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A CATALOGUE OF DISCRETE SOURCES OBSERVED AT 400 Mc/s

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The discrete sources found in the 400 Mc/s survey described in the foregoing paper are listed, together with flux densities, ratios to M 87 (Vir A), comparisons with other source catalogues, and identifications with emission nebulae. A number of sources are discussed in the notes to the table. A series of narrow 'ridges' in the background radiation, which might be related to the galactic halo, was also detected. New galactic coordinates are used throughout this paper.

In the survey at 400 Mc/s described by SEEGER, WESTERHOUT, CONWAY and HOEKEMA (1965, hereafter referred to as paper I), a large number of discrete sources were found. In the present paper their position, extent and flux density are given, and comparisons are made with other radio and optical catalogues and with the Palomar Sky Atlas. The observations of some of the sources, the Coma cluster, the Moon, and the Andromeda nebula, are described by SEEGER, WESTERHOUT and CONWAY (1957). The available material consisted of the sweeps in azimuth, elevation and right-ascension described in paper I. Each record was examined for the presence of discrete sources. A source was defined as an increase of intensity which was clearly of a smaller width than the surrounding background. In 'empty' regions at high galactic latitudes, therefore, the maximum width for an intensity fluctuation still to be called a source was larger than near the galactic equator.

The positions and intensities of all sources thus found were tabulated. The positions were converted to right-ascension and declination where necessary, and plotted on equatorial coordinate grids. The spacing of adjacent sweeps was much smaller than the beamwidth, most sweeps were repeated, and in many regions sweeps were made in various directions. Therefore, a genuine source showed up immediately as a cluster of six or more points. Individual points (sources on one record only) were discarded immediately; they were due to interference. All cases where a few points were situated fairly closely together, but not so closely that they would be classified as a source, were investigated, and it was practically always decided that they were spurious.

The intensity of a source on the records was determined with respect to the surrounding background. Only in places with steep intensity gradients was it difficult to interpolate between regions adjacent to the source position. The intensities of all the points belonging to a source were corrected for gain changes and extinction, and then plotted as a function of right-ascension or declination. A smooth curve was drawn through the points. For weak sources, the spread in intensity was often fairly large, and in most cases the best curve had a more or less Gaussian shape. The coordinates of the peak of the curve were determined and an eye estimate was made of the probable error in this position, and in the peak intensity.

After having plotted the sources on the contour maps, it was found that these maps showed a number of additional features which could be classified as sources. Mostly, they were not noted on the original records because these would cross the source in an unfavourable direction, or because they showed a number of intensity fluctuations close together so that it was difficult to decide which was a source, or because they were too large. The positions and intensities of such sources were usually derived from the contour maps, with the aid of the original records. They have in general large probable errors.

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Since the galactic ridge is only two or three times wider than the antenna beam, it was difficult to distinguish discrete sources on the maximum of the ridge from this maximum itself. Therefore, the sources on the ridge, between $l^{II} = 355°$ and $55°$, had to be found by plotting the maximum intensity of each sweep across the ridge as a function of galactic longitude (figure 14 in paper I). In this graph of the ridge-line intensity a number of maxima occur, which are classified as discrete sources. The background underlying the sources was determined as well as possible by trying to draw a smooth lower envelope to the curve and assuming that this represents the background. The width of the sources in latitude was determined by subtracting an average ridge-background cross-section from the measured cross-section. This procedure necessarily introduces large errors, both in intensity and width, and thus the flux densities of the ridge sources are rather uncertain.

The list of 149 sources which resulted from the investigation described above is given in table 3. Column 1 contains running numbers; an asterisk here indicates that the source is discussed in the notes at the end of this paper. Column 2 gives the right-ascension and declination (epoch 1950), column 3 the estimated probable error in position. The sources used for position calibration of the telescope, and a number of sources with previously determined positions which were simply observed by setting on and off the source, have a dash in the probable error column. Galactic longitude and latitude are given in column 4. Column 5 lists W_r, the apparent size of the radio source, not reduced for the beamwidth of the antenna; this is the width between half-intensity points. P indicates that the source is a point source, i.e. it appeared to have a width equal to the beamwidth of our antenna, 2°.

