9	820	M			M10	620		164
165	R AUR	IRC 50141	05 13 15	53 31.9		M	6.7	13.7	M7E-M9E	458		165
166	T COL		05 17 27	-33 45.5		M	6.6	12.7	M4E-M6	226		166
167	U ORI	IRC 20127	05 52 51	20 10.1	280	M	5.8	12.6	M6E-M9E	372		167
168		IRC 60169	06 30 02	60 58.9					M8			168
169	L2 PUP		07 12 01	-44 33.4	64	SR	2.6	6.0	M5E-M6E	141		169
170	VY CMA	IRC-30087	07 20 55	-25 40.2	400	-	6.5	9.4	M5 PEC	----		170
171	Z PUP	IRC-20133	07 30 29	-20 32.8	540	M	7.2	14.6	M4E-M9E	500		171
172	R CNC	IRC 10185	08 13 49	11 52.9		M	6.2	11.8	M6E-M8E	362		172
173	R CAR	GRL 4095	09 30 58	-62 34.1	144	M	3.9	10.0	M4E-M8E	309		173
174	R LMI	IRC 30215	09 42 35	34 44.6	350	M	6.3	13.2	M6E-M9E	372		174
175	R LEO	IRC 10215	09 44 52	11 39.8	232	M	4.4	11.3	M6E-M9E	313		175
176	V ANT		10 18 55	-34 32.5	1227	M	9.2	(12.5	M7E	303		176
177	R HYA	IRC-20254	13 26 59	-23 01.5		M	3.8	11.0	M6E-M8E	388		177
178	S VIR	IRC-10290	13 30 23	-06 56.4	477	M	6.3	13.2	M6E-M7E	378		178
179	W HYA	IRC-30207	13 46 13	-28 07.1	100	SR	7.7	11.6	M8E-M9E	398		179
180	RX BOO	IRC 30257	14 21 58	25 55.9		SR	8.6	11.3	M7E-M8E			180
181	S CRB	IRC 30272	15 19 21	31 32.8	375	M	5.8	14.0	M6E-M8E	360		181
182	WX SER	IRC 20281	15 23 32	19 44.1	970	M	12.8	(16.0	M8E	425	CIT 7	182
183	RU HER	IRC 30282	16 08 07	25 12.0		M	6.8	14.3	M6E-M7E	485	CIT 8	183
184	U HER	IRC 20298	16 23 35	19 00.3	457	M	6.5	13.4	M6E-M9E	406		184
185	RR SCO	IRC-30271	16 53 26	-30 29.6		M	5.0	12.4	M6-M8E	280		185
186	AH SCO	IRC-30282	17 08 02	-32 15.9	2600	SR	8.1	12.0	M3E	714		186
187	RW SCO	GRL 1937	17 11 36	-33 22.6	800	M	8.8	15.0	M5E	390		187
188		IRC 10322	17 11 56	08 59.3					M8-9.5			188
189		IRC-30308	17 35 27	-31 55.8					M7.8-8.7			189
190		IRC-20424	18 00 58	-20 19.5	560							190
191	VX SGR	IRC-20431	18 05 03	-22 14.0	500	SR	6.5	12.5	M4E-M9E	732		191
192	V1111 OPH	IRC 10365	18 34 59	10 23.0	500	M	16.0	(19.0	M9			192
193	R AQL	IRC 10406	19 03 58	08 9.2	300	M	5.7	12.0	M5E-M8E	293		193
194		IRC-20540	19 05 56	-22 19.2	1050					530		194
195	RT AQL	IRC 10433	19 35 36	11 36.3	532	M	7.8	14.5	M6E-M8E	331		195
196	GY AQL	IRC-10524	19 47 20	-07 44.3		SR	10.0	(16.0	M6E	204		196
197	CHICYG	IRC 30395	19 48 39	32 47.2		S	3.3	14.2	S7E-S10E	407		197
198	RR AQL	IRC 00458	19 54 58	-02 01.2	758	M	7.8	14.5	M6E-M7E	394		198
199		IRC-10529	20 07 46	-06 24.7	620					680		199
200	NML CYG	IRC 40448	20 44 34	39 55.9	500							200
201	UX CYG	IRC 30464	20 53 00	30 13.4	900	M	9.0	16.5	M4E-M6E	578		201
202	T CEP	IRC 70168	21 06 52	68 17.4		M	5.4	11.0	M5E-M9E	388		202
203		IRC 10523	22 51 40	08 37.9					M8			203
204	R PEG	IRC 10527	23 04 08	10 16.4	480	M	6.9	13.8	M6E-M9E	378		204
205	R AQR	IRC-20642	23 41 12	-15 34.1	181	M	5.8	11.5	M7E-PEC	387		205
206	R CAS	IRC 50484	23 55 53	51 06.6	359	M	4.7	13.1	M6E-M10E	431		206

