1987A&AS....68....1B

ASTRONOMY & ASTROPHYSICS
SUPPLEMENT SERIES

Astron. Astrophys. Suppl. Ser. **68**, 1-19 (1987)

The velocity field of the outer Galaxy in the Southern Hemisphere. II. CO observations of galactic nebulae

J. Brand ([1,2]), L. Blitz ([2,*]), J. G. A. Wouterloot ([3]) and F. J. Kerr ([2])

([1]) Sterrewacht Leiden, P.O. Box 9513, 2300 RA Leiden, The Netherlands
([2]) Astronomy Program, University of Maryland, College Park, MD 20742, U.S.A.
([3]) Max Planck Institut für Radioastronomie, Auf dem Hügel 69, D-5300 Bonn 1, F.R.G.

Received March 26, accepted June 5, 1986

Summary. — CO observations of 308 objects (77 %) from our catalogue of galactic emission and reflection nebulae are presented ; CO was detected in the direction of 234 nebulae (76 %). For 194 of these objects (63 %) the emission could actually be associated with the nebula. Fifteen objects (5 %) have associated CO emission with velocity in excess of 50 km s^{-1} $\left(V_{\mathrm{LSR}}\right)$. These objects are of crucial importance as they are potentially very distant, and nearly all of them have been newly identified by us. In the course of this survey several sources with interesting line profiles were found. Eighteen of them exhibit wings and/or plateaus and are potential CO outflow sources.

Key words : the Galaxy : kinematics and dynamics — interstellar medium : reflection nebulae — HII regions — radio lines : molecular.

1. Introduction.

This is the second paper in a series in which we determine the velocity field of the outer Galaxy in the Southern Hemisphere. Here we present the results of CO observations toward southern HII regions and reflection nebulae.

The method we use is to determine independent distances and velocities of HII regions and reflection nebulae in the longitude range $230^\circ \leq l \leq 305^\circ$. The catalogue of objects observed is presented in Brand *et al.* (1985 ; Paper I). This catalogue is a compilation of newly identified and previously catalogued nebulosities. In general, as stated by Blitz *et al.* (1982), more than 70 % of all HII regions have CO emission which can be associated with the nebula, and this percentage increases in the second and third galactic quadrants. Reflection nebulae are also usually associated with CO clouds (de Vries *et al.*, 1984) and consequently they can be used for our purposes. Because most of the mass in a complex of HII regions/reflection nebulae/molecular clouds resides in the molecules, the CO emission provides an accurate measurement of the velocity centroid of the complex.

This paper presents the results of CO observations of 308 of the 400 objects catalogued in paper I. As a corollary to this project, we have found unusual CO emission from several objects including potential CO outflow sources.

(*) Alfred P. Sloan Fellow.

2. Observations and data reduction.

2.1 DATA TAKING. — The observations presented in this paper were carried out with the 4-m millimeter wave telescope at the Division of Radiophysics of CSIRO, Epping, NSW, Australia during two sessions in September/October 1983 (1 month) and October 1984 (2 weeks). At a frequency of 115 GHz (of the CO $(J = 1 - 0)$ transition) the beamwidth is 2.8 arcmin. The pointing accuracy of the telescope was generally better than 30 arcsec. The front-end had a cryogenically cooled Schottky-barrier diode as receiving element. The single sideband system noise temperature was 500 K during both observing runs. As a back-end we used an acousto-optical filterbank with 512 channels. In 1983 the width per channel was 174.4 kHz, corresponding to 0.45 km s^{-1} at 115 GHz. This resulted in a total velocity coverage of about 230 km s^{-1}. For the 1984 observations these numbers were respectively 185.3 kHz, 0.48 km s^{-1} and 246 km s^{-1}. Channel width and location of the central channel were calibrated roughly every ten days.

Before each scan, an internal calibration of the receiver sensitivity was performed by the standard chopper technique (Penzias and Burrus, 1973). A few times per day Orion-A and RCW57 were measured for intensity calibration. Afterwards, all spectra were scaled such that T_{A}^{*} (Ori-A) is 65 K. Sky transmission was determined regularly by antenna dipping, and was found to be 80 % (at the zenith) at best.

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS....68....1B

The system was used in two different modes : beam switching (1983) and frequency switching (1984). In the beam switching mode the main beam was switched with a reference beam at a rate of 0.5 Hz (see Robinson *et al.*, 1982). The width of the reference beam was 3.6° and it was generated by illuminating the horn feed through a flat mirror at the edge of the 4-m dish. Good baselines were obtained by adjusting this plane mirror such that the power levels for the main and reference beams were the same. Frequency switching was generally by ± 6 MHz, which corresponds roughly to ± 32 channels or ± 16 km s^{-1}. At times (for sources with broader lines, like Ori-A) the switching was over ± 8 MHz. In all cases the amount of switching was greater than the widths of the observed lines. With respect to beam switching, this procedure reduces the integration time needed to reach a certain noise level by a factor of $\sqrt{2}$. Typical integration times were two to three minutes on source per individual observation, with typical r.m.s. noise levels of 1 K. Many sources have been observed more than once, reducing the r.m.s. noise for these objects.

Subsequent to the completion of the observations in Australia, a number of sources were checked using the 1.2-m Columbia Sky Survey telescope (which had an 8 arcmin beam and a velocity resolution of 1.3 km s^{-1}) at the Cerro Tololo Interamerican Observatory in Chile, by Eugene de Geus.

2.2 Observing strategy and data reduction.

2.2.1 Due to limited observing time, shortened by occasional equipment and weather problems, not all sources in our catalogue could be observed. We have, however, observed all sources likely to be distant objects, based on their appearance and location. Apart from these objects, a sampling was made of sources from our listing of « doubtful objects », nebulous objects which were not obviously HII regions, reflection or planetary nebulae or galaxies (for their distribution on the sky, see Paper I, Fig. 3). Nearly all of these latter sources went undetected ; in those cases where a signal was found it was too weak to be able to associate it with the optical nebula with any confidence. This can be seen as an *a posteriori* justification of the exclusion of these objects from our catalogue. Only two objects from this category have appreciable emission (about 3.5 K), and these are at low velocity (within ± 5 km s^{-1} of zero).

For sources of size comparable to the telescope beam an observation was made at the catalogued position (which is the center of the nebulosity). In larger objects, additional observations were made at positions of obscuration or locations where enhanced CO emission may be expected, such as bright rims. For every object, spectra at each position were reduced separately and a Gaussian was fitted to each emission line after removing polynomial baselines from the spectra. The quantity of interest to us is the velocity centroid of the CO emission, being the weighted average of the velocities at all locations where a detection was made. This quantity was derived by adding all spectra with detectable CO emission to yield an average spectrum for that particular object. In a single object the velocity variations are usually not very large. Weighting was done inversely with the noise of a spectrum. A similar procedure was followed when a source in the catalogue is divided into sub-entries. Here the velocity differences are sometimes greater than they are for a single object.

2.2.2 Associating the CO emission with the nebula is another important item. In many cases associations are unambiguous, in particular for HII regions. Strong CO emission $\left(T_A^* > 10\ \mathrm{K}\right)$ is usually only found in regions of star formation and strong lines can therefore be associated with a nebula with a high degree of confidence, especially if the line velocity is appreciably different from zero. This criterion also applies to reflection nebulae, even though one does not necessarily expect enough energy from the associated star to heat the CO. Observationally, however, virtually all local reflection nebulae are accompanied by strong CO emission, in some cases as a result of embedded, unseen stars. Other considerations facilitate the association of even relatively weak CO emission : (1) CO is strongly concentrated toward the galactic plane (e.g. Cohen and Thaddeus, 1977) ; (2) There is very little CO outside the solar circle (Solomon *et al.*, 1983 ; Bloemen *et al.*, 1984). CO detected in the direction of high latitude nebulosity is thus nearly always associated with the nebula (Magnani *et al.*, 1985), therefore the chance superposition of a random cloud (except near zero LSR velocity) is very unlikely. Mapping is of course the best way to confirm the association of emission at a particular velocity with a nebula but this could not be done for all 400 catalogued objects in the available time. Therefore only those objects of greatest potential importance for measuring the rotation curve at large distances $\left(V_{LSR} \geqslant 50\ \mathrm{km\ s^{-1}}\right)$ were mapped. In some other cases, positions off the nebula were observed, to ensure that the CO emission decreases in intensity.

3. Results.

The results of the CO observations of the objects in our catalogue (Paper I, Tab. I) are presented in table I.

Column 1 gives the source number ; columns 2 through 5 the galactic and equatorial coordinates respectively. Columns 6, 7 and 8 give the parameters of the CO emission, derived according to procedures described in section 2.2. Quoted in column 8 are the velocity centroid, with respect to the LSR, and the estimated 1σ uncertainties. The latter is only given when more than one location in a source was observed in which a detection was made. The velocity is then derived (by fitting a Gaussian) from the sum of all individual spectra with emission ; the uncertainty is the standard deviation of the intensity weighted average of the velocities at individual locations. Following Blitz *et al.* (1982) we also employ the following terms : « cannot associate » and « no definite detection ». The former is used when relatively strong CO was found along the line of sight but its relation to the nebula is uncertain ; mostly this is due to multiple lines in the spectrum. The latter means weak CO emission was

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

detected, probably not related to the nebula. The distinction between these two is not always well defined and mostly based on line intensity. Line width (FWHM ; Col. 7) and temperature (Col. 6) are also determined from fitting a Gaussian to the line profile. Temperatures are estimated to have a 25 % uncertainty but are of no real significance for this project. Column 9 is reserved for remarks ; if line parameters are given here, it is in the format $T_A^*/\Delta V/V_{LSR}$. More extensive notes are at the bottom of the table. Sources to which they apply have « notes » in column 9. The same convention for presenting line parameters as in column 9 is applied in the « notes ». Data for sources indicated with « EdG » in column 9 have been obtained with the Columbia telescope.

4. Discussion.

4.1 STATISTICS. — The histograms of figures 1 and 2 give a visual representation of the detection statistics. Of the 400 sources in the catalogue, 308 (77 %) were observed ; of these, CO was detected toward 234 (76 % of those observed). For 14 sources (5 %) there were multiple velocity components, none of which could be definitely associated with the nebula, and 26 (8 %) have the designation « no definite detection » indicating weak emission which could be originating anywhere along the line of sight. Therefore in 194 objects (63 %) CO was detected which could be associated with the optical nebula. Fifteen objects (5 % of all observed sources) have CO emission at LSR velocities exceeding 50 km s^{-1}. Of all observed sources, 74 (24 %) were not detected.