Column 6 gives the measured top intensity of the source, I, and its estimated probable error, in the same units as the contour maps. These intensities are corrected for the influence of the non-linear detector (see paper I); only for sources with $I \geq 150$ units does this amount to a correction of 1 unit or more. One unit of I is 0.6 °K in T_A, 1.2 °K in apparent T_b or 9.47×10^{-26} watt $\cdot$ m$^{-2} \cdot$ (c/s)$^{-1}$ received in the main beam. The conversion factor was derived by using a flux density of 5600×10^{-26} watt $\cdot$ m$^{-2} \cdot$ (c/s)$^{-1}$ for Cas A; all flux values, therefore, depend on this assumed value. The flux density S in column 7 was determined from the top intensity I by

$$S = 9.47 \times 10^{-26}\, gI,$$

where $g = W_r^2/\Theta^2$ is a correction factor for size, and $\Theta = 2°$ is the half-width of the antenna beam. For a point source, where $W_r = \Theta$, we have $g = 1$. For a source which has $W_r > \Theta$ we assumed that it has a Gaussian shape, so that the apparent cross-section was also Gaussian. In fact, in most instances a Gaussian profile was simply fitted to the small number of observed points. When the source appeared to be non-circular the largest and smallest half-widths, W_r' and W_r'' are given in column 5, and the geometric mean $(W_r' W_r'')^{\frac{1}{2}}$ was used to determine g. For sources which have an apparent width only slightly larger than the beamwidth of the antenna the assumption of a Gaussian shape will not introduce serious errors. Several low-intensity sources appear to have a very large extent, 4° to 10°. Although they might better be described as background irregularities we have included them as discrete sources if they appeared as such on the individual tracings. The boundaries of such a source are difficult to determine, with the result that a large uncertainty is introduced into the flux density. For such sources the value of S is enclosed in parentheses. Other sources were such that the half-width was difficult or impossible to determine; these sources have ? or P(?) in the W_r column, while column 7 has a $\geq$ sign before the flux value, which was calculated as though the source were a point source. No probable errors are given for the flux density. In the case of point sources these can be determined directly from the probable error in I. For extended sources, the uncertainty in the correction factor for size, g, increases the error.

Column 8 lists the ratios of the flux densities to that of M 87 (Vir A) which has been used as a standard source by other authors. The catalogue numbers of the source in other catalogues are given in columns 9 to 12 and in the notes at the end of this paper. The catalogues referred to are summarized in table 1. Although we attempted to eliminate spurious identifications with other catalogues by taking into account large differences in apparent size and intensity, we are not certain of identifications of low-intensity sources. For example, MSH sources with $S \leq 20 \times 10^{-26}$ watt $\cdot$ m$^{-2} \cdot$ (c/s)$^{-1}$ are so numerous that there is a probability of 1/3 for them to be identified with one of our sources having a positional accuracy of 1°.

If the source has been investigated by CONWAY *et al.* (1963) their spectral classification and spectral index appear in column 13. Otherwise the approximate spectrum of the source, based on radio identifications, is given. If the flux density, determined from observations at three or more frequencies, is roughly proportional to (wavelength)$^{0.7}$ the source is listed as non-thermal (NT). If the flux density is more or less constant, perhaps dropping off at longer wavelengths, the source is listed as thermal (T). If the spectrum is based on observations at only two wavelengths a question mark is added. An asterisk in column 13 indicates that the spectrum is discussed in the notes following the table.

A search was made on prints of the Palomar Sky Atlas for possible identification of the sources with emission nebulae. A number of catalogues of emission nebulae was also consulted. NGC and IC numbers, and catalogue numbers from the two catalogues listed in table 1 together with remarks concerning the nature of the optical field, are given in the notes.

It is of interest to note that more than half the sources detected in this survey seem to be extended, i.e. of the order of 1°.5 or larger in actual diameter. It should be pointed out that our instrument was much more sensitive to such sources than any other instrument

TABLE 1

Catalogues of radio sources and emission nebulae

Abbreviation	Author	Wavelength (cm)
MSH	MILLS, SLEE and HILL, 1958, 1960	350
3C	EDGE, SHAKESHAFT, MCADAM, BALDWIN and ARCHER, 1959 BENNETT, 1962	189
CTA	HARRIS and ROBERTS, 1960	31
CTB	WILSON and BOLTON, 1960	31
W	WESTERHOUT, 1958	22
HBH	HANBURY-BROWN and HAZARD, 1953	189
LHE	LONG, HASELER and ELSMORE, 1963	75
PT	PIDDINGTON and TRENT, 1956	50
IAU	PAWSEY, 1955	various
C	CEDERBLAD, 1946	emission nebulae
S	SHARPLESS, 1959	emission nebulae