II. RADIO PROPERTIES

PEAK FLUX DENSITY AND VELOCITY

	NAME(S)		SIO# 43 GHZ		I	SIO# 86 GHZ			I	SIO# 43 GHZ		
151	Y CAS	IRC 60001				60.0	-15	I	19.0	-21	16.0	-17	I			151
152	WX PSC	IRC 10011	150.0	8		DET	28	I	48.8	6			I			152
153	W AND	IRC 40037	26.6	-34				I	31.1	-33			I			153
154	O CET	IRC 00030	91.0	45		88.0	47	I					I			154
155	S PER	IRC 60086	22.0	-38		13.0	-36	I			14.8	-34	I			155
156	R HOR		61.0	31		50.0	39	I					I			156
157	IK TAU	IRC 10050	235.0	35		124.0	39	I					I			157
158	W ERI	IRC-30033	80.0	-1				I					I			158
159	R TAU	IRC 10060	40.0	10				I					I			159
160	R DOR		93.0	4				I					I			160
161	R CAE	GRL 617	42.0	2				I					I			161
162	TX CAM	IRC 60150	10.0	-11		23.0	11	I					I			162
163	T LEP	IRC-20066	68.0	29				I					I			163
164	NV AUR	IRC 50137	---	---		---	---	I	8.5	1			I			164
165	R AUR	IRC 50141	60.0	-8				I					I			165
166	T COL		88.0	25				I					I			166
167	U ORI	IRC 20127				106.0	-36	I	46.6	-42	31.1	-40	I			167
168		IRC 60169	32.0	-24				I					I			168
169	L2 PUP		80.0	25		255.0	41	I					I			169
170	VY CMA	IRC-30087	311.0	5		311.0	23	I	155.4	11	38.9	32	I	622.8	12	170
171	Z PUP	IRC-20133						I	24.0	0	32.0	7	I			171
172	R CNC	IRC 10185	35.0	16		100.0	20	I	88.8	14	93.2	19	I			172
173	R CAR	GRL 4095	48.0	5		49.0	10	I					I			173
174	R LMI	IRC 30215	125.0	-1		92.0	0	I					I			174
175	R LEO	IRC 10215	244.8	-2		226.0	7	I	---	---	186.5	7	I			175
176	V ANT		42.0	16				I					I			176
177	R HYA	IRC-20254	120.0	-9				I					I			177
178	S VIR	IRC-10290	63.0	5				I					I			178
179	W HYA	IRC-30207	440.0	38		---	---	I	369.0	39	97.1	44	I			179
180	RX BOO	IRC 30257	---	---		---	---	I	21.4	8	23.3	4	I			180
181	S CRB	IRC 30272	18.0	5				I	---	---	---	---	I			181
182	WX SER	IRC 20281	40.0	7				I	---	---	---	---	I			182
183	RU HER	IRC 30282	40.8	-12				I	57.7	-12			I			183
184	U HER	IRC 20298	240.0	-16		71.0	-10	I	17.5	-16	11.7	-10	I			184
185	RR SCO	IRC-30271						I	53.0	-31			I			185
186	AH SCO	IRC-30282	120.0	-2		44.4	1	I	44.4	-2			I			186
187	RW SCO	GRL 1937	67.0	-71				I					I			187
188		IRC 10322	56.0	10				I					I			188
189		IRC-30308	14.0	2				I					I			189
190		IRC-20424	75.0	16				I					I			190
191	VX SGR	IRC-20431	370.0	3		270.0	8	I	27.2	-2	21.4	5	I			191
192	V1111 OPH	IRC 10365				100.0	-32	I	90.0	-33	74.0	-31	I			192
193	R AQL	IRC 10406	40.0	42				I	---	---	---	---	I			193
194		IRC-20540	50.0	23				I					I			194
195	RT AQL	IRC 10433	78.0	-32				I					I			195
196	GY AQL	IRC-10524	80.0	32				I					I			196
197	CHICYG	IRC 30395	18.0	9				I	52.4	9			I			197
198	RR AQL	IRC 00458	133.0	30		80.0	32	I					I			198
199		IRC-10529	88.8	17		111.0	19	I					I			199
200	NML CYG	IRC 40448	44.0	-12		71.0	4	I			25.4	1	I	146.0	0	200
201	UX CYG	IRC 30464	---	---		---	---	I	58.0	5			I			201
202	T CEP	IRC 70168	44.4	-1				I	62.2	-2			I			202
203		IRC 10523	40.0	0				I					I			203
204	R PEG	IRC 10527	32.0	19		38.0	23	I					I			204
205	R AQR	IRC-20642	33.0	-25				I					I			205
206	R CAS	IRC 50484	373.0	28				I			24.1	23	I			206