There is a clear correlation between the detection of CO emission and the presence of « obvious obscuration » (as listed in the catalogue) : of all sources observed, those with obvious obscuration have a detection rate a factor of two larger than those without. Nevertheless, of the 15 sources with high velocity CO, only 9 have obvious obscuration, implying that obscuration is a good, but not perfect indicator of molecular clouds, especially at large distances from the sun.

In figure 1 the peak in the distribution shows that most of the detections are of local material. The peak is displaced from zero to slightly positive velocities because the majority of the observed objects (63 %) lie in the third quadrant where only positive velocities are « permitted ». The most important part of the histogram for present purposes, however, is the high (positive) velocity wing. Figure 2 demonstrates that the detection frequency (i.e. the fraction of objects detected) does not change significantly with galactic longitude, but the fraction of objects with « no definite detection » or « cannot associate » is larger in the fourth (64 % of the total number of such objects) than in the third quadrant.

4.2 KINEMATICALLY DISTINCT COMPLEXES. — As can be seen in figure 2 of paper I, the distribution of the 400 catalogued objects on the sky is not uniform, and a number of separately catalogued objects appear to be related. It is important, statistically, that when the rotation curve is determined, we take only kinematically distinct complexes. In compiling the catalogue, objects that appear to be associated on a morphological basis have been grouped together as sub-entries. The purpose now is to group objects on a larger scale, based on closeness in space and velocity. As no distance information is available yet, a regrouping at this stage would be based only on apparent closeness and velocity. Defining kinematically distinct complexes will therefore be postponed until paper IV in this series, which presents distances to stars associated with nebulae in our catalogue.

4.3 INTERESTING OBJECTS. — On the basis of the CO spectra, some sources observed are interesting in their own right. These are the sources of which the CO spectra show asymmetric profiles, wings or plateaus, not being obviously due to multiple emission components. For a number of objects these spectral features may well be due to significant activity, such as outflow. A listing of such sources is presented in table II.

In table II, column 1 gives the object number ; column 2 gives the size of the nebula and in column 3 the presence or absence of obvious obscuration at the location of the nebula is noted (information taken from Tab. I, Paper I). In column 4 it is indicated whether an IRAS point source (1985) is found within 1 or 2 arcmin from the catalogued center of the nebula (for the larger regions this requirement was somewhat relaxed).

For most objects in this list we searched for CO only at the central position (in most cases the beam size is larger than or comparable to the size of the nebula). If the asymmetries and wings in the CO line profile are due to, for instance, star formation activity in the molecular clouds associated with these nebulae one would expect these nebula/cloud complexes to show up in the infrared ; from table II it is seen that this is the case for 61 % of the listed objects (14 out of 23). Thirteen of these fourteen objects have obscuration as well. The presence of an IRAS point source in more than half of the objects with interesting CO line profiles is a very promising sign and it would be worthwhile to study these objects more extensively than we were able to do here.

Acknowledgements.

We gratefully acknowledge the generous allotment of telescope time from the Division of Radiophysics of CSIRO, Epping. In particular we thank B. Robinson, B. Batchelor, R. Otrupcek and D. Manchester for their continued support with hard- and software and all additional arrangements they provided to make our stay a successful and pleasant one. We thank E. de Geus (Sterrewacht Leiden) for devoting part of his valuable time to some of our objects.

This work was partially supported by grant no. 407/83 from the NATO Scientific Affairs Division, grants no. AST 83-15276 and AST 80-21283 from the United States National Science Foundation, by the Kerkhoven-Bosscha Fonds and the Alfred P. Sloan Foundation.

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS....68....1B

References

BLITZ, L., FICH, M., STARK, A. A. : 1982, *Astrophys. J. Suppl. Ser.* **49,** 183.

BLOEMEN, J. B. G. M., BENNET, K., BIGNAMI, G. F., BLITZ, L., CARAVEO, P. A., GOTTWALD, M., HERMSEN, W., LEBRUN, F., MAYER-HASSELWANDER, H. A., STRONG, A. W. : 1984, *Astron. Astrophys.* **135,** 12.

BRAND, J., BLITZ, L., WOUTERLOOT, J. G. A. : 1985, *Astron. Astrophys. Suppl. Ser.,* in press (Paper I).

COHEN, R. S., THADDEUS, P. : 1977, *Astrophys. J. Lett.* **217,** L155.

DE VRIES, C. P., BRAND, J., ISRAEL, F. P., DE GRAAUW, Th., WOUTERLOOT, J. G. A., VAN DE STADT, H., HABING, H. J. : 1984, *Astron. Astrophys. Suppl. Ser.* **56,** 333.

IRAS Point Source Catalog : 1985 (Washington : U.S. Gov. printing office).

IRAS Catalog and Atlases, Explanatory Supplement : 1985, C. A. Beichmann, G. Neugebauer, H. J. Habing, P. E. Clegg, T. J. Chester Eds. (Washington, U.S. Gov. printing office).

MAGNANI, L. A., BLITZ, L., MUNDY, L. : 1985, *Astrophys. J.* **295,** 402.

PENZIAS, A. A., BURRUS, C. A. : 1973, *Ann. Rev. Astron. Astrophys.* **11,** 51.

ROBINSON, B. J., MCCUTCHEON, W. H., WHITEOAK, J. B. : 1982, *Int. J. Infrared and Millimeter Waves* **3,** 63.

SOLOMON, P. M., STARK, A. A., SANDERS, D. B. : 1983, *Astrophys. J. Lett.* **267,** L29.

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

TABLE I. — *CO observations of galactic nebulae.*

Object	l	b	RA (1950)	DEC (1950)	T_A^*	ΔV	V_{LSR}	Remarks
	(degrees)		h m s	° ′ ″	(K)	(kms^{-1})		
1	233.18	-9.63	6 50 58.5	-22 16 09	NOT DETECTED			
2	234.76	-10.08	6 52 08.1	-23 51 52	NOT DETECTED			
3	233.40	-9.42	6 52 12.5	-22 22 00	NOT DETECTED			
4	228.97	-4.65	7 01 57.3	-16 18 36	5.7	3.3	19.6	
5	242.88	-10.80	7 04 48.5	-31 22 49	NOT OBSERVED			
6	231.57	-4.47	7 07 35.7	-18 31 30	9.0	3.8	51.8	
7					5.7	5.1	52.3 ± 0.5	Average
A	231.49	-4.41	7 07 41.9	-18 25 25	6.2	5.1	52.3 ± 0.6	
B	231.31	-4.76	7 06 01.4	-18 25 44	not observed			
C	231.50	-4.37	7 07 57.5	-18 24 05	not observed			
D	231.52	-4.30	7 08 08.6	-18 24 23	5.2	6.0	52.3	
8	237.94	-6.45	7 12 08.0	-25 20 26	3.8	1.2	14.2	
9	258.23	-16.05	7 12 08.7	-47 08 06	NOT OBSERVED			
10	259.65	-16.57	7 12 26.0	-48 35 50	NOT OBSERVED			
11	259.56	-16.48	7 12 46.8	-48 28 37	6.7	1.3	3.6	
12	259.56	-16.36	7 13 23.9	-48 25 49	NOT OBSERVED			
13	232.41	-2.91	7 15 04.0	-18 32 42	NOT OBSERVED			
14	232.48	-2.91	7 15 12.5	-18 36 04	NOT OBSERVED			
15	239.83	-6.52	7 16 08.6	-26 45 50	6.2	1.9	28.2	
16	235.54	-4.06	7 16 59.0	-21 50 42	1.4	2.2	31.0 ± 0.6	Merging; see notes
					1.9	3.6	26.7	
17A	237.34	-4.97	7 17 09.6	-23 50 59	not observed			
B	237.45	-4.93	7 17 31.5	-23 55 52	6.2	3.3	19.5 ± 0.3	
18	256.14	-14.06	7 17 56.4	-44 29 34	7.1	1.5	3.6	
19	240.88	-6.52	7 18 21.3	-27 41 38	4.8	3.0	32.5	
20	230.36	-0.61	7 19 31.0	-15 38 54	NOT DETECTED			
21	255.29	-13.11	7 20 39.4	-43 19 52	NOT OBSERVED			
22					7.1	3.4	20.0 ± 0.5	Average
A	238.56	-4.42	7 21 47.1	-24 40 07	cannot associate			Notes
B	238.25	-4.22	7 21 55.3	-24 18 12	3.3	3.9	20.3	Additional component 1.9/1.4/2.3
C	238.48	-4.29	7 22 09.0	-24 32 20	11.9	2.4	19.7	
D	238.56	-4.26	7 22 25.8	-24 35 43	10.0	2.8	20.6	
E	238.47	-4.17	7 22 33.9	-24 28 31	2.7	3.0	20.2	
F	238.42	-4.11	7 22 41.1	-24 24 09	10.0	3.7	19.7	
G	238.59	-4.20	7 22 42.1	-24 35 25	cannot associate			Notes
H	238.43	-4.08	7 22 48.4	-24 23 34	8.6	3.4	20.5	
I	238.46	-3.98	7 23 16.1	-24 22 31	6.7	4.0	20.0	
23	239.54	-4.85	7 22 09.3	-25 44 02	6.2	4.6	23.6 ± 0.7	Merging; see notes
					3.8	3.4	17.9 ± 0.2	
24	231.34	-0.32	7 22 29.0	-16 22 31	NOT DETECTED			
25	262.99	-16.07	7 23 13.8	-51 20 00	NOT DETECTED			
26	255.78	-12.62	7 24 15.6	-43 33 10	1.9	3.2	-4.3	
27	257.79	-13.23	7 26 03.4	-45 35 09	NOT DETECTED			
28	236.27	-2.00	7 26 17.8	-21 30 28	NOT OBSERVED			
29	236.60	-2.17	7 26 20.5	-21 52 29	6.2	3.5	26.3 ± 0.4	Mapped
30	251.44	-9.80	7 27 28.6	-38 28 45	NOT OBSERVED			

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

TABLE I *(continued)*.