TABLE 2

Table of 'ridges'

No.	α (1950)	δ	l^{II}	b^{II}	Width	I	Remarks
I	09^h 31^m.6	-20° 00'	252°.3	22°.7	2°.5 - 6°	0 - 3	Top intensity fluctuates from 0 to 3 I units.
	09 47.6	-02 00	239.4	37.4			
	09 39.6	06 00	229.5	40.3			
II	11 11.6	-10 00	267.4	45.8	≈ 4°	2 ± 1	
	10 31.6	-25 00	267.5	28.0			
III	12 03.6	-20 00	288.7	41.4	≈ 4°	0	
	12 19.6	-27 00	295.0	35.2		↓	
	12 39.6	-30 30	300.7	32.1			
	12 59.6	-31 00	305.7	31.6			
	13 13.6	-33 00	308.8	29.4		4	
IV	13 11.6	08 00	319.5	69.9	6°		May be extension of spur at l^{II}= 32°.
	12 57.6	05 00	308.6	67.6			
	12 43.6	03 00	299.8	65.6		9(max.)	
	12 43.6	00 00	300.1	62.6			
V	15 59.6	-13 00	358.3	28.6	6°	2	Top intensity fluctuates from 2 to 9 I units.
	15 15.6	-15 00	347.5	34.6		5	
	15 07.6	-21 00	341.4	31.2		5	
	14 03.6	-30 00	321.7	30.0		6	
	13 39.6	-32 00	315.4	29.4		9	
	13 39.6	-33 00	315.2	28.5		9	
VI	14 43.6	-30 30	330.3	25.9	≈ 3°	2 ± 1	Might be zero-line effect (close to horizon).
	14 59.6	-31 00	333.3	23.8			
	15 09.6	-33 00	324.1	21.0			
VII	15 00.0	68 00	106.3	44.9	10°	4	Might be a second large "spur" like the one at l^{II}= 32°.
	17 12.0	67 30	98.1	34.4			
	18 16.0	61 30	90.8	27.7			
	19 04.0	56 00	86.4	20.5			
	19 44.0	51 30	84.6	13.2			
	20 11.6	50 00	85.5	8.6			
VIII	23 07.6	08 00	84.7	-48.2	-	3 ± 1	
	22 51.6	13 00	84.1	-41.9			
	22 19.6	19 30	81.2	-32.2			

used at frequencies up to 800 Mc/s. For some of the sources identified with emission nebulae this is to be expected. It is not clear why so many other sources are that large. Some may be emission nebulae behind dark clouds, but in many instances there is no clear evidence for such absorption. We might be dealing with supernova remnants, blends of several small extragalactic sources, or even with small-scale structure in the non-thermal background radiation which is not connected with any presently known non-thermal emitter.

Although they cannot be classified as sources, we have tabulated in table 2 a series of narrow 'ridges' in the background radiation which, when a 2° beam scans across them, appear as discrete sources on a single tracing. Some of these ridges are clearly visible on the contour maps, and most of them are at high galactic latitudes, and can be followed in some cases over as much as 30°. They are clearly in the class of background irregularities, and are perhaps of the same nature as the well-known 'spur' projecting from the plane at $l^{II} = 32°$. They might be related to the structure of the galactic halo. Discrete sources (catalogued in table 3) are superposed on some of the ridges.