Table V *(continued)*

III. INFRARED PROPERTIES

- LOG FLUX DENSITY

	NAME	I	K	I(104)	R	I	J	H	K	L	M	8.4	N	11.0	Q	CAL	
151	Y CAS	6.65	1.27	13.41		13.74	13.41	13.47	13.74	14.18	14.63		15.29			1	151
152	WX PSC	9.23	1.63	15.95			15.18	14.61	14.20	13.98	13.92		14.39			1	152
153	W AND	6.48	0.88	13.12		13.45	12.99	13.08	13.40	13.91	14.40		15.17			1	153
154	O CET			11.70	12.17	11.73	11.73		12.18	12.51						1	154
155	S PER	3.70	1.31		14.54	13.84	13.72		13.99	14.34	14.61		15.21			2	155
156	R HOR							13.81	13.18	13.64	14.22		15.16			3	156
157	IK TAU	5.54	-1.24	12.98			12.83	12.79	12.98	13.33	13.58		14.11		14.87	1	157
158	W ERI	7.09	1.89	13.88													158
159	R TAU	5.07	1.15	13.30													159
160	R DOR				12.45	11.52										1	160
161	R CAE			13.14													161
162	TX CAM	6.95	0.08		15.77	14.23	13.50		13.25	13.54						1	162
163	T LEP	5.32	0.33	13.46													163
164	NV AUR	9.29	2.72				15.57	14.76	14.42	14.29	14.34		14.75		15.47	2	164
165	R AUR	3.40	-0.94	12.74													165
166	T COL			13.56													166
167	U ORI	4.91	-0.49	12.59			12.65	12.77	13.02	13.52	13.94		14.76		15.74	3	167
168	IRC 60169	7.58	1.32	13.83		14.47		13.52	13.70	14.05			14.86			1	168
169	L2 PUP				12.59	12.00										1	169
170	VY CMA	4.87	-0.69				13.25	13.12	13.12	13.12	13.18		13.59		13.87	2	170
171	Z PUP	7.48	1.77	13.53													171
172	R CNC	2.98	-0.74	12.67						13.68	14.09	14.83		15.04		4	172
173	R CAR				13.05	12.37										1	173
174	R LMI	4.84	0.62	12.39						13.69	14.06	15.68		15.85		4	174
175	R LEO			11.91				11.76	11.12	12.58	13.17		14.88			1	175
176	V ANT																176
177	R HYA	2.32		12.86	12.67	12.01	11.92		12.34	12.84						4	177
178	S VIR	5.71	0.57	13.87													178
179	W HYA						11.81	10.27	12.13	12.64	13.14		13.96		14.94	3	179
180	RX BOO	2.77	-1.85	12.39						13.25	13.92	14.49		14.62		4	180
181	S CRB	3.67	-0.20	12.90			12.97	13.09	13.34	13.80	14.26		14.84			3	181
182	WX SER	8.02	1.94	14.72			14.45	14.26	14.32	14.60	14.85		15.23			2	182
183	RU HER	6.03	2.28	13.05		13.76	13.40	13.40	13.68	14.07	14.46	15.10		15.25		7	183
184	U HER	3.87	-0.31	12.75			12.97	13.05	13.30	13.80	14.22		14.96		15.94	3	184
185	RR SCO	3.46	-0.30	13.50					13.31							1	185
186	AH SCO	4.31	0.32						13.65							1	186
187	RW SCO			13.46					14.01	14.25						1	187
188	IRC 10322	7.53	1.22														188
189	IRC-30308	9.45	2.71	15.35													189
190	IRC-20424	7.21	0.90				13.93	13.77	13.86	14.88	14.42		14.80			3	190
191	VX SGR	4.39	-0.37				12.92	13.00	13.18	13.37	13.61		14.16			2	191
192	IRC 10365	6.65	0.77				13.55	13.53	13.65	14.08	14.43		14.97			2	192
193	R AQL	4.47	-0.57	12.58			12.62	12.74	13.02	13.58	13.96		14.91			2	193
194	IRC-20540	6.27	2.22				14.78	14.46	14.44	14.60	14.99		15.44			2	194
195	RT AQL	6.54	1.40	13.38													195
196	GY AQL	4.50	-0.07														196
197	CHICYG	2.52		12.34		12.82	12.29	12.39	12.65	13.05						1	197
198	RR AQL	5.39	0.66	13.42			13.02	13.11	13.35	13.79	14.18		14.95			2	198
199	IRC-10529	9.42	2.65				15.58	14.90	14.48	14.16	14.17		14.62			2	199
200	IRC 40448	8.79	0.62	15.05		15.74	14.56	14.04	13.65	13.45	13.50		13.71			1	200
201	UX CYG	6.92	1.69				14.26	14.17	14.30	14.54	14.97		15.72			2	201
202	T CEP	3.26	-1.56	12.47		13.92	12.36	12.43	12.75	13.26						1	202
203	IRC 10523	6.73	1.53	13.80		14.38	13.70	13.76	14.00	14.48	14.78		15.18			1	203
204	R PEG	4.61	0.33	12.94	13.77	13.02	12.98		13.38	13.83						1	204
205	R AQR	3.59	-1.22	12.44						13.22				14.29		4	205
206	R CAS	3.02	-1.84	12.77		13.40	12.53	12.54	12.77	13.19	13.62		14.22			1	206