31	237.67	-2.39	7 27 43.9	-22 55 10	NOT DETECTED				
32	233.75	-0.20	7 27 51.0	-18 25 54	4.3	3.9	44.1 ± 0.6		Mapped
33A,B	235.69	-1.25	7 27 54.7	-20 38 03	1.9	2.5	74.7		Mapped
34	259.23	-13.51	7 28 01.8	-46 57 54	7.6	1.5	4.9 ± 0.1		
35	259.21	-13.51	7 28 01.9	-46 56 45	NOT OBSERVED				
36	233.84	-0.18	7 28 04.0	-18 29 37	8.1	4.9	44.3 ± 0.4		
37	230.97	1.47	7 28 19.0	-15 11 38	2.9	2.8	47.9		See notes for #40
38	247.53	-7.49	7 28 42.1	-33 59 05	NOT DETECTED				
39	234.41	-0.29	7 28 50.0	-19 02 54	NOT OBSERVED				
40	231.14	1.53	7 28 52.0	-15 18 28	NO DEFINITE DETECTION				Notes
41	232.56	0.86	7 29 17.0	-16 52 45	7.1	2.9	16.7		
42A,B	234.74	-0.27	7 29 36.0	-19 19 39	5.7	4.5	43.0 ± 0.4		
43	237.51	-1.75	7 29 49.0	-22 28 13	NOT OBSERVED				
44	237.26	-1.28	7 31 03.0	-22 01 12	2.4	6.4	72.9		Mapped; see notes
45	237.32	-1.28	7 31 10.8	-22 04 25	1.9	3.5	76.9		Mapped; see notes
46	238.95	-2.09	7 31 33.2	-23 53 35	NOT OBSERVED				
47	237.23	-1.07	7 31 48.7	-21 53 41	NO DEFINITE DETECTION				Faint emission 1.0/2.4/23.3 ± 1.3
48	257.72	-12.12	7 32 10.9	-45 29 33	NO DEFINITE DETECTION				Faint emission 2.9/1.7/40.9
49	237.74	-0.96	7 33 17.8	-22 17 17	4.8	3.3	22.3 ± 0.4		
50	234.58	0.83	7 33 20.0	-18 38 53	2.4	5.3	46.7 ± 0.3		Notes
51A,B	239.04	-1.67	7 33 21.5	-23 45 44	9.0	1.9	18.9		
52	261.00	-13 34	7 33 28.0	-48 25 39	NO DEFINITE DETECTION				Faint emission 1.9/3.7/-7.6
53A,B	260.64	-13.04	7 34 09.2	-47 58 45	NOT DETECTED				
54	240.43	-2.17	7 34 27.0	-25 13 12	NOT DEFINITE DETECTION				EdG; 1.2/2.9/23.5 kms^{-1}
55	262.42	-13.76	7 34 56.6	-49 51 25	NOT DETECTED				
56	255.83	-10.44	7 35 01.3	-42 36 30	6.7	3.8	-3.9 ± 1.1		
57	262.52	-13.73	7 35 19.8	-49 55 44	NOT DETECTED				
58	247.14	-5.58	7 35 49.9	-32 43 39	NOT OBSERVED				
59	260.81	-12.76	7 36 04.0	-48 00 05	NOT DETECTED				
60	263.05	-13.76	7 36 38.8	-50 24 13	NOT OBSERVED				
61	248.01	-5.46	7 38 21.1	-33 25 34	4.8	5.6	51.3		Mapped
62	254.85	-8.94	7 39 41.0	-41 02 47	NOT DETECTED				
63	247.58	-4.72	7 40 26.2	-32 41 18	NO DEFINITE DETECTION				EdG; 0.8/4.6/23.5
64	244.40	-2.71	7 41 11.4	-28 55 45	NOT DETECTED				
65	243.68	-2.19	7 41 36.4	-28 03 05	NOT OBSERVED				
66A,B	241.52	-0.60	7 42 53.0	-25 23 22	4.8	3.7	70.1 ± 0.6		Mapped
67A,B	237.53	1.85	7 43 18.0	-20 42 25	NOT OBSERVED				
68	247.64	-4.03	7 43 23.1	-32 23 38	NOT OBSERVED				
69	261.44	-11.61	7 43 52.1	-48 01 24	NOT OBSERVED				
70A-C	263.13	-12.16	7 45 41.0	-49 43 55	NOT OBSERVED				
71	235.96	3.50	7 46 00.3	-18 30 45	NOT OBSERVED				
72	251.09	-5.39	7 46 04.4	-36 03 13	NOT DETECTED				
73	263.06	-12.04	7 46 09.7	-49 36 39	NOT OBSERVED				
74	247.97	-3.44	7 46 23.8	-32 24 35	3.3	1.2	18.2		
75	241.87	0.44	7 47 36.9	-25 09 19	NOT OBSERVED				
76	248.71	-3.37	7 48 40.4	-32 58 43	CANNOT ASSOCIATE				Lines at 2.9/1.9/17.3 & 1.9/1.6/22.2
77	249.27	-3.65	7 48 54.0	-33 36 25	NOT OBSERVED				
78	255.84	-7.47	7 49 01.1	-41 10 33	NOT DETECTED				
79	250.14	-4.13	7 49 02.8	-34 35 25	NOT DETECTED				
80A,B	243.16	0.35	7 50 14.9	-26 18 42	2.4	2.2	49.8 ± 0.2		Notes

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

TABLE I *(continued)*.

81	256.62	-7.26	7 52 03.5	-41 44 17	NOT DETECTED			
82	244.67	0.06	7 52 37.8	-27 44 59	NOT DETECTED			
83	245.29	-0.31	7 52 40.3	-28 28 29	NOT DETECTED			
84	242.56	1.45	7 53 01.0	-25 13 40	NOT DETECTED			
85	246.12	-0.55	7 53 41.3	-29 18 32	NOT DETECTED			
86	245.21	0.13	7 54 10.6	-28 10 19	NOT OBSERVED			
87A-C	268.39	-13.35	7 54 57.1	-54 48 45	NOT OBSERVED			
88	253.88	-4.93	7 55 11.1	-38 11 53	NOT OBSERVED			
89	251.01	-2.82	7 56 39.5	-34 39 39	2.9	1.7	29.2 ± 0.2	Mapped; see notes
90A,B	247.64	-0.56	7 57 20.4	-30 36 06	2.4	2.3	56.9 ± 0.3	Notes
91	252.21	-3.15	7 58 23.1	-35 51 12	12.4	2.1	8.3	Additional component at 3.3/3.4/-1.0
92	248.01	-0.41	7 58 51.7	-30 50 27	1.4	7.8	53.6 ± 1.5	
93	260.38	-7.99	7 59 10.4	-45 18 46	6.7	2.4	3.0 ± 0.1	
94	255.52	-5.01	7 59 13.7	-39 38 13	NOT OBSERVED			
95	255.40	-4.82	7 59 44.7	-39 25 52	5.2	2.2	9.8	
96	245.93	1.16	7 59 52.4	-28 14 35	3.3	3.2	62.9 ± 0.7	Notes
97	246.09	1.21	8 00 27.2	-28 20 51	3.3	3.0	62.9 ± 0.8	Both lines associated with nebula; see notes
					3.3	5.5	54.0 ± 0.4	
98	246.01	1.26	8 00 27.4	-28 15 34	1.4	4.3	62.9 ± 0.7	Both lines associated with nebula; see notes
					1.9	6.0	55.3 ± 0.8	
99	251.19	-1.97	8 00 37.5	-34 21 49	4.3	3.2	54.7 ± 0.4	
100	250.43	-1.33	8 01 16.9	-33 22 27	NOT DETECTED			
101	248.90	-0.01	8 02 39.6	-31 22 23	10.0	1.7	13.5	
102					3.3	1.7	9.1 ± 0.1	Average
A	255.42	-4.12	8 02 51.0	-39 04 46	3.3	1.6	9.3	
102B	255.44	-4.10	8 03 01.6	-39 05 13	5.2	1.6	9.1	
C	255.42	-4.07	8 03 03.7	-39 03 23	1.9	2.3	9.4	
103	255.45	-3.97	8 03 34.5	-39 01 31	7.1	1.4	9.0	
104A	252.01	-1.51	8 04 37.9	-34 48 14	not observed			
B	252.39	-1.40	8 06 06.6	-35 03 53	6.2	2.6	11.5	
105	245.85	2.67	8 05 26.0	-27 21 39	NOT DETECTED			
106	252.93	-1.90	8 05 29.2	-35 47 20	8.1	2.1	10.9	
107	254.27	-2.73	8 05 40.9	-37 21 37	1.9	2.4	35.6 ± 0.4	Mapped
108	248.01	1.44	8 06 02.1	-29 50 05	NOT DETECTED			
109	255.42	-3.04	8 07 30.0	-38 29 53	4.3	2.7	5.1 ± 0.7	Smaller component 2.4/3.4/9.2 merges
110	247.47	2.19	8 07 37.3	-28 58 54	2.9	2.7	40.8	Mapped
111	253.29	-1.61	8 07 39.9	-35 56 02	6.2	1.9	5.5 ± 0.3	
112	255.62	-3.13	8 07 40.4	-38 42 36	NO DEFINITE DETECTION			Faint emission 1.0/3.2/9.5
113	267.18	-10.42	8 07 54.2	-52 18 21	NOT OBSERVED			
114	251.88	-0.47	8 08 31.3	-34 07 32	2.4	1.3	33.4 ± 0.	
115	264.45	-8.53	8 08 57.1	-49 01 06	NO DEFINITE DETECTION			Faint emission 1.9/1.4/-7.7
116	261.18	-6.43	8 09 05.8	-45 09 00	NOT DETECTED			
117	242.08	6.36	8 10 03.3	-22 11 54	NOT OBSERVED			
118	267.47	-10.16	8 10 21.8	-52 24 11	NOT OBSERVED			
119	255.83	-2.60	8 10 32.3	-38 35 54	5.7	1.6	9.8	
120	252.43	-0.19	8 11 09.0	-34 25 37	NOT DETECTED			
121	255.68	-2.27	8 11 33.0	-38 17 10	5.2	2.2	9.4	
122					4.8	2.3	11.3 ± 0.3	Average
A	253.82	-0.91	8 11 59.6	-35 59 06	5.2	2.5	11.5 ± 0.2	
B	253.79	-0.88	8 12 03.2	-35 56 56	5.7	2.9	10.9 ± 0.	

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

TABLE I (continued).