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Notes to table 3

3. 00N6A, HBH1 (Tycho Brahe's supernova).
4. 00N4A, HBH2 (Andromeda nebula).
5. There are faint emission regions (S181, 182, 183) to the south-west and strong obscuration to the south-east. Poor positional agreement with 3C27 and CTA7.
6. Some optical absorption present.
12. HBH3. The source is centred on the small bright emission nebula IC 1795 (W3). The extension of the radio contour to the south is due to IC 1805 (W4). The extension of the contours to the south-east is probably due to IC 1848 (W5).
13. 03N4A, HBH6 (NGC 1275).
14. HBH8, PT2. IC 1491 is 1° to the north; however, the large angular size of the radio source and the displaced position are difficult to reconcile with this identification. The difficulty may be due to the problem of separating the radio source from the galactic ridge.
15. PT3(?). Perhaps a blend of two sources. Some absorption present. The source extends perpendicular to the galactic plane.
17. A small (0°.1) emission region (S239) is about 1° south-east of the radio position. The entire area is strongly obscured.
18. 04N3A.
20. 04N4A, HBH9. A very faint emission region (S221), agrees well with the radioposition, while there is some obscuration a little to the north.
23. The radio source is centred on IC 410, a bright emission region of diameter 0°.5. IC 405, another bright nebulosity 1°.7 to the north-west of IC 410, and the surrounding area of lower brightness apparently contribute to the radio flux. The 3C flux density is probably low due to partial resolution.
24. An emission region of moderate brightness extends north-west – south-east for about 2° near the radio position, while a faint, very extended (6°) emission region surrounds the source.
25. 05N2A, PT5 (Tau A, Crab nebula).
26. 05S0A, PT 6 (Orion nebula).
27. PT8. This is a region of faint emission wisps, with moderate obscuration also present.
28. PT9, LHE157. NGC 2024 (0°.25 east-north-east of ζ Ori, north of Horsehead nebula).
29. Part of Barnard's ring? The size may be grossly overestimated due to superposition on the galactic ridge.
30. The 'source' may be a zero-line error. A moderately faint emission region, part of the faint, very extended emission region around the Orion nebula, agrees well with the source position.
31. Part of Barnard's ring?
33. The radio position is about 1° north of a moderately bright emission region (S261) of diameter 0°.75.
34. 06N2A, PT11 (IC 443).
37. PT12/13 (Rosette nebula).
43. A large (8°), faint emission region (S310) corresponds with the source position. There is strong obscuration in the area.
45. 08N4A, HBH11.
46. 09S1A, PT19 (Hydra A).
47. From the radio contour map one gets the impression that the source might very well be a blend of the three MSH sources.
52. Central concentration may be 3C263.