Table VI Objects undetected in the optical or infrared

PEAK FLUX DENSITY AND VELOCITY

	NAME	RA.	DEC.	OH# 1612 MHZ				I	OH# 1665/67 MHZ				I	H2O# 22 GHZ		SIO	REM.	
207	138.0+7.2	03 20 36	65 21.2	9.7	-47	7.1	-28	I					I					207
208	141.7+3.5	03 29 29	60 10.3	5.0	-70	1.0	-45	I	0.5	-70	0.8	-45	I					208
209	305.9-1.9	13 15 42	-64 23.0	1.4	-46	1.3	-76	I					I					209
210	327.1-0.3	15 46 50	-54 20.2	7.8	-88	24.0	-54	I					I			-		210
211	337.4-0.1	16 33 48	-47 13.9	6.0	-43	9.5	-13	I					I			-		211
212	343.4+1.3	16 49 52	-41 43.8	5.5	-64	12.0	-21	I	---	---	---	---	I	---	---	-	(1)	212
213	0.1+5.1	17 23 18	-26 03.0	4.0	-151	2.0	-135	I					I					213
214	359.5+1.3	17 26 21	-28 37.3	1.6	18	0.4	45	I					I					214
215	359.8+2.6	17 31 44	-27 43.2	4.7	37	5.3	60	I					I					215
216	359.1+1.2	17 35 37	-29 02.4	1.8	-145	1.6	-127	I					I					216
217	356.5-0.6	17 35 58	-32 10.3	10.0	61	32.0	87	I	4.0	60			I	---	---		(2)	217
218	359.7+1.3	17 36 53	-28 30.5	0.7	33	0.8	62	I					I					218
219	358.1+0.1	17 37 12	-30 29.5	1.1	-40	1.3	-11	I					I					219
220	1.2+1.3	17 40 29	-27 13.5	5.6	31	5.3	58	I					I					220
221	1.3+1.0	17 41 43	-27 15.3	4.2	-27	4.2	8	I					I					221
222	0.1+0.1	17 42 33	-28 46.8	2.0	146	3.1	174	I					I					222
223	0.4+0.1	17 42 51	-28 31.5	1.0	125	0.9	155	I					I					223
224	0.0-0.1	17 43 01	-28 57.6	0.8	99	1.9	127	I					I					224
225	0.3-0.0	17 43 06	-28 42.1	1.5	58	4.4	93	I					I					225
226	1.1+0.4	17 43 34	-27 47.4	0.8	-143	1.3	-108	I					I					226
227	0.3-0.2	17 43 59	-28 44.2	4.9	-357	3.5	-328	I					I					227
228	0.5-0.1	17 44 06	-28 34.6	0.9	130	1.4	154	I					I					228
229	359.4-1.3	17 45 50	-30 06.4	4.4	-234	5.3	-203	I					I					229
230	1.5+0.0	17 45 57	-27 40.6	3.0	-141	4.1	-114	I					I					230
231	0.5-0.8	17 46 34	-28 52.9	1.1	-64	0.8	-30	I					I					231
232	1.7-0.0	17 46 57	-27 29.1	0.8	105	4.2	134	I					I					232
233	2.5+0.3	17 47 22	-26 39.2	0.4	-86	0.5	-71	I					I					233
234	1.1-0.8	17 48 10	-28 23.7	25.4	-9	30.5	30	I					I					234
235	10.5+4.5	17 49 24	-17 41.0	1.4	-78	1.8	-43	I					I					235
236	3.3+0.0	17 50 03	-26 08.3	1.2	-57	1.5	-25	I					I					236
237	3.3-0.3	17 51 08	-26 16.9	1.6	-96	1.7	-69	I					I					237
238	3.9+0.0	17 51 37	-25 32.8	1.2	-31	1.1	1	I					I					238
239	4.4+0.0	17 52 37	-25 08.7	3.2	-18	1.2	16	I					I					239
240	13.1+5.0	17 52 54	-15 07.0	7.7	-82	2.3	-53	I					I					240
241	4.0-0.5	17 53 40	-25 44.9	0.8	-13	8.4	10	I					I					241
242	2.2-1.7	17 53 58	-27 54.5	4.2	-91	6.7	-55	I					I					242
243	4.5-0.4	17 54 25	-25 13.3	1.3	-144	1.9	-100	I					I					243
244	8.0+1.4	17 55 12	-21 21.8	6.0	-34	6.0	-8	I					I					244
245	6.0+0.3	17 55 16	-23 38.6	1.8	94	1.3	106	I					I					245
246	5.9-0.4	17 57 26	-24 02.8	34.7	-21	1.5	13	I					I					246
247	6.5-0.1	17 57 48	-23 24.1	0.7	93	1.2	114	I					I					247
248	10.9+1.5	18 01 06	-18 47.8	1.1	113	0.4	145	I					I					248
249	9.6+0.4	18 02 36	-20 26.0	1.3	-77	2.8	-46	I					I					249
250	9.0-0.1	18 03 10	-21 13.9	0.7	-66	1.3	-33	I					I					250
251	9.9-0.1	18 05 01	-20 26.8	1.9	79	0.8	112	I					I					251
252	10.0-0.1	18 05 14	-20 18.7	0.7	23	2.7	80	I					I					252
253	10.4+0.0	18 05 35	-19 58.8	0.6	43	0.8	79	I					I					253
254	11.1+0.0	18 07 06	-19 18.7	0.9	-35	1.1	-8	I					I					254
255	12.0+0.9	18 07 22	-17 26.0	5.0	16	5.0	38	I					I					255
256	11.3+0.0	18 07 32	-19 08.8	2.1	64	2.9	98	I					I					256
257	11.5+0.1	18 07 37	-18 54.3	4.2	20	25.0	64	I					I					257
258	11.4-0.1	18 08 08	-19 09.4	0.5	87	0.4	123	I					I					258
259	15.4+1.9	18 08 41	-14 39.6	3.0	-2	3.0	27	I					I					259
260	13.4+0.8	18 08 54	-16 56.8	0.9	-20	0.7	4	I					I					260
261	19.5+4.0	18 09 18	-10 04.8	1.6	30	2.0	62	I					I					261