123	260.56	-5.21	8 12 53.8	-43 57 56	3.3	1.1	4.7	Notes
124A	253.75	-0.63	8 12 56.9	-35 46 10	5.7	2.3	36.5	
B	253.74	-0.60	8 13 03.8	-35 45 03	not observed			
125					11.9	3.6	34.7 ± 0.	Average
A	254.03	-0.58	8 13 56.5	-35 58 34	7.6	3.5	34.7	
B	254.06	-0.56	8 14 07.2	-35 59 11	13.3	3.8	34.7	
126	253.93	-0.49	8 14 02.8	-35 50 44	CANNOT ASSOCIATE			EdG; Mapped, see notes
127	253.67	-0.23	8 14 22.7	-35 28 40	4.3	6.1	35.7	
128	257.64	-2.78	8 14 57.5	-40 11 43	NOT OBSERVED			
129	259.25	-3.76	8 15 27.6	-42 04 33	7.6	2.2	9.5	
130	268.06	-9.47	8 16 14.7	-52 31 06	NOT OBSERVED			
131	268.03	-9.45	8 16 15.5	-52 29 23	NOT OBSERVED			
132	259.23	-3.56	8 16 19.2	-41 57 08	4.8	2.2	9.0	
133	254.44	-0.11	8 16 59.4	-36 02 47	NO DEFINITE DETECTION			Faint emission 1.4/3.4/30.1
134	257.89	-2.44	8 17 12.0	-40 12 29	NOT OBSERVED			
135					1.9	3.0	25.5 ± 0.4	Average; mapped
A	251.52	2.00	8 17 22.7	-32 27 02	1.9	3.5	25.8 ± 0.1	
B	251.55	2.01	8 17 30.3	-32 27 54	2.4	3.0	25.4	
136	268.06	-9.13	8 18 04.8	-32 20 20	NOT OBSERVED			
137	266.07	-7.80	8 18 09.1	-49 57 41	9.5	1.6	3.0	
138	254.68	0.22	8 18 59.1	-36 03 22	1.9	2.1	68.2 ± 0.3	Mapped
139	266.32	-7.78	8 19 07.1	-50 09 16	8.6	1.6	3.1	
140	268.16	-8.94	8 19 28.9	-52 18 48	6.7	2.0	5.3	
141					4.8	2.8	10.0 ± 0.5	Average
A	259.61	-2.99	8 19 59.4	-41 55 56	4.8	1.6	10.0	
141B	259.59	-2.97	8 20 00.2	-41 54 20	9.5	2.1	10.2	
C	259.64	-3.00	8 20 01.4	-41 58 04	not detected			
D	259.64	-2.97	8 20 10.2	-41 57 09	not observed			
E	258.87	-2.31	8 20 43.1	-41 56 40	not detected			
F	259.71	-2.82	8 21 03.1	-41 55 22	5.7	2.7	10.6	
G	259.79	-2.86	8 21 07.6	-42 00 37	3.5	3.6	10.5	EdG
H	259.75	-2.83	8 21 08.2	-41 57 49	not observed			
I	259.78	-2.84	8 21 11.4	-41 59 24	not observed			
J	259.77	-2.78	8 21 24.7	-41 56 56	3.8	2.5	9.7	
K	259.85	-2.73	8 21 53.5	-41 59 01	8.6	2.5	9.4	
142	261.60	-4.33	8 20 12.8	-44 20 06	4.3	2.7	8.3	Merging
					1.9	2.8	11.9	
143					6.7	2.6	8.9 ± 1.0	Average
A	258.31	-1.96	8 20 31.4	-40 16 39	5.2	2.8	8.9	Merging
					1.9	3.3	12.9	
B	258.31	-1.90	8 20 46.2	-40 14 46	8.6	2.6	8.9	
144	256.11	-0.15	8 21 36.1	-37 26 20	NOT OBSERVED			
145A	264.18	-5.42	8 23 31.8	-47 07 00	2.2	2.9	8.6	EdG
B	264.17	-5.33	8 23 56.0	-47 00 30	not detected			
146	253.58	2.23	8 23 55.2	-33 59 55	3.8	2.7	35.9 ± 0.	
147					2.4	2.3	12.4 ± 1.2	Average; see notes
A	258.48	-1.27	8 23 58.6	-40 01 08	2.4	2.5	12.4 ± 0.1	
B	258.50	-1.32	8 23 59.2	-40 05 33	2.4	2.7	12.4 ± 1.4	
148	267.36	-7.49	8 24 17.3	-50 50 32	3.8	1.2	5.0	
149	260.49	-2.54	8 24 43.2	-42 23 37	3.3	3.7	8.1 ± 1.5	
150	252.91	3.11	8 25 29.1	-32 56 48	NOT OBSERVED			

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

TABLE I (*continued*).

151	267.67	-7.34	8 26 11.6	-50 59 50	6.7	1.8	5.2	
152	243.84	9.76	8 26 24.4	-21 45 06	NOT OBSERVED			
153	268.22	-7.61	8 26 47.7	-51 36 11	NOT DETECTED			
154	253.26	3.35	8 27 24.7	-33 04 56	4.8	1.4	6.7	
155	256.14	1.53	8 28 30.1	-36 29 02	NOT DETECTED			
156	257.53	0.63	8 29 02.7	-38 08 05	2.4	2.0	5.9 ± 0.4	Mapped
157	266.00	-5.47	8 29 39.6	-48 33 17	1.9	1.5	4.4	
158	260.97	-1.65	8 30 08.0	-42 15 27	4.3	1.8	16.1	
159	262.86	-2.41	8 32 59.2	-44 13 19	2.6	3.3	10.5	EdG; see notes
					1.6	3.6	3.9	
160	259.97	-0.06	8 33 42.8	-40 30 08	11.4	2.9	7.4	
161	259.15	0.94	8 35 16.2	-39 14 43	3.8	3.5	5.2	
162	266.07	-4.30	8 35 29.6	-47 55 21	5.2	1.8	5.0	
163	260.15	0.25	8 35 35.2	-40 27 35	4.3	3.8	8.0	Merging
					2.9	2.7	13.4	
164	265.37	-3.74	8 35 37.1	-47 01 25	NOT DETECTED			
165	259.34	0.92	8 35 47.0	-39 24 29	5.2	1.5	4.1	Merging
					2.4	1.6	6.4	
166	259.97	0.56	8 36 18.0	-40 07 18	NOT OBSERVED			Notes
167	255.92	3.99	8 37 34.1	-34 49 45	3.8	3.9	-16.1	Mapped
168	260.22	0.70	8 37 40.6	-40 14 01	NOT OBSERVED			
169	260.27	0.67	8 37 41.7	-40 17 40	4.3	2.8	9.5	Merging
					4.8	2.1	5.8	
170	259.28	1.50	8 37 57.0	-39 00 09	NOT OBSERVED			
171	254.98	4.96	8 38 28.6	-33 29 26	NOT OBSERVED			
172	260.76	0.66	8 39 16.3	-40 40 59	15.2	2.6	7.7	
173	261.47	0.32	8 40 10.1	-41 27 30	5.2	6.7	7.5	
174	260.79	0.92	8 40 26.5	-40 33 23	NOT OBSERVED			
175	266.60	-3.61	8 40 39.0	-47 55 07	NOT OBSERVED			
176	261.38	0.84	8 42 03.0	-41 03 45	9.5	3.3	4.9 ± 0.8	
177	262.18	0.36	8 42 44.5	-41 59 15	3.8	2.1	8.2 ± 0.1	
178	258.28	3.53	8 42 56.4	-36 57 55	NOT DETECTED			EdG
179	276.27	-10.59	8 43 16.7	-59 46 01	NO DEFINITE DETECTION			Ft. em. at 40.7 kms^{-1} (1.4K) & 2.2 kms^{-1} (2.9K)
180	258.81	3.24	8 43 27.7	-37 33 12	NOT OBSERVED			
181	263.61	-0.52	8 43 52.4	-43 39 16	15.2	5.4	4.9	
182	263.52	-0.35	8 44 18.0	-43 28 38	11.9	2.4	11.0 ± 0.	Additional component at 3.8/2.1/3.8 ± 0.4
183	263.75	-0.40	8 44 51.8	-43 41 12	14.3	3.4	3.7	
184	262.09	1.17	8 45 45.4	-41 24 22	2.4	2.8	7.9 ± 0.4	
185	263.74	-0.16	8 45 50.4	-43 31 43	11.4	2.3	11.2	Merging
					3.8	4.8	6.9	
186	263.23	0.50	8 46 51.2	-42 42 45	6.2	3.7	12.0	
					2.9	4.4	5.7	
187A	266.46	-2.03	8 47 26.2	-46 49 07	7.1	1.9	23.8	
B	266.47	-2.02	8 47 30.8	-46 49 01	not observed			Within beam of A-observation
188	269.67	-4.62	8 47 38.5	-50 56 11	NOT DETECTED			
189	260.34	3.14	8 47 57.2	-38 48 50	NOT OBSERVED			
190	252.27	9.73	8 48 14.7	-28 25 49	NOT OBSERVED			
191	254.02	8.35	8 48 15.2	-30 38 48	NOT OBSERVED			
192					7.6	3.3	5.9 ± 0.8	Average
A	262.90	1.31	8 48 32.3	-41 49 38	cannot associate			Notes

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

TABLE I (continued).

192B	263.16	1.43	8 50 29.6	-42 03 52	18.5	2.1	6.1	
C	263.12	1.53	8 50 46.1	-41 58 06	4.3	2.7	5.6	
D	263.11	1.61	8 51 03.1	-41 54 54	8.6	3.3	5.4	
E	263.22	1.57	8 51 18.4	-42 01 29	18.5	3.4	5.4	
F	263.53	1.52	8 52 11.3	-42 17 42	not observed			
193					11.9	3.4	0.7 ± 0.5	Average
A	268.21	-3.18	8 48 45.2	-48 53 48	10.9	3.2	0.8 ± 0.6	
B	268.27	-3.15	8 49 07.3	-48 55 16	13.8	3.2	0.4	
194	268.38	-3.06	8 49 58.8	-48 56 44	13.3	2.3	1.1	
195					3.8	3.3	14.5	Average; merging
					1.9	2.1	9.6	
A	268.16	-2.70	8 50 46.8	-48 32 58	4.8	2.5	14.6	
					3.3	2.6	9.6	
B	268.22	-2.69	8 51 04.0	-48 35 34	no definite detection			Notes
196A-C	264.69	0.23	8 50 51.6	-44 00 51	NOT DETECTED			Notes
197	264.97	0.27	8 52 02.4	-44 12 18	CANNOT ASSOCIATE			Notes
198	268.42	-2.65	8 52 03.3	-48 42 58	NOT OBSERVED			
199	272.40	-5.97	8 52 10.1	-53 53 36	NOT DETECTED			
200	269.78	-3.80	8 52 15.2	-50 29 38	NOT DETECTED			
201	266.98	-1.27	8 52 48.1	-46 43 42	3.8	2.9	2.1	
202	271.09	-4.73	8 52 50.2	-52 05 17	NOT OBSERVED			
203	268.06	-2.16	8 52 51.8	-48 07 37	NOT OBSERVED			Notes
204	264.42	1.05	8 53 20.7	-43 16 30	7.6	2.0	3.1	
205	263.86	1.55	8 53 27.5	-42 31 42	6.7	2.1	7.9	
206					8.6	4.3	7.1 ± 0.7	Average
206A	264.28	1.43	8 54 26.6	-42 55 09	not observed			
B	264.29	1.47	8 54 39.4	-42 54 19	9.0	3.6	6.6	
C	264.39	1.43	8 54 49.9	-43 00 32	9.0	4.6	7.6	
D	264.49	1.45	8 55 15.4	-43 04 10	not observed			
207	264.98	0.98	8 55 06.2	-43 44 49	7.1	5.2	3.8	
208	261.50	4.10	8 55 34.1	-39 04 29	NOT DETECTED			
209	253.58	10.78	8 55 38.6	-28 45 59	NOT DETECTED			
210					17.1	3.7	6.8 ± 0.7	Average
A	264.13	1.88	8 55 47.1	-42 30 47	not observed			
B	264.27	1.86	8 56 10.0	-42 38 00	18.1	3.4	7.0	
C	264.17	1.95	8 56 10.4	-42 29 46	16.2	3.7	6.6	
211	265.87	0.48	8 56 12.6	-44 44 46	4.8	7.1	5.8	
212	267.98	-1.36	8 56 13.3	-47 32 36	NOT OBSERVED			
213					7.6	4.2	4.6 ± 0.8	Average; merging
					8.6	3.8	-0.4	
A	268.06	-0.95	8 56 22.4	-47 11 06	3.8	5.9	3.2 ± 0.4	
B	267.93	-0.98	8 57 41.4	-47 15 36	9.5	3.4	4.8 ± 0.8	Merged
					15.2	4.2	-0.5	
C	269.86	-0.84	8 58 02.7	-47 06 36	not observed			
D	268.06	-0.98	8 58 14.0	-47 21 17	3.3	5.6	4.7	
214	265.42	0.94	8 56 30.0	-44 06 05	6.2	5.8	5.5 ± 0.3	
215	264.78	1.52	8 56 37.6	-43 14 29	11.4	3.1	6.4	
216	273.38	-5.86	8 57 02.9	-54 33 42	NOT OBSERVED			
217	265.07	1.41	8 57 12.6	-43 32 27	12.8	5.1	6.2	
218	271.76	-4.24	8 58 07.9	-52 17 00	NOT DETECTED			