TABLE 3
Table of sources

(1) No.	(2) α (1950)	δ	(3) m. e. α	m. e. δ	(4) l^{II}	b^{II}	(5) W_r	(6) I	±	(7) S	(8) S/S_{M87}	(9) MSH	(10) 3C	(11) CT	(12) W	(13) Spectrum type	index
1	00h 03m6	79° 00'	1m2	30'	120°7	16°6	P(?)	2	1	20	0.042						
2	00 21.6	58 12	6.0	30	119.4	-4.2	P	2	1	20	0.042						
3 *	00 22.4	64 06	2.0	18	120.1	1.6	P	10	1	95	0.200		10	A2		S_1	.62
4 *	00 40.0	41 00	-	-	121.2	-21.6	6°2 x 3°3	1.9	-	78	0.232						
5 *	00 55.6	66 30	8.0	60	123.6	3.9	P	5	2	45	0.095		25/27(?)*	A7(?)*			
6 *	01 25.6	63 00	6.0	30	127.1	0.7	3°	7	2	150	0.316						
7	01 35.6	50 00	4.0	60	130.6	-11.9	5°	4	1	(240)	(0.505)						
8	01 36.0	32 54	4.0	60	134.2	-28.7	P	4	2	40	0.084		48	A15		C	
9	02 07.2	77 30	12.0	30	127.3	15.6	P(?)	1.5	0.5	15	0.032						
10	02 11.6	67 48	6.0	18	130.7	6.5	3°	6	2	130	0.274						
11	02 11.6	31 00	8.0	60	143.1	-28.4	4°	2	1	75	0.158						
12 *	02 22.4	61 48	1.2	12	133.8	1.2	3°2 x 2°1	23	5	365	0.768			B9	3/4/5*	T	
13 *	03 17.2	41 24	-	-	150.6	-13.1	?	4	1	≥ 40	≥0.084		84	A22	6	S_1	.70
14 *	04 01.6	50 12	4.0	30	151.5	-1.5	3°5 x 5°	5	1	205	0.432						
15 *	04 06.8	37 36	6.0	60	160.7	-10.2	2° x 5°	6	2	140	0.295						
16	04 15.2	77 00	12.0	60	133.7	18.9	4°(?)	1.5	1	(55)	(0.116)						
17 *	04 26.4	18 36	4.0	60	178.1	-20.1	3°	3	1	65	0.137						
18 *	04 32.8	29 24	2.0	18	170.6	-11.9	P	10.5	1	100	0.212		123	A31	7	S_2	.69
19	04 51.2	60 00	8.0	60	149.3	10.4	3°(?)	2	2	(45)	(0.095)						
20 *	04 57.6	46 30	4.0	30	160.5	2.8	P	13	3	125	0.263			A33		T(?)	
21	05 00.8	37 54	2.0	12	167.7	-2.0	P	3	1	30	0.063		134	A34		S	.96
22	05 07.2	75 00	12.0	60	137.4	20.2	?	2	2	≥ 20	≥0.042						
23 *	05 18.0	33 30	1.2	18	173.3	-1.8	2°5	7	2	105	0.221		139.1*	B16/17	8	T	
24 *	05 28.8	07 42	4.0	60	196.6	-13.9	5° x 4°	4	1	(190)	(0.400)						
25 *	05 31.5	21 59	-	-	184.5	-5.8	P	109.5	3	1036	2.19		144	A36	9	S_1	.27
26 *	05 32.8	-05 24	-	-	209.0	-19.3	P	22	3	210	0.442	05-011	145	A37	10		
27 *	05 34.0	27 42	2.0	30	180.1	-2.2	3°(?)	4	2	(85)	(0.179)			A38		T(?)	
28 *	05 39.6	-01 30	4.0	60	206.2	-16.1	P	3	1	30	0.063	05-012/-013	147.1		12	T *	
29 *	05 46.4	01 00	2.0	60	204.8	-13.4	3°5*	5	1	(145)	(0.303)						
30 *	05 47.6	-07 30	4.0	60	212.7	-17.1	?	2.5	2	≥ 25*	≥0.053	05-016/-017				T(?)	
31 *	05 54.4	-02 30	1.2	30	208.9	-13.2	2°5	2	0.5	30	0.063						
32	05 59.2	65 30	4.0	30	148.5	19.8	5°(?)	1	1	(55)	(0.116)						
33 *	06 06.0	16 48	0.8	30	193.2	-1.4	2°5	4	1	60	0.126						
34 *	06 14.4	22 30	1.2	12	189.2	3.0	2°2	20	2	230	0.484		157	A41	14	S	.28
35	06 24.8	16 30	2.0	30	195.6	2.4	P	1.5	0.5	15	0.032		164(?)			T(?)	
36	06 24.8	-05 30	4.0	30	215.2	-7.8	P	3.5	1	35	0.074	06-04	161	A42		(C)	.58
37 *	06 30.0	05 00	0.4	18	206.4	-1.9	2°5	17	3	250	0.526	06+08	163	A43	16	T	
38	06 33.6	-19 12	2.0	30	228.5	-12.0	4° x 2°5	4	1	95	0.200						
39	06 42.4	-10 00	2.0	30	221.2	-6.0	P(?)	2	0.5	20	0.042	06-111				NT	
40	06 47.6	15 12	2.0	60	199.3	6.6	3°5	2	0.5	60	0.126						
41	06 52.8	22 00	2.0	30	193.7	10.8	3°	2.5	1	50	0.105						
42	06 55.6	-25 00	1.2	30	236.1	-9.9	3°	2.5	0.5	50	0.105						
43 *	07 20.4	-25 12	2.0	30	238.9	-4.9	P	3	1	30	0.063						
44	07 23.6	-05 42	1.2	30	222.0	5.0	P	2	0.5	20	0.042	07-05				NT(?)	
45 *	08 10.4	48 36	-	-	170.9	33.3	?	3.5	1	≥ 35	≥0.074		196	A45		(S_1)	.70
46 *	09 15.6	-11 48	0.8	12	242.8	25.1	P	11.2	0.6	105	0.221	09-14	218	A47		S_2	.87
47 *	10 23.6	-07 00	4.0	60	252.0	40.8	2° x 4°	2	1	40	0.084*	10-07/-010/-011*					
48	10 43.2	-29 48	2.0	30	272.9	25.3	2°5	2	0.5	30	0.063	10-212(?)				T(?)	
49	11 08.0	-09 42	2.0	60	266.1	45.6	4°	2	1	(75)	(0.158)						
50	11 22.8	12 42	2.0	30	244.9	65.1	2°5	1.5	0.5	20	0.042						