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Table VI *(continued)*

PEAK FLUX DENSITY AND VELOCITY

	NAME	RA.	DEC.	OH: 1612 MHZ				I	OH: 1665/67 MHZ				I	H20: 22 GHZ		SIO	REM.	
262	12.3-0.2	18 10 15	-18 25.5	3.0	23	5.0	50	I					I					262
263	16.1+1.4	18 12 06	-14 21.0	0.7	30	1.2	65	I					I					263
264	15.7+0.8	18 13 26	-14 57.4	22.0	-15	13.0	13	I	1.0	-17	3.0	15	I					264
265	12.8-0.9	18 13 42	-18 15.0	5.1	-67	1.4	-45	I					I					265
266	20.8+3.1	18 15 12	-09 22.0	2.8	13	3.9	41	I					I					266
267	15.4-0.1	18 16 18	-15 38.0	1.2	-43	2.1	-13	I					I					267
268	18.7+1.6	18 16 24	-11 53.0	1.7	-17	0.9	15	I					I					268
269	18.5+1.4	18 16 46	-12 10.0	6.0	166	6.0	186	I					I					269
270	12.8-1.9	18 17 36	-18 49.0	5.5	-7	3.6	32	I					I					270
271	16.1-0.3	18 18 03	-15 05.2	9.0	2	12.0	43	I	2.0	-2	4.0	45	I					271
272	18.2+0.5	18 19 15	-12 55.2	2.3	114	2.6	138	I					I					272
273	17.0-0.1	18 19 21	-14 13.8	2.6	35	2.5	57	I					I					273
274	18.3+0.5	18 19 55	-12 49.5	7.0	33	8.0	63	I					I					274
275	20.4+1.4	18 20 38	-10 30.0	0.6	21	1.0	56	I					I					275
276	18.3+0.1	18 21 00	-12 58.0	0.3	38	0.3	64	I					I					276
277	17.4+0.3	18 20 48	-13 55.5	4.0	13	3.0	46	I					I					277
278	18.8+0.4	18 21 17	-12 28.0	27.0	-2	18.0	27	I	2.0	-3	1.8	28	I	---	---		(3)	278
279	17.2-1.1	18 23 06	-14 29.0	1.1	159	1.7	184	I					I					279
280	17.1-1.2	18 23 30	-14 40.0	1.7	-8	1.0	13	I					I					280
281	20.6+0.3	18 24 48	-10 54.0	1.4	71	1.8	111	I					I					281
282	21.9+0.4	18 26 48	-09 40.0	1.4	68	0.8	104	I					I					282
283	20.4-0.3	18 26 49	-11 18.3	3.8	25	6.0	59	I					I					283
284	17.7-2.0	18 27 40	-14 30.8	58.0	49	66.8	73	I	0.6	47	2.0	74	I					284
285	20.8-0.8	18 28 54	-11 13.0	0.4	32	0.9	63	I					I					285
286	20.3-1.5	18 30 42	-12 00.3	0.6	-24	2.6	1	I					I					286
287	22.1-0.6	18 30 49	-09 58.6	5.2	104	6.0	129	I					I					287
288	23.8+0.2	18 31 06	-08 04.0	2.0	97	7.5	117	I					I					288
289	23.1-0.3	18 31 27	-09 00.9	6.0	20	6.0	48	I					I				(4)	289
290	24.5+0.3	18 32 18	-07 22.4	6.8	-86	2.3	-59	I					I					290
291	24.7+0.3	18 32 45	-07 14.0	5.0	22	3.0	62	I					I					291
292	24.7+0.1	18 33 06	-07 17.8	2.0	41	2.8	72	I					I					292
293	25.5+0.4	18 33 54	-06 28.0	2.0	23	2.2	55	I					I					293
294	24.7-0.1	18 34 03	-07 22.2	6.8	106	DET	142	I					I					294
295	23.5-0.9	18 34 29	-08 50.9	0.3	34	1.3	50	I					I				(5)	295
296	25.1-0.3	18 35 33	-07 12.6	9.5	130	5.5	155	I					I					296
297	23.8-1.1	18 36 03	-08 41.4	1.5	35	6.8	62	I					I					297
298	26.3+0.1	18 36 12	-05 52.0	1.6	-39	2.5	-13	I					I					298
299	25.5-0.3	18 36 13	-06 47.2	5.2	20	3.6	54	I					I					299
300	27.2+0.2	18 37 39	-05 05.0	1.0	73	2.0	112	I					I					300
301	27.3+0.2	18 37 42	-05 00.6	30.0	36	10.0	63	I	---	---	---	---	I	---	---		(6)	301
302	22.3-2.5	18 38 12	-10 39.0	0.9	99	0.8	126	I					I					302
303	27.0-0.4	18 39 22	-05 32.7	3.2	87	5.8	116	I					I					303
304	24.7-1.7	18 39 48	-08 11.0	1.3	79	1.3	105	I					I					304
305	28.5-0.0	18 40 48	-04 00.3	7.3	94	6.9	121	I					I					305