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

TABLE I (continued).

219	271.87	-4.12	8 59 12.0	-52 16 53	NOT OBSERVED			
220	268.26	-0.80	8 59 46.3	-47 23 04	6.2	4.1	7.0	Merged
					3.8	4.1	2.9	
221	266.46	-2.03	9 00 02.3	-44 32 26	7.1	1.9	23.6	
222	268.42	-0.86	9 00 09.5	-47 32 28	11.4	4.5	1.8	Merged
					3.8	2.6	6.9	
223	268.48	-0.87	9 00 20.2	-47 35 28	5.2	4.3	2.8	
224	269.19	-1.43	9 00 40.8	-48 30 01	4.8	4.1	7.0	
225	268.62	-0.74	9 01 27.9	-47 36 51	NOT OBSERVED			
226	269.10	-1.13	9 01 40.2	-48 13 51	8.6	5.8	10.0 ± 0.3	Merged
					5.7	3.6	3.0 ± 1.2	
227	268.59	-0.61	9 01 53.4	-47 30 13	9.0	4.0	3.4	Merged
					5.2	2.3	8.4	
228	261.00	6.41	9 02 43.7	-37 10 32	NO DEFINITE DETECTION			Very faint emission at 2.4/3.4/22.8
229	268.97	-0.49	9 03 58.3	-47 42 02	CANNOT ASSOCIATE			Lines at 1.9/7.8/42.2±0.6 & 3.3/2.8/2.5±0.1
230	270.11	-1.30	9 05 00.8	-49 05 07	4.3	3.6	2.0	
231	272.88	-3.71	9 05 37.8	-52 45 21	NOT DETECTED			
232	271.62	-2.29	9 06 50.1	-50 52 29	1.4	2.8	73.0	Mapped; see notes
233	272.06	-2.60	9 07 18.6	-51 23 57	NOT OBSERVED			
234	270.05	-0.70	9 07 24.6	-48 37 57	2.9	4.7	3.1	
235	268.86	0.53	9 07 57.2	-46 55 57	4.8	1.8	-0.2	Merging
					3.3	6.7	2.9	
236	270.02	-0.51	9 08 08.2	-48 29 13	4.3	3.4	1.9	
237					4.8	3.2	-0.9 ± 0.1	Average
A	267.90	1.81	9 09 29.9	-45 21 12	4.8	2.9	-0.9	Merged
237A					2.9	1.0	1.7	
B	267.93	1.791	9 09 32.2	-45 23 25	5.2	2.4	-0.9	
					2.4	3.6	-5.3	
C	268.02	1.81	9 10 00.0	-45 26 28	5.2	3.0	-0.7	
238	281.66	-10.82	9 10 44.4	-63 58 26	NOT OBSERVED			
239	270.43	-0.27	9 10 53.7	-55 06 54	3.8	4.2	2.1	
240	272.83	-2.34	9 11 55.4	-51 47 19	4.3	3.0	6.5	
241	266.95	3.67	9 13 26.1	-43 23 08	NOT DETECTED			
242	269.76	0.97	9 13 28.4	-47 16 31	NOT OBSERVED			
243	268.98	0.86	9 13 52.3	-47 30 49	NOT OBSERVED			
244	270.99	0.03	9 14 32.9	-48 48 52	5.7	4.0	-0.1	
245	270.18	0.90	9 14 52.6	-47 37 36	NOT OBSERVED			
246	270.13	0.85	9 15 13.0	-47 45 11	5.7	1.2	10.8	Merged
					3.8	3.9	7.4	
247	270.82	0.69	9 16 41.4	-48 13 40	9.0	4.1	6.4 ± 0.1	Merged
					3.8	4.5	-0.4 ± 0.5	
248	269.32	2.21	9 16 50.8	-46 05 39	NOT OBSERVED			
249	267.93	3.62	9 16 57.5	-44 06 53	3.3	3.2	1.8	
250	271.46	0.19	9 17 16.7	-49 01 56	NOT OBSERVED			
251	269.33	2.37	9 17 31.4	-45 59 02	NOT OBSERVED			
252	271.26	0.56	9 17 59.9	-48 37 41	5.7	9.3	4.1	
253	271.79	0.21	9 18 47.8	-49 15 40	CANNOT ASSOCIATE			Notes
254	265.82	6.22	9 18 54.4	-40 47 34	NOT OBSERVED			
255	271.23	0.96	9 19 33.6	-48 19 38	3.8	5.7	0.6	Notes
256	267.83	4.41	9 19 40.6	-43 29 28	NOT OBSERVED			

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

TABLE I (continued).

257	260.03	12.13	9 19 56.3	-32 34 24	NOT DETECTED			
258	273.89	-1.59	9 20 13.7	-52 00 23	4.8	2.9	2.9	Broad component at 2.4/4.8/-12.2
259					6.7	3.7	5.6 ± 0.3	Average; see notes
A	271.01	1.39	9 20 27.1	-47 52 08	4.8	3.3	5.3	
B	271.01	1.41	9 20 30.8	-47 50 51	8.1	4.6	5.7	Merged
					4.3	7.7	-1.8	
260	272.87	-0.27	9 21 27.2	-50 21 20	NO DEFINITE DETECTION			EdG; see notes
261	273.78	-1.01	9 22 19.1	-51 31 17	NOT DETECTED			
262	274.80	-1.96	9 22 46.4	-52 55 01	NO DEFINITE DETECTION			EdG; 0.8/6.2/4.9 kms^{-1}
263	274.01	-1.13	9 22 50.0	-51 46 09	3.8	7.1	38.4 ± 0.4	
264A	274.68	-1.48	9 24 25.9	-52 28 45	not observed			Within beam of B-observation
B	274.71	-1.46	9 24 35.9	-52 29 15	7.1	3.0	3.1	
265	275.57	-2.20	9 25 22.5	-53 37 12	8.1	3.1	3.2	
266	271.85	1.92	9 26 15.9	-48 04 22	2.9	3.9	-2.6 ± 0.1	
267	277.72	-3.56	9 29 46.6	-56 04 22	NOT DETECTED			
268	271.22	4.98	9 35 36.4	-45 23 28	4.8	3.4	-2.6 ± 0.6	
269	273.01	3.61	9 38 08.5	-47 36 18	4.8	4.9	-5.4	Notes
270	273.20	3.71	9 39 22.1	-47 38 45	NOT OBSERVED			
271	276.30	0.22	9 39 46.7	-52 18 37	NOT OBSERVED			
272	273.34	3.93	9 40 51.1	-47 34 31	5.2	1.8	-8.8	Merging
					2.9	2.8	-5.3	
273	277.16	0.40	9 44 51.0	-52 43 43	NO DEFINITE DETECTION			Emission found at 1.4/3.1/-2.7
274	273.67	6.19	9 50 47.7	-46 02 39	NOT DETECTED			
275	280.82	-2.63	9 51 22.6	-46 51 34	NOT DETECTED			
276	284.32	-5.86	9 57 26.0	-62 05 05	NOT OBSERVED			
277	281.76	-2.26	9 58 33.9	-57 40 15	NOT DETECTED			
278	284.36	-5.61	9 58 59.9	-61 54 43	NOT DETECTED			
279	280.13	0.17	9 59 40.8	-54 44 50	NOT OBSERVED			
280	281.77	-2.00	9 59 47 4	-57 28 13	13.3	5.4	-6.2 ± 0.3	
281					7.1	6.0	-7.0 ± 0.1	Average; see notes
A	281.83	-2.07	9 59 52.2	-57 33 32	7.1	2.6	-6.2	Merging
					3.8	6.7	-9.9	
					2.9	1.7	-2.4	
B	281.82	-2.04	9 59 56.0	-57 32 03	8.6	4.0	-6.6	Merging
					2.4	4.8	-11.8	
282	278.24	2.79	9 59 59.3	-51 31 01	NOT OBSERVED			
283	282.88	-3.14	10 01 25.7	-59 02 40	7.1	3.7	-3.1 ± 0.1	
284	274.90	7.94	10 02 26.2	-45 24 24	NOT OBSERVED			
285	282.71	-2.48	10 03 22.0	-58 24 45	4.3	5.7	-17.6	Notes
286	286.28	-6.95	10 05 31.3	-64 07 15	NOT DETECTED			
287					3.8	2.0	-0.7 ± 0.4	Average
A	283.74	-3.41	10 05 35.8	-59 46 17	2.9	1.0	-0.1	
B	283.78	-3.42	10 05 51.1	-59 48 08	6.7	2.1	-0.9	
288	282.35	-1.39	10 05 57.6	-57 19 03	13.8	2.5	-18.0	
289	284.72	-4.47	10 07 07.2	-61 11 50	NOT DETECTED			
290	282.74	-1.43	10 08 06.6	-57 34 36	NOT OBSERVED			
291	282.30	-0.77	10 08 16.6	-56 47 10	CANNOT ASSOCIATE			Notes
292	280.58	1.81	10 08 43.7	-53 41 13	NOT DETECTED			
293	282.81	-1.34	10 08 57.1	-57 32 27	7.1	4.2	-15.3	Doubtful component at 3.3/5.5/-7.4
294	283.01	-1.56	10 09 17.8	-57 50 12	NO DEFINITE DETECTION			Line at 2.4/2.3/-20.4

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

TABLE I (*continued*).