TABLE 3 (*continued*)

(1) No.	(2) α (1950)	δ	(3) m. e. α	δ	(4) l^{II}	b^{II}	(5) W_r	(6) I		(7) S	(8) S/S_{M87}	(9) MSH	(10) 3C	(11) CT	(12) W	(13) Spectrum type	index
51	11^h $31^m.2$	-32° 00'	$4^m.0$	90'	284°.3	27°.8	6°	3	1	(260)	(0.527)						
52 *	11 39.6	66 00	8.0	120	133.9	49.9	5° x 10°	3	1	(360)	(0.737)		*				
53 *	12 03.6	-13 18	2.0	30	286.4	47.8	3° *	2	0.5	40	0.084	12-13					
54	12 17.6	06 00	1.2	30	282.3	67.3	P	3	1	30	0.063	12+05	270	A52		(S_2)	.41
55 *	12 26.0	-02 30	2.0	30	291.6	59.6	8° *	8	2	(1220)	(2.57)						
56	12 26.8	02 00	0.8	18	290.4	64.1	P	7	2	65	0.137	12+08	273	A53	17	S_1	.33
57 *	12 28.3	12 40	-	-	284.0	74.5	P	50.0	1	476	1.000		274	A54	18	S_1	.83
58 *	12 39.6	-08 00	4.0	60	299.0	54.5	3° *	4	1	85	0.179	12-012					
59 *	12 57.2	28 18	-	-	60.6	88.0	P	1.0	0.2	10	0.021						
60 *	13 03.6	55 00	8.0	60	118.5	62.3	3°(?)	2	1	(40)	(0.084)						
61 *	13 25.6	31 00	1.2	18	59.6	81.3	P	3	0.5	30	0.063		286	A60		C*	
62	13 27.6	-26 36	4.0	60	313.6	35.2	3°	2	1	(45)	(0.095)						
63	13 29.6	-21 30	2.0	30	315.4	40.1	3°	2	0.5	45	0.095						
64 *	14 09.6	52 36	-	-	97.7	60.7	P	5	1	45	0.095		295	A62		C	
65	14 11.6	-03 48	4.0	60	338.7	53.0	3°	2	1	(40)	(0.084)						
66	14 16.8	-15 00	2.0	60	332.4	42.5	3°.5	2	0.5	60	0.126						
67	14 18.0	06 36	2.0	30	352.5	60.3	P	2	1	20	0.042	14+05	298	A63		C	
68	14 48.0	16 36	2.0	60	17.8	60.5	P	2	1	20	0.042		306(?)				
69	15 02.8	26 00	4.0	60	38.1	60.1	P	1	1	10	0.021		310	A64		S	.94
70	15 11.2	18 48	1.2	30	26.0	56.4	4° x 2°.5	2	0.5	50	0.105						
71 *	15 12.0	07 42	2.0	30	9.5	50.8	3°	2.5	1	50	0.105	15+02/+05	313/317	A65/67		*	
72 *	15 15.6	11 30	4.0	60	15.4	52.2	4° x 3°	2	1	(55)	(0.116)						
73	15 20.8	01 24	-	-	4.0	45.3	P	1	1	10	0.021						
74	15 25.6	-28 42	4.0	60	339.8	22.6	4°	2	0.5	75	0.158						
75	15 27.6	41 00	4.0	60	66.2	54.9	4°?	1	1	(35)	(0.074)						