306	27.5-0.9	18 42 02	-05 14.8	4.5	93	4.2	120	I					I					306
307	32.1+0.9	18 44 12	-00 23.4	2.2	126	2.3	150	I					I					307
308	27.8-1.5	18 44 52	-05 18.6	1.6	71	2.4	100	I					I					308
309	31.0+0.0	18 45 05	-01 48.3	19.8	26	55.0	41	I	2.2	27	2.5	42	I			-	(7)	309
310	29.4-0.8	18 45 12	-03 32.9	7.1	114	3.5	137	I					I					310
311	31.0-0.2	18 46 07	-01 51.4	7.0	112	10.0	140	I			2.5	142	I			-		311
312	31.5-0.1	18 46 29	-01 20.8	3.6	22	1.8	50	I					I					312
313	26.4-2.8	18 46 48	-07 09.0	0.7	-78	1.1	-54	I					I					313
314	34.7+0.9	18 48 40	01 53.4	1.4	14	2.7	42	I					I					314
315	32.0-0.5	18 48 51	-01 04.7	7.0	56	3.0	97	I					I					315
316	33.2-0.1	18 49 30	00 07.0					I	12.0	74	8.0	79	I	17.4	77	-		316
								I					I	7.0	79			
317	34.9+0.8	18 49 35	02 03.6	1.3	53	1.6	84	I					I					317
318	33.4+0.0	18 49 52	00 20.9	1.0	45	3.0	76	I					I					318
319	36.9+1.3	18 51 30	04 01.0	2.7	-20	2.8	-5	I					I					319
320	40.1+2.4	18 53 36	07 24.0	1.2	29	2.0	66	I					I					320
321	36.4+0.3	18 54 09	03 10.8	5.3	84	2.5	121	I					I					321
322	35.6-0.3	18 54 56	02 07.7	64.0	18	14.0	92	I	---	---	---	---	I	---	---			322
323	39.6+0.9	18 58 11	06 16.8	1.4	4	3.2	36	I					I					323
324	37.1-0.8	18 59 37	03 16.7	10.0	73	15.0	101	I					I					324
325	39.9-0.0	19 01 44	06 06.1	7.7	134	11.5	163	I					I					325
326	35.2-2.6	19 02 12	00 46.0	3.9	37	3.6	65	I					I					326
327	37.7-1.4	19 02 31	03 33.0	2.6	100	0.7	121	I					I					327
328	43.9+1.2	19 04 54	10 13.9	1.0	34	0.7	66	I					I					328
329	42.6+0.0	19 06 35	08 30.5	3.5	35	10.0	76	I					I					329
330	42.3-0.1	19 06 44	08 12.3	5.0	37	22.0	75	I					I					330
331	43.8+0.5	19 07 11	09 46.1	3.6	-3	3.7	20	I					I					331
332	43.6-0.5	19 10 19	09 19.6	3.2	68	3.0	83	I					I					332
333	42.8-1.0	19 10 42	08 14.0	0.8	-26	0.7	-3	I					I					333
334	44.8-2.3	19 19 09	09 23.5	6.3	-86	11.2	-55	I					I					334
335	52.4+1.8	19 19 27	18 01.5	2.0	0	2.1	29	I			1.0	31	I					335
336	51.8-0.2	19 25 24	16 31.8	5.0	-17	4.0	21	I			1.0	20	I					336
337	33.9-1.0	19 27 48	19 12.0	0.9	39	0.9	65	I					I					337
338	55.0+0.7	19 28 19	19 45.3	5.0	13	3.0	41	I	1.0	2	2.0	43	I					338
339	53.6-0.2	19 29 09	18 06.9	6.0	-2	10.0	24	I	2.0	-4	2.0	24	I				(8)	339
340	57.5+1.8	19 29 30	22 29.0	1.3	-87	0.9	-62	I					I					340
341	57.5+1.8	19 29 51	22 29.2	0.8	36	1.8	44	I					I				(5)	341
342	56.4-0.3	19 35 10	20 32.6	3.8	-4	2.1	2	I					I				(5)	342
343	65.5+1.3	19 49 24	29 06.0	3.3	-39	3.8	-5	I					I					343
344	53.9-0.2	19 51 06	27 01.0	1.4	-10	2.2	28	I					I					344
345	65.7+0.8	19 57 41	28 14.2	1.0	-69	2.3	-48	I					I					345
346	66.8-1.3	20 02 15	28 53.8	1.0	-77	1.0	-52	I					I					346
347	77.9+0.2	20 26 40	38 57.0	8.8	-49	5.8	-28	I					I	---	---		(9)	347
348	75.3-1.8	20 27 12	35 36.8	6.0	-16	4.0	8	I	1.0	-15	1.0	9	I					348
349	83.4-0.9	20 49 12	42 37.0	12.4	-57	2.9	-21	I					I					349
350	85.4+0.1	20 51 50	44 46.0	1.0	-37	2.0	-10	I					I					350
351	104.9+2.4	22 17 40	59 36.5	41.3	-40	37.5	-11	I					I					351