295	282.13	-0.10	10 10 00.6	-56 07 54	NOT OBSERVED				
296	283.08	-1.48	10 10 01.6	-57 48 46	NOT OBSERVED				
297	283.84	-1.73	10 13 41.6	-58 26 28	NOT DETECTED				
298	284.76	-3.06	10 13 51.3	-60 03 36	9.0	2.7	-1.2		
299	283.15	-0.61	10 14 05.1	-57 07 30	NO DEFINITE DETECTION				Notes
300A	283.52	-0.97	10 14 45.7	-57 41 02	not detected				
B	284.30	-0.31	10 22 26.7	-57 30 21	2.9	4.6	19.3 ± 1.5		
C	284.38	0.40	10 25 40.3	-56 56 07	not observed				
301	285.32	-3.37	10 16 15.5	-60 37 31	5.7	1.8	-17.1		
302	284.12	-1.51	10 16 24.4	-58 24 35	NOT OBSERVED				
303	285.53	-3.36	10 17 45.0	-60 44 06	NOT DETECTED				EdG
304	284.20	-0.15	10 22 25.3	-57 18 48	CANNOT ASSOCIATE				EdG; Mapped, see notes
305	284.53	-0.59	10 22 45.5	-57 51 35	NOT OBSERVED				
306A,B	279.43	8.12	10 24 37.9	-47 46 54	NOT OBSERVED				
307	289.19	-7.60	10 24 56.0	-66 15 54	NOT OBSERVED				
308	277.30	12.47	10 27 31.6	-42 58 58	NOT OBSERVED				
309					NO DEFINITE DETECTION				Average; see notes
A	285.87	-1.02	10 29 49.1	-58 55 34	not observed				
B	286.23	-1.32	10 31 05.4	-59 21 58	cannot associate				
C	286.09	-0.92	10 31 42.6	-58 57 04	not definite detection				EdG
D	286.01	-0.76	10 31 46.1	-58 45 53	cannot associate				
E	286.42	-0.79	10 34 23.8	-58 59 45	no definite detection				
F	286.28	-0.52	10 34 30.4	-58 41 35	3.3	7.9	14.6		
310	287.97	-4.42	10 30 35.5	-62 54 47	NOT DETECTED				
311	287.22	-3.05	10 30 56.1	-61 21 27	8.1	3.7	-7.7		Notes
312	290.75	-8.54	10 33 33.4	-67 52 12	NOT OBSERVED				
313	285.76	1.65	10 38 56.6	-56 32 46	NOT DETECTED				
314	288.97	-3.84	10 40 42.5	-62 53 41	5.7	3.1	-13.6		
315	284.70	4.28	10 41 09.4	-53 43 33	NO DEFINITE DETECTION				Faint emission 1.9/3.0/-5.5
316					NO DEFINITE DETECTION				Average; see notes
A	287.61	-0.85	10 42 22.9	-59 37 34	not detected				
B	285.73	-0.50	10 30 55.1	-58 24 31	cannot associate				
C	285.85	0.08	10 33 54.0	-57 57 26	cannot associate				
D	286.21	-0.20	10 35 14.7	-58 23 05	3.8	6.9	-21.5 ± 0.9		
E	287.25	0.35	10 44 12.7	-58 23 22	no definite detection				
317	284.18	5.74	10 42 39.0	-52 11 45	NOT OBSERVED				
318	285.65	3.78	10 45 19.4	-54 36 33	NOT OBSERVED				
319	285.04	5.24	10 46 08.5	-53 02 07	NOT OBSERVED				
320	289.26	-2.80	10 47 15.1	-62 05 52	4.3	2.4	-7.5		
321					6.7	1.9	-12.6		Average
A	286.35	3.23	10 47 53.9	-55 25 13	5.7	1.8	-12.5		
					2.9	1.2	-16.3		
B	286.35	3.24	10 47 57.3	-55 24 20	8.6	1.8	-12.6 ± 0.1		
C	286.39	3.25	10 48 12.6	-55 25 02	not observed				
322A	285.85	4.38	10 48 24.0	-54 10 10	1.3	2.9	-25.9		EdG; see notes
B	285.89	4.50	10 49 00.5	-54 04 46	7.6	4.3	-24.0		
323	289.78	-3.23	10 49 28.4	-62 43 53	9.0	1.7	-14.3		
324	286.86	2.89	10 50 04.8	-55 56 59	6.2	2.8	-14.3		
325	287.14	2.39	10 50 19.3	-56 31 30	9.5	2.7	-13.1		
326	284.79	7.42	10 51 02.3	-50 58 05	NOT OBSERVED				

© European Southern Observatory • Provided by the NASA Astrophysics Data System

TABLE I *(continued)*.

327	288.04	0.80	10 51 07.5	-58 20 21	CANNOT ASSOCIATE			Notes
328					6.2	3.2	-12.9 ± 0.2	Average
A	290.32	-2.99	10 54 35.0	-62 44 43	3.3	3.6	-12.6	
B	290.36	-2.96	10 54 59.5	-62 44 10	7.1	2.9	-13.0	
329	288.49	1.02	10 54 56.1	-58 20 23	NOT OBSERVED			
330	284.07	10.47	10 55 17.0	-47 54 49	NOT DETECTED			
331	290.36	-2.84	10 55 27.2	-62 37 33	7.1	2.7	-16.6	
332	290.41	-2.91	10 55 34.1	-62 42 44	6.7	4.0	-15.6	
333	289.89	-1.32	10 57 12.8	-61 03 09	NOT DETECTED			
334A,B	289.89	-0.80	10 58 59.5	-60 34 50	CANNOT ASSOCIATE			Mapped; see notes
335	289.50	0.12	10 59 11.7	-59 34 30	CANNOT ASSOCIATE			Mapped; see notes
336	290.56	-1.98	11 00 06.1	-61 55 32	NO DEFINITE DETECTION			Notes
337	289.55	0.53	11 00 50.6	-59 13 06	NOT OBSERVED			Source 335 (e.g.) embedded in 337
338	291.12	-2.57	11 02 27.4	-62 41 31	NOT DETECTED			
339	291.04	-2.08	11 03 32.4	-62 13 42	CANNOT ASSOCIATE			EdG; Mapped, see notes
340	292.30	-4.86	11 04 01.7	-65 15 53	NOT DETECTED			
341					8.1	2.1	4.6 ± 0.2	Average
A	297.16	-15.69	11 04 51.3	-77 05 43	8.1	2.2	4.7	
B	297.37	-15.91	11 06 38.4	-77 23 03	7.6	3.0	4.5	
C	297.04	-14.92	11 08 19.9	-76 20 39	9.5	2.0	4.5	
D	297.23	-14.98	11 10 52.1	-76 28 04	7.1	1.7	4.8	
E	297.50	-15.56	11 11 10.1	-77 06 05	8.1	1.9	4.8	
342	290.64	0.26	11 07 55.6	-59 54 05	CANNOT ASSOCIATE			Notes
343					4.3	2.7	-18.8 ± 1.3	Average; see notes
343A	290.37	0.96	11 08 03.1	-59 08 50	2.9	2.5	-18.7	
B	290.41	0.90	11 08 11.3	-59 13 06	6.2	2.2	-18.7	
C	290.43	0.99	11 08 34.3	-59 08 29	5.7	2.5	-18.7	
D	290.63	1.16	11 10 31.9	-59 03 52	3.3	4.6	-22.2	
344	291.39	-1.07	11 09 29.8	-61 24 25	NOT OBSERVED			
345	295.08	-10.10	11 09 38.4	-71 09 53	NOT OBSERVED			
346	288.23	6.84	11 09 45.2	-52 53 34	NOT OBSERVED			
347	290.35	1.62	11 09 49.4	-58 31 27	3.8	2.8	-19.2	
348					11.9	9.8	-24.1	Average; see notes
A	291.29	-0.68	11 09 58.8	-61 01 08	14.7	9.8	-24.0	Additional component 1.4/4.6/28.2
B	291.63	-0.53	11 12 59.5	-60 59 55	no definite detection			
C	292.15	-0.15	11 18 09.1	-60 49 23	not observed			
349	288.29	7.07	11 10 39.5	-52 42 15	NOT OBSERVED			
350	288.34	7.24	11 11 23.3	-52 33 38	NOT OBSERVED			
351	291.86	-0.68	11 14 21.6	-61 13 27	NOT DETECTED			
352	287.53	11.43	11 16 17.2	-48 22 09	NOT DETECTED			
353	291.94	2.06	11 22 25.5	-58 40 07	10.5	2.4	-23.0	
354					5.2	4.1	-24.0 ± 0.2	Average; see notes
A	293.09	-0.97	11 23 15.6	-61 54 34	8.6	2.5	-23.9	
B	293.15	-0.96	11 23 46.1	-61 55 25	10.9	3.4	-23.6	
C	293.49	-0.92	11 26 37.3	-61 59 22	4.8	3.1	-23.8 ± 0.1	Additional component of 2.5K at -3.6 kms^{-1}
D	293.59	-0.86	11 27 33.2	-61 57 43	cannot associate			
E	293.56	-0.68	11 27 47.2	-61 46 58	5.2	6.7	-24.0 ± 0.2	
355	291.82	2.88	11 23 37.6	-57 51 25	NOT DETECTED			
356	292.65	1.24	11 25 39.5	-59 40 54	NOT DETECTED			

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS....68....1B

TABLE I *(continued)*.