76	15 28.4	14 00	4.0	30	21.4	50.6	P	3	1	30	0.063						
77	15 41.6	06 54	2.0	30	14.5	44.3	P	2	0.5	20	0.042	15+011(?)					
78 *	15 53.6	-24 36	4.0	90	347.8	21.6	P	1.5	0.5	15	0.032	15-212/-214	*				
79	16 02.4	01 30	1.2	18	12.3	37.0	2°.7	3	0.5	50	0.105		327.1			S	.92
80 *	16 27.6	-20 12	4.0	30	357.0	18.9	4°	5	1	190	0.400						
81 *	16 28.4	-26 48	2.0	18	351.9	14.4	4° x 2°.5 *	5	1	(115)	(0.242)						
82 *	16 31.6	08 30	8.0	30	24.2	34.3	6° x 3°(?)*	4	1	(170)	(0.358)						
83 *	16 31.6	-09 30	4.0	60	6.7	24.7	5° x 4°	3.5	1	(165)	(0.348)						
84	16 38.4	16 54	3.2	30	34.5	36.3	6° x 3°	5	1	(210)	(0.452)						
85	16 39.2	-16 12	4.0	60	2.1	19.3	P	2	1	20	0.042	16-112(?)/-117					
86 *	16 47.6	02 12	4.0	60	20.0	27.8	7° x 4°	6.5	1.5	(425)*	(0.895)						
87 *	16 49.2	05 06	0.4	6	23.1	28.9	P	11.4	1	110	0.232	16+010	348	A75	20	S_2	.93
88 *	17 04.4	11 48	1.2	18	31.9	28.5	3°.8 x 3°	8	1	(215)	(0.452)						
89	17 07.6	-12 42	2.0	30	9.3	15.7	3°	1.5	0.5	30	0.063						
90	17 09.6	-03 36	2.0	30	17.6	20.1	P	4	1	40	0.084						
91	17 10.8	-15 18	4.0	60	7.5	13.5	P	2	1	20	0.042	17-12(?)/-13(?)					
92	17 12.0	67 30	8.0	60	98.0	34.4	5°(?)	2	1	(120)	(0.253)						
93	17 18.0	-00 42	0.8	12	21.5	19.8	P	12.5	1	120	0.253	17-06	353	A76	21	S_2	.64
94	17 22.0	49 00	6.0	60	75.5	34.3	4°(?)	2	1	(75)	(0.158)						
95	17 28.8	-09 06	4.0	60	15.3	13.1	P	2.5	1	25	0.053	17-08(?)	360(?)			T(?)	
96 *	17 42.7	-28 55	-	-	0.0	- 0.1	2°.5 x 2°.0	257	20	3040*	5.14	17-213		B42	24		
97	17 44.8	-01 36	2.0	60	24.0	13.4	P	2.5	1	25	0.053	17-011(?)/-012(?)				NT(?)	
98 *	17 54.4	-05 00	4.0	60	22.2	9.7	3° x 4°	8	2	(230)	(0.484)						
99 *	17 58.0	-23 24	0.4	6	6.5	- 0.2	P	50	10	475	1.00	17-216		B45	28	T+NT*	
100 *	18 02.8	-21 00	2.0	18	9.2	0.0	P(?)	13	7	125	2.63	18-21/-23(?)		B47(?)/49(?)	30(?) 31(?)	*	