NOTES: (1) PREVIOUS NAME: 1647-41
(2) PREVIOUS NAME: 1735-32
(3) PREVIOUS NAME: 1821-12
(4) PREVIOUS NAME: N41
(5) OH/IR CLASSIFICATION UNCERTAIN
(6) PREVIOUS NAME: 1837-05
(7) PREVIOUS NAME: W43A
(8) AT 1665 MHZ PEAK AT 11 KM/SEC
(9) PREVIOUS NAME: ON-4

Table VII Reference list

REFERENCES IN BRACKETS: FURTHER INFRARED OBSERVATIONS

1	S PER	24,25,28,31,46,50,84,(52,53,72,81)	103	IRC 10365	10,31,55,58,64,68,69,(73)
2	VY CMA	3,20,28,29,55,80,87,(60,72,73)	104	IRC-10490	10,31,55,69,(73,75)
3	AH SCO	32,35,49,67,84,(82)	105	26.2-0.6	26,33,37,66
4	VX SGR	4,8,21,28,29,55,87,(54,60,72,73,81)	106	28.7-0.6	26,33,37,66
5	IRC 40448	1,2,28,29,36,61,(53,55,60,62,73,76,81)	107	30.7+0.4	22,26,33,37
6	HY CEP	24,50,68,70,90,(52,53,72,81)	108	RW LYR	31,44
7	PZ CAS	17,28,31,67,(82)	109	26.4-2.0	26,33,37,66
8	Y CAS	31,38,44,61,68,(56)	110	30.1-0.2	15,34,35,45,70
9	O CET	10,25,29,31,48,56,69,87,(51,53,72,81)	111	30.1-0.7	15,34,35,45,89
10	R HOR	6,18,11,69,83,87,(47,49,54)	112	31.7-0.8	26,33,37
11	W ERI	25,31,38,44,56,69	113	32.8-0.3	26,33,34,35,37,45,70
12	R TAU	29,31,56,86,87,90	114	IRL 2290	40,66,71,(92)
13	IRC 20082	10,14,16,58,69,75,(63)	115	R AQL	1,10,29,55,56,69,(21,51,66,81)
14	RX TAU	56,86,88	116	IRC-205.0	10,31,55,69,(60)
15	S PIG	39,44,69	117	45.5+0.1	15,33,34,35,41,45
16	RU AUR	31,44,56	118	IRL 2370	40,90,(92)
17	AH TAU	44,86	119	IRL 2425	40
18	U LYN	44,56,88	120	RR AQL	10,16,29,36,44,55,56,69,(60,82)
19	FX MON	86	121	Z CYG	25,31,44,56,68
20	Z PUP	19,25,31,35,44,56,68	122	SY AQL	25,31,44,56,68
21	231.8+4.2	13,35,42,43,59	123	IRC-10529	10,31,35,55,(60)
22	AU GEM	44	124	U MIC	39,44,49,69,83
23	X HYA	32,56,69,90	125	BR DEL	44
24	R LMI	12,16,44,46,52,56,87,(48,51,53,81)	126	UX CYG	25,28,29,31,55,68
25	R LEO	19,28,29,31,44,56,61,87,(51,52,53,81)	127	V MIC	7,29,44,54,83,(49)
26	W VEL	39,44,69	128	IRC 40483	10,31,55,58,(73,75,82)
27	W LEO	10,19,31,44,56,68	129	IRL 2885	90
28	R COM	35,56,78	130	S SCL	38,56,83,87
29	U CVN	28,31,38,44	131	IRC 50049	10,70,(82)
30	RT VIR	28,31,35,56,78,90,(72,81)	132	R DOR	32,47,69,87
31	W HYA	9,11,28,29,36,69,87,(21,53,81)	133	U AUR	56,86,88
32	RU HYA	12,16,44,56,68	134	V CAM	10,56,88
33	Y LUP	39,69,83	135	L2 PUP	7,32,47,69,87,(48)
34	S SER	56,68,70,90	136	R CAR	39,47,83,87,(49)
35	S CRB	11,25,29,56,(21,48,51,53,81)	137	V LEO	56,88
36	U HER	11,28,29,44,56,(21,48,51,53,81)	138	IRC-30182	16,69
37	RX OPH	78	139	S CRT	38,88
38	RW SGO	39,40,56,69,87,(49)	140	V CVN	53,56,68,88,(52,82)
39	RT OPH	44,56	141	S VIR	10,35,38,56,83,87
40	IRC-20424	11,35,36,69,(73)	142	Z BOO	56,78,88
41	IRC-10414	10,38,79,88,(73)	143	R CEN	69,83
42	V LYR	31,38,44,56,58	144	RX BOO	10,21,28,29,53,56,69,(52,72,81)
43	RT AQL	31,44,56,68,86,90	145	R SER	12,35,52,56,78,83,(82)
44	GY AQL	12,31,69,(82)	146	IRC 10322	10,46,88,(73,75)
45	RR SGR	19,25,44,56,68,83	147	IRC-30308	62,79,87,93
46	UU PEG	78,88,(82)	148	IRC-20427	79,88
47	TW PEG	17,29,31,56,78,(81)	149	KY CYG	10,88,(82)
48	RV PEG	10,19,25,31,44,56,68	150	SV PEG	10,31,87
49	IRC 10523	16,61,90,(62)	153	W AND	35,61,(56)
50	R PEG	12,16,44,46,48,56,(51,52,81)	161	R GAE	56,87
51	R CAS	5,11,28,29,44,61,(51,52,53,56,81)	162	TX CAM	35,46,63,(48,73,82)
52	WX PSC	10,31,35,55,62,69,87,(60,61,73,76,81)	163	T LEP	56,87
53	CRL 230	22,66,71,92	165	R AUR	56,68,(51)
54	RU ARI	78	166	T COL	46,56
55	IK TAU	10,16,29,35,55,61,(48,73,76,81)	172	R CNC	35,46,52,56,(48,53,81)
56	NV AUR	10,28,29,55,58,88,(60,73,75,82)	177	R HYA	29,48,56,69,(52,53,81)
57	U ORI	11,28,44,46,56,87,(21,51,52,53,82)	183	RU HER	35,56,76,(53)
58	IRC 40156	10,55,(73)	185	RR SCO	49,56,68,(82)
59	IRC 50169	46,61,88,98,(82)	197	CHICYG	26,29,61,(48,51,52,53,81)
60	CRL 1074	90	202	T CEP	35,46,61,(51,52,56,81)
61	CRL 1099	40,90	205	R AQR	53,56,87
62	SS PUP	40	207	138.0+7.2	66,71
63	CRL 1274	40,(74,91)	208	141.7+3.5	66,71
64	IRC-20197	10,28,55,79,88,(60,73)	209	305.9-1.9	67
65	V ANT	17,29,68,87	210	327.1-0.3	30,69
66	R CRT	17,29,87,(82)	211	337.4-0.1	30,69
67	T VIR	44,56	212	343.4+1.3	10,35,41
68	T COM	78,88	213	0.1+5.1	22
69	CRL 1686	48,98,(74,91)	214	359.5+1.3	65
70	RS VIR	25,32,44,52,56,68	215	359.8+2.6	65
71	WX SER	10,28,29,31,44,55,62,(51,53,73,76,81)	216	359.1+1.2	65
72	327.4-0.1	30,69,85	217	356.5-0.6	10,41
73	327.4-0.6	30,85	218	399.7+1.3	65
74	328.2+0.0	30,69,85	219	358.1+0.1	65
75	328.4-0.2	30,69,85	220	1.2+1.3	65
76	328.7-0.2	30,69,85	221	1.3+1.0	65
77	FS LIB	44,62,64,83	222	0.1+0.1	65
78	330.4+0.1	30,69,85	223	0.4+0.1	65
79	CRL 1822	40,77,(92)	224	0.0-0.1	65
80	331.6-0.3	30,69,85	225	0.3-0.0	65
81	IRC 38292	10,28,31,36,58,61,(55,73,75)	226	1.1+0.4	65
82	337.5+0.1	30,69,85	227	0.3-0.2	27
83	337.9+0.3	30,69,85	228	0.5-0.1	65
84	338.0-0.1	30,69,85	229	359.4-1.3	65
85	338.5+0.1	7,30,69,85	230	1.5+0.0	65
86	338.5-0.2	30,69,85	231	0.5-0.8	65
87	CRL 1992	48,77,(92)	232	1.7-0.0	65
88	5.0+1.5	22,33	233	2.5+0.3	65
89	IRC-10381	10,31,55,69,79,(73)	234	1.1-0.8	65
90	CRL 2019	40	235	10.5+4.5	71
91	VW SGR	44	236	3.3+0.0	65
92	CRL 2086	40,77,(91)	237	3.3-0.3	65
93	CRL 2136	40,77	238	3.9+0.0	65
94	20.2-0.1	26,33,87	239	4.4+0.0	65
95	21.5+0.5	15,34,45	240	13.1+5.0	71
96	20.7+0.1	26,33,35,37,66	241	4.0-0.5	65
97	19.2-1.0	15,38,33	242	2.2-1.7	65
98	23.7+1.2	26,33,37	243	4.5-0.4	65
99	CRL 2174	40,77	244	5.0+1.4	22
100	IRC-10434	10,55,69,71	245	6.0+0.3	65
101	22.8-0.3	40	246	5.9-0.4	65
102	CRL 2205	23,26,33,34,35,45,(48,74,91)	247	6.5-0.1	65