357	294.13	-2.63	11 27 16.8	-63 48 56	6.7	1.5	-13.4	
358A	292.91	1.32	11 27 49.6	-59 40 54	3.8	2.7	-21.8 ± 0.3	
B	292.94	1.32	11 28 00.1	-59 41 20	not observed			
359	289.05	13.15	11 28 02.8	-47 14 44	NOT DETECTED			
360	294.12	-0.04	11 33 52.9	-61 20 18	NOT DETECTED			
361	294.31	-0.11	11 35 13.4	-61 27 42	CANNOT ASSOCIATE			Notes
362					2.4	4.6	-17.9 ± 0.5	Average; see notes
A	294.85	-1.65	11 35 59.8	-63 05 44	3.5	3.4	-18.4	EdG
B	293.67	-1.64	11 26 05.9	-62 43 45	17.1	3.6	-17.5	
C	293.61	-1.26	11 26 37.1	-62 21 00	4.3	6.9	-25.0	
D	293.75	-1.70	11 26 39.0	-62 48 49	12.8	3.8	-18.3	
E	293.94	-2.13	11 26 59.8	-63 16 41	not detected			
F	294.14	-2.34	11 28 08.5	-63 32 28	3.8	6.5	-26.1	Notes
G	294.24	-1.92	11 30 10.1	-63 10 20	7.6	4.8	-18.5	Notes
363	294.49	-0.39	11 36 05.1	-61 46 59	6.2	3.5	-25.2 ± 0.1	Additional component 2.4/2.7/-7.0 ± 0.6
364	294.36	0.19	11 36 22.3	-60 11 20	NOT DETECTED			
365	294.54	-0.34	11 36 32.2	-61 44 52	6.7	3.3	-24.4	Additional component 1.9/2.9/-6.7
366	295.41	-2.70	11 38 12.0	-64 15 28	NO DEFINITE DETECTION			Emission at 2.9/4.2/-27.3
367	294.28	2.67	11 41 05.3	-58 45 44	NOT DETECTED			
368	294.22	3.51	11 42 21.7	-57 59 13	NOT DETECTED			
369	291.78	12.92	11 42 48.4	-48 13 57	NOT DETECTED			
370	293.28	7.43	11 42 54.6	-53 55 01	NO DEFINITE DETECTION			Faint emission at 1.9/1.3/-8.6 & 1.4/1.1/-20.6
371					5.2	3.7	-30.0 ± 0.6	Average
A	296.22	-3.55	11 43 33.1	-65 16 54	7.6	3.6	-30.1	
B	296.27	-3.59	11 43 49.7	-65 20 12	2.9	1.3	-28.6	
371C	296.19	-3.55	11 43 13.1	-65 16 16	12.8	4.1	-30.8	
372					5.7	1.6	-13.4 ± 0.1	Average
A	295.48	0.41	11 45 47.8	-61 16 11	not observed			
B	295.47	0.52	11 45 58.0	-61 09 43	4.3	1.9	-13.3	
C	295.51	0.48	11 46 11.8	-61 12 27	8.1	1.6	-13.4	
373					7.6	1.5	-16.2 ± 0.1	Average
A	295.69	-0.34	11 45 58.3	-62 02 30	6.7	1.7	-16.3	
B	295.72	-0.34	11 46 16.1	-62 02 53	8.1	1.4	-16.2	
374	296.49	-2.77	11 47 45.7	-64 35 38	5.7	2.5	-26.3	
375	296.00	-0.60	11 47 59.6	-62 22 14	2.9	4.0	-37.8 ± 1.1	
376A-C	295.95	-0.27	11 48 14.1	-62 02 17	NOT OBSERVED			
377	297.02	-1.71	11 54 37.0	-63 40 38	2.9	2.2	-29.8 ± 0.2	
378	296.39	3.14	11 57 41.0	-58 48 07	NOT DETECTED			
379	297.58	-0.87	12 01 00.0	-62 58 00	3.8	5.2	30.8 ± 0.5	
380	297.58	1.14	12 04 06.1	-60 58 39	NOT DETECTED			
381	296.55	10.12	12 07 39.7	-51 57 36	NOT DETECTED			
382	298.42	0.69	12 10 20.9	-61 33 48	10.5	3.3	-32.5	
383					2.9	3.0	-30.0 ± 1.1	Average
A	298.36	2.23	12 11 44.7	-60 02 08	5.7	2.2	-29.6	
B	298.73	2.31	12 14 45.7	-60 00 23	1.9	4.3	-32.3	
384	298.94	0.48	12 14 29.1	-61 50 56	6.2	2.1	-25.7	
385	298.70	2.86	12 15 05.7	-59 27 20	6.2	2.3	-31.9	
386					9.0	2.8	-40.4 ± 0.2	Average
A	299.26	-0.35	12 16 19.3	-62 42 27	10.0	2.5	-40.3	
B	299.31	-0.29	12 16 43.9	-62 39 25	not observed			

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

TABLE I (continued).

386C	299.33	-0.31	12 16 54.2	-62 40 43	5.7	2.1	-40.3	
D	299.35	-0.31	12 17 07.0	-62 41 04	11.4	3.3	-40.2	
E	299.35	-0.27	12 17 09.3	-62 38 29	10.5	2.7	-40.5	
F	299.37	-0.32	12 17 16.8	-62 41 38	10.0	3.1	-40.0	
G	299.39	-0.24	12 17 31.6	-62 36 54	13.8	2.9	-39.9	
387	299.46	-1.09	12 17 11.3	-63 28 31	4.3	3.4	-34.4 ± 0.1	Merged
					3.3	3.7	-38.9 ± 0.4	
388	299.67	-0.60	12 19 37.3	-63 00 37	8.1	4.2	-33.5 ± 0.3	Merging
					4.3	2.4	-40.4	
389	300.67	1.06	12 29 27.1	-61 27 08	NO DEFINITE DETECTION			Emission at 1.9/6.0/-35.8
390					10.9	4.5	-42.9 ± 0.3	Average
A	300.96	1.16	12 32 00.0	-61 19 01	17.1	5.7	-42.9	
B	300.97	1.22	12 32 06.9	-61 22 24	9.5	4.4	-42.9 ± 0.4	
391					7.6	4.6	-42.0 ± 0.1	Average; asymmetric profile, fitted by
					3.3	3.5	-37.2	two gaussians
A	301.05	1.07	12 32 37.9	-61 27 54	9.5	5.6	-41.7	
B	301.10	1.07	12 33 04.5	-61 28 21	8.1	5.3	-41.9	Merged (asymmetric profile)
					3.8	3.2	-36.9	
392	301.76	-6.76	12 34 42.7	-69 19 12	NO DEFINITE DETECTION			Emission at 2.4/2.9/5.4±0.1; see notes
393	301.67	-4.87	12 35 13.2	-67 26 01	NO DEFINITE DETECTION			Emission at 1.9/1.5/-24.7
394	301.73	-4.43	12 35 59.2	-66 59 53	NOT DETECTED			
395	301.86	1.38	12 39 34.1	-61 11 59	NO DEFINITE DETECTION			Notes
396	302.13	0.34	12 41 29.6	-62 14 48	2.9	6.4	-21.4	Notes
397	302.81	1.29	12 47 23.2	-61 18 36	CANNOT ASSOCIATE			Notes
398	302.92	-0.43	12 48 18.0	-63 01 53	10.0	2.5	-22.9 ± 0.1	
399	303.66	-3.51	12 55 30.0	-66 06 04	2.9	2.9	-23.3 ± 0.3	
400					8.0	3.1	-35.1 ± 0.2	Average; see notes
A	304.94	0.56	13 05 29.4	-61 58 38	15.7	3.8	-35.2	Merged
					2.9	4.2	-40.4	
B	304.94	0.51	13 05 35.1	-62 01 30	11.4	3.8	-34.9	Merged
					2.4	4.1	-40.9	
C	304.95	0.47	13 05 36.1	-62 03 57	4.8	2.8	-35.0	Merging
					1.9	5.4	-40.6	

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

Notes to table I:

Object number	Notes
16	In total spectrum there is additional line at 1.0/2.5/3.0. Probably not associated. Of the quoted lines, only one component visible per observed position.
22	A: Lines at 3.3/2.0/18.9 and 2.4/1.6/6.7. G: Two lines detected: at 20.6 kms^{-1} (5.7K) and 1.5 kms^{-1} (3.8K).
23	Eleven positions were observed. In only three of them both lines are seen simultaneously.
40	Faint emission at two off-positions. This source forms a kinematical complex with source 37. These two, and a molecular cloud to the East have been mapped. Whole complex averaged gives 1.4/8.1/50.4 ± 2.4.
44, 45	There is an additional component: 1.4/1.9/21.7 ± 1.1 (for #44) and 1.9/2.2/21.7 ± 0.3 (for #45). Combined spectrum yields 1.9/2.8/76.9, merging with 1.9/5.2/72.1, and a line at 1.9/2.5/21.7 ± 0.8. The high velocity components are most likely associated with the nebula. Fitting one representative high velocity component gives 74.4 ± 2.4 kms^{-1}.
50	In some individual spectra there is another emission line, swamped out in the sum spectrum. Averaging all by hand, we obtain V_{LSR} = 49.0 ± 3.7 kms^{-1}.
80	In sum spectrum there is a narrow component at 55.3 ± 0.1 kms^{-1}. Both components averaged yield 51.6 ± 2.9 kms^{-1} as representative velocity.
89	In off-positions to E there is a component at around 25 kms^{-1}. In sum spectrum this is only a very small line: 0.5K at 24.8 ± 0.7 kms^{-1}.
90	Additional component 1.0/2.3/29.9. Shows up only in sum spectrum.
96, 97, 98	Region extensively mapped. Both lines are associated with the region. Adding all spectra gives 2.4/3.6/63.0 ± 0.8 and 1.9/6.3/55.1 ± 0.9
123	There is a cloudlet associated with this object. At cloud position, the 4.7 kms^{-1} component is detected. Centered at the nebula 1.9/1.4/50.4 is found
126	At the central position emission is found at 4.6/2.9/8.6 and 1.6/6.5/32.8. The former component peaks at the center, the latter one beam S (6.9K). At positions E, W and N only the 8.6 kms^{-1} component is present. Objects nearby (projected) have emission at either one of these velocities