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Table VII *(continued)*

248	10.9±1.5	71
249	9.6±0.4	65
250	9.0-0.1	65
251	9.9-0.1	65
252	10.8-0.1	65
253	10.4±0.0	65
254	11.1±0.0	65
255	12.8±0.9	66
256	11.3±0.0	65
257	11.5±0.1	65
258	11.4-0.1	65
259	15.4±1.9	66
260	13.4±0.0	71
261	19.5±4.0	71
262	12.3-0.2	66
263	16.1±1.4	71
264	15.7±0.8	66
265	12.8-0.9	71
266	20.8±3.1	71
267	15.4-0.1	71
268	18.7±1.6	71
269	18.5±1.4	66,71
270	12.8-1.9	71
271	16.1-0.3	66
272	18.2±0.5	37
273	17.0-0.1	71
274	18.3±0.5	15,30
275	20.4±1.4	71
276	18.3±0.1	71
277	17.4-0.3	66
278	18.8±0.4	10,41
279	17.2-1.1	71
280	17.1-1.2	71
281	20.6±0.3	71
282	21.9±0.4	71
283	20.4-0.3	26,37
284	17.7-2.8	66
285	20.8-0.8	71
286	20.3-1.5	66
287	22.1-0.6	26,37
288	23.6±0.2	26,37,66
289	23.1-0.3	13
290	24.5±0.3	66,71
291	24.7±0.3	66,71
292	24.7±0.1	66
293	25.5±0.4	71
294	24.7-0.1	15,26,37
295	23.5-0.9	66
296	25.1-0.3	26,37
297	23.8-1.1	37
298	26.3±0.1	71
299	25.5-0.3	37,66
300	27.2±0.2	66,71
301	27.3±0.2	10,41
302	22.3-2.5	71
303	27.0-0.4	26,37
304	24.7-1.7	71
305	28.5-0.0	26,37
306	27.5-0.9	26,37
307	32.1±0.9	37,71
308	27.8-1.5	37
309	31.0±0.0	10,68
310	29.4-0.8	26,37,66
311	31.8-0.2	15,26,37,68
312	31.5-0.1	26,37
313	26.4-2.8	71
314	34.7±0.9	37,71
315	32.0-0.5	15,37
316	33.2-0.1	15,68,70
317	34.9±0.8	37
318	33.4-0.0	66
319	36.9±1.3	71
320	40.1±2.4	71
321	36.4±0.3	37,71
322	35.6-0.3	10,41
323	39.6±0.9	37
324	37.1-0.8	26,37,66,71
325	39.9-0.0	26,37,71
326	35.2-2.6	71
327	37.7-1.4	37,71
328	43.9±1.2	71
329	42.6±0.0	26,37,71
330	42.3-0.1	26,37,66,71
331	43.8±0.5	26,37,71
332	43.6-0.5	37,71
333	42.8-1.0	71
334	44.8-2.3	66,71
335	52.4±1.8	66,71
336	51.8-0.2	66,71
337	43.9-1.0	71
338	55.0±0.7	66,71
339	53.6-0.2	66,71
340	57.5±1.8	71
341	57.5±1.8	66
342	56.4-0.3	66
343	65.5±1.3	71
344	63.9-0.2	71
345	65.7-0.8	66,71
346	66.8-1.3	66,71
347	77.9±0.2	10,28
348	75.3-1.0	66,71
349	83.4-0.9	66,71
350	85.4±0.1	66,71
351	184.9±2.4	66,71

Table VIII References

ABBREVIATIONS:

AP.J. = ASTROPHYSICAL JOURNAL
AP.LETTERS = ASTROPHYSICAL LETTERS
ASTR.J. = ASTRONOMICAL JOURNAL
ASTR.AP. = ASTRONOMY AND ASTROPHYSICS
BOL.OBS.T.T. = BOLETIN DE LOS OBSERVATORIOS TONANZINTLA Y TACUBAYA
MNRAS = MONTHLY NOTICES OF THE ROYAL ASTRONOMICAL SOCIETY
NAT. = NATURE
PASP = PUBLICATIONS OF THE ASTRONOMICAL SOCIETY OF THE PACIFIC

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