Object number	Notes
147	At some off positions there are lines at other velocities, but they vary and disappear in total spectrum. It seems the 12.4 kms^{-1} component is associated.
159	Average velocity is 6.6 kms^{-1}. Detection made at W edge of star cluster. Center position yields weak emission 1.4/1.8/-4.7 (CSIRO)
166	This source is the general emission nebula RCW 27. Within its boundaries the following objects are located: 160, 161, 163, 165, 168, 169, 172 and 174. Adding all relevant spectra yields 5.2/4.2/7.1 ± 1.4
192A	At two positions lines were detected at different velocities: 12.8/1.6/7.5 and 4.8/2.4/14.7
195B	Emission found at 2.4/3.9/14.4. This is the same velocity as the strongest component in A, and the emission is therefore very likely associated with B. In the sum spectrum the 9.6 kms^{-1} component is reduced in strength because it is not present in position B.
196	At position of B, a narrow line was found: 3.3/1.0/50.4 ("no definite detection").
197	Lines were found at: 8.6/2.3/12.1, 4.3/2.2/5.3 and 2.9/1.2/-1.5.
203	Large object, and several sources within its boundaries or at its edges may be associated: 193, 194, 195, 198, 212, 213, 220, 222 - 227.
232	In sum spectrum of all off positions there is a doubtful emission line at 1.0/1.4/-0.9.
253	Lines were found at 2.9/2.4/6.2 and 2.9/1.7/1.4 and there is uncertain emission at 47.5 kms^{-1} (1.9K) and at -17.1 kms^{-1} (1.9K) which only shows up in the 1984 observation. In the 1983 spectrum there is emission at 2.9/2.1/-2.7.
255	There are, however, uncertain lines at 2.4/1.8/7.2 and 2.9/2.5/-48.4. The broad component listed in the Table is probably the associated CO emission.
259	Merging with this strong line is a broad component, possibly itself a merger of two or three emission lines: 3.3/8.2/-1.9. In A this broad component is also present but less prominent than in B.
260	Weak emission at 1.1/3.6/1.1 and 0.8/3.1/17.9.
269	Asymmetric profile. Fitting two gaussians yields: 3.3/1.6/-6.6 and 3.3/5.1/-4.6.
281	Broad plateau at the 2.5K level, possibly caused by additional emission components. Fitting A and B with one component only yields 7.6/4.5/-6.9 (A) and 6.2/6.7/-7.1 (B), but the fits are less good.
285	The quoted component (which has a high velocity wing) is most likely associated with the general nebula. At the position of a star with intense emission around it we detect two lines: 3.8/2.8/-5.3 and 4.8/4.5/-16.7. The additional component shows up as a 1.9K line in the total spectrum for this object. It is most likely associated only with the peculiar star.

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS...68....1B

Notes to table I (continued).

Object number	Notes
291	Extremely broad emission, best fitted by four gaussians: 1.9/2.0/18.2, 4.3/4.6/7.0, 5.7/7.1/1.3 and 3.8/9.8/-12.2. The last three components merge.
299	Two faint lines found at center position: 1.9/3.1/4.8 and 2.4/5.9/-11.9.
304	Emission lines detected at velocities between -19 kms^{-1} and 51 kms^{-1}. The component at -13.8 kms^{-1} peaks at the nebula (3.8/6.4/-13.8).
309	In total spectrum there are weak lines over quite a range in velocities, which is not surprising considering the line of sight cuts through the Carina spiral arm section of the Galaxy here. At position B we detect two strong lines: 6.7/3.0/40.8 and 10.5/2.3/-13.0. On the low velocity side of the former there is broad emission which can be represented by 2.9/5.8/37.2 and 2.4/10.6/28.7. At position C (EdG-data) weak emission was found: 1.1/4.9/-3.5 with low level extension to the red. At position D relatively strong lines are seen at 2.9/5.9/29.1, 3.3/8.4/16.5 and 3.8/2.8/-8.2. At position E there is weak, doubtful emission at 3.3/2.7/83.0, 2.9/5.7/23.8, 2.4/2.9/-15.7 and 3.3/1.7/-42.4. Unfortunately observations of these sources suffered from bad weather conditions.
311	There is low level, broad emission at the lower velocity side of this strong component: 2.4/6.3/-15.8.
316	The same general remarks as for 309 apply here. In the total spectrum there is a 1.9/4.1/-20.7 emission line but considering the many lines in the sub-entries it is not obvious that this is really the relevant velocity. A: only one position (at VBH 43) observed. B: relatively weak lines at 67.8 kms^{-1} (2.9K) and 21.0 kms^{-1} (1.9K). C: at central position a line was found at 2.4/5.5/6.9 while at another location there was CO detected at 6.7/4.4/-21.0. E: faint emission was found 1.9/2.2/-19.3 and possibly at 17.6 kms^{-1} (1.4K) and 76.2 kms^{-1} (1.4K).
322	CSIRO observations were done under bad weather conditions and spectra are noisy.
327	Lines at 4.3/2.4/-36.4 and 2.4/4.4/-24.3.
334	Interesting source. Two broad components with wings were found: 3.8/6.0/32.7 ± 0.7 and 3.3/7.8/18.7 ± 1.4 A: 4.8/7.1/32.6 and 3.3/10.4/19.3. B: 3.8/5.2/32.6 and 3.8/7.0/18.6. The highest velocity component has a red wing. When this line is fitted by two gaussians we get: 1.4/9.6/33.7 and 2.9/3.1/32.3.

Object number	Notes
335	CO is detected at 2.9/5.5/20.9 ± 0.7 and 5.7/2.4/-25.9 ± 0.2. It is hard to tell which component is associated with the nebula: at points 2.5 arcmin E and N of the nebula center only the red component is detected, whereas the central position, and the 2.5 arcmin W and S show both lines (although very faint at the 2.5 arcmin S point).
336	A 2.4/2.2/-11.9 detection was made at off position.
339	CSIRO: a narrow line is detected: 3.3/1.0/-4.3. Mapped by EdG; at center position emission is detected at 1.9/3.6/-17.5, 1.9/3.6/-4.5 and 0.7/5.2/-25.8.
342	CO was found at 2.9/3.1/-23.9 and at 2.4/4.1/-18.0. The former is detected only at an off-position (the 7.6K line there is reduced in intensity in the sum spectrum).
343	In sum spectrum a second component shows up: 1.9/1.5/-11.3.
348	This is one of the two sources used for intensity calibration. The listed component is very broad and is probably a merger of at least three emission lines. At position B faint, broad emission was found at 2.4/15.3/30.7 and 2.9/9.3/13.1.
354	An additional emission line was found: 1.4/2.5/-3.1. C: the listed component has a small one merging with it: 1.9/2.0/-27.4. D: at this position we detected emission at 4.8/5.0/-23.5 and 3.8/2.3/-3.2.
361	CO was detected at 2.9/2.6/-10.6 ± 0.5 and 2.9/2.8/-24.3 ± 0.3.
362	A: at CSIRO, emission was found at 1.9/1.6/-8.4 and 2.9/6.6/-14.1 at center of nebula; S of nebula, emission was detected (EdG) at 4.3/4.7/-17.5 and 1.1/2.5/-2.6. F: in different part of this sub-entry only marginal detection made. G: as for F.
392	The detection is made in a cloudlet close to the nebula, not visually connected, but probably associated with it.
395	A 1.9K line at -48.4 kms^{-1} and a 1.4K line at -53.3 kms^{-1} were found.
396	Two more lines at 1.9/2.7/-36.9 and 1.9/5.1/-45.3.
397	Emission was found at 4.3/1.6/-3.2, 3.8/2.3/-29.7 and 2.4/2.8/-38.3.
400	There is a broad "bump" at 2.9/13.1/-36.1, which is all that is left of the influence of the -40.9 kms^{-1} component found in the individual sub-entries.

© European Southern Observatory • Provided by the NASA Astrophysics Data System

1987A&AS....68....1B

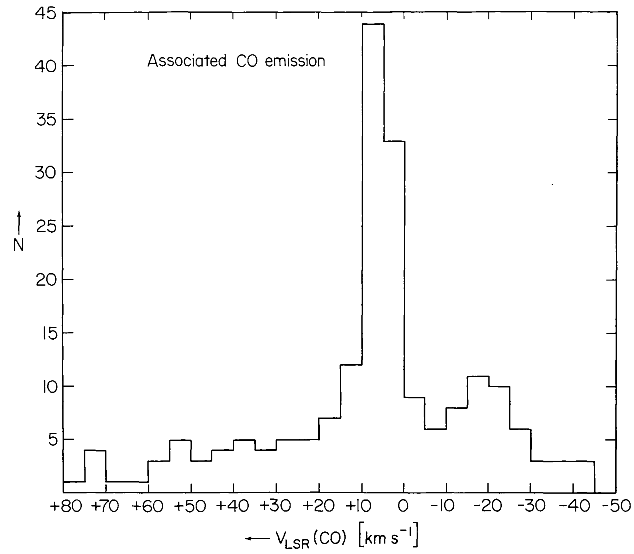

FIGURE 1. — Distribution over velocity of all 194 cases in which the CO could be associated with the nebula. The displacement of the peak (which is from local material) is due to the fact that most of our sampled objects lie in the third quadrant.

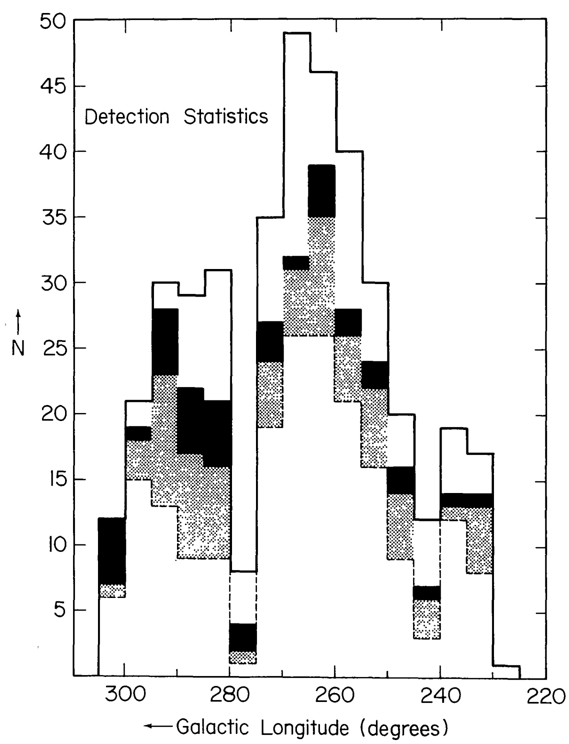

FIGURE 2. — Distribution over galactic longitude of all sources. The upper envelope shows the distribution of all objects in the catalogue ; the dashed line marks all objects for which the CO is associated with the nebulae ; objects not detected are included in the dotted areas, while the objects for which no definite detection was made or for which the CO cannot be associated are grouped together in the dark areas. The blank areas between the dark regions and the drawn line are objects which were not observed. The number of sources detected with respect to the number observed does not change significantly with longitude, but the number of cases in which no definite detection was made, or in which no particular emission line could be associated with the nebula, is larger in the fourth quadrant. This is a consequence of the fact that in the inner Galaxy the line of sight intersects several molecular clouds rather than just one, contrary to the general situation in the outer Galaxy.

© European Southern Observatory • Provided by the NASA Astrophysics Data System