TABLE 3 (*continued*)

(1)	(2)		(3)		(4)		(5)	(6)		(7)	(8)	(9)	(10)	(11)	(12)	(13)	
No.	α (1950)	δ	m. e. α	m. e. δ	l^{II}	b^{II}	W_r	I		S	S/S_{M87}	MSH	3C	CT	W	Spectrum type	Spectrum index
101 *	18^h $15^m.2$	-16° 12'	$0^m.8$	12'	14°.8	- 0°.1	P	25	5	235	0.494			B52	38a	T	
102 *	18 16.0	61 30	8.0	60	90.8	27.7	6°(?)	4	2	(340)	(0.716)						
103	18 19.6	23 30	4.0	60	51.2	16.7	?	2	1	≥ 20	≥0.042		379(?)			T(?)	
104	18 22.4	04 36	2.0	30	34.0	8.0	2°.5	2.5	1	35	0.074						
105	18 25.6	00 30	2.0	48	30.7	5.4	P(?)	4	2	40	0.084	18+05		B54		T(?)	
106	18 28.8	48 36	-	-	77.1	23.4	P	3	1	30	0.063		380	A79		S_1	.73
107 *	18 29.6	-30 00	1.2	42	4.0	- 9.5	3°	5	2	105	0.221						
108	18 30.0	14 30	4.0	60	43.9	10.7	?	2	1	≥ 20	≥0.042						
109	18 31.6	09 48	4.0	60	39.8	8.4	4°(?)	7	2	(265)	(0.558)						
110 *	18 31.6	-08 36	0.8	18	23.4	- 0.1	P	28	5	265	0.558	18-08		B56	41	*	
111	18 43.6	29 30	2.0	30	59.2	14.2	4°(?)	4	1	(150)	(0.316)						
112	18 44.0	-02 12	1.2	12	30.5	0.1	P	40	10	380	0.800		390.2(?)	B59	43	T	
113	18 49.2	24 42	4.0	30	55.2	11.1	P	4	2	40	0.084						
114	18 52.0	01 30	1.6	18	34.7	0.0	P	31	7	295	0.620	18+011	392	A83	44	S	.47
115	18 52.8	16 00	4.0	60	47.7	6.4	3° x 4°	6	2	170	0.358			B63			
116 *	18 53.2	-30 00	1.2	18	6.2	-14.1	P	6	1	55	0.116						
117	18 53.6	-17 00	2.0	60	18.3	- 8.7	3°	2.5	1	50	0.105						
118	18 59.2	05 00	0.8	30	38.6	0.1	P	15	10	140	0.295		396(?)	B64(?)/65(?)	47(?)		
119	19 00.4	75 30	8.0	60	106.9	25.7	3°(?)	2	1	(40)	(0.084)						
120	19 03.6	27 00	4.0	60	58.8	9.1	P	3	1	30	0.063						
121	19 09.6	05 00	6.0	60	39.8	- 2.2	?	15	10	≥ 145	≥0.305	19+01		B69	50		
122	19 11.6	-25 00	2.0	30	12.7	-15.9	P	2	1	20	0.042	19-24				NT(?)	
123 *	19 18.8	14 00	1.2	18	48.8	- 0.1	P	30	10	285*	0.600		400(?)	B73	51	T	
124	19 26.0	00 06	2.0	30	37.4	- 8.2	P(?)	2	2	(20)	(0.042)						
125	19 50.0	01 06	4.0	30	41.1	-13.0	?	2	2	≥ 20	≥0.042						
126 *	19 52.4	37 48	2.0	12	73.3	5.2	P(?)	3	1.5	(30)	(0.063)						
127	19 52.4	07 54	4.0	30	47.5	-10.2	?	2	2	≥ 20	≥0.042						
128 *	19 56.8	44 54	4.0	30	79.8	8.1	?	2	2	≥ 20	≥0.042						
129 *	19 57.8	40 36	-	-	76.2	5.7	P	424	13	4015	8.48		405	A88	57	C	
130 *	20 12.8	45 06	2.0	18	81.5	5.8	P(?)	10	5	95	0.200			B88(?)	63(?)		
131	20 12.8	23 36	2.0	30	63.6	- 6.2	P	3	1	30	0.063		409	A89		S_2	.89
132	20 19.6	29 12	?	?	69.1	- 4.2	P(?)	3	1	30	0.063		410	A90		S_2	.55
133	20 19.6	06 00	4.0	30	49.3	-17.0	3°	4	2	85	0.179						
134 *	20 21.3	40 22	0.4	6	78.5	2.0	3°.5	128.5	7	3740	2.57		410.1	B91	66		
135 *	20 34.8	41 30	1.2	18	80.9	0.5	2°.5	50	10	740	1.56		416.2*	B96	73/75	T	
136 *	20 43.6	50 18	0.8	6	88.8	4.8	P	17	3	160	0.337			A91			
137 *	20 47.6	30 18	1.2	12	73.7	- 8.4	3°.2 ± 0°.4	11	2	265	0.558			A93	78	NT	
138 *	20 51.6	43 54	1.2	18	84.7	- 0.4	2°.8	37	6	705	1.48			B100	80	T	
139	20 59.6	23 42	2.0	60	70.1	-14.7	3°(?)	4	1	85	0.179						
140	21 13.6	52 00	4.0	24	93.2	2.3	2°.5 x 3°	15	5	265	0.558			B102		NT(?)	
141	21 20.4	-05 00	2.0	60	47.6	-35.7	5°	2	1	(120)	(0.253)						
142	21 21.2	61 00	6.0	60	100.3	7.9	P(?)	3	1	30	0.063		430	A94		S	.68
143	21 24.8	29 48	4.0	60	78.8	-14.8	3°(?)	3	1	65	0.137						
144 *	21 36.8	57 12	1.6	12	99.2	3.7	2°.4	7	2	95	0.200			B105		T	
145	21 46.4	46 30	1.2	30	93.4	- 5.4	4°(?)	5	2	195	0.410						
146	21 52.4	83 48	20.0	60	118.3	22.9	?	1.5	1	≥ 15	≥0.032		435.1				
147 *	22 22.4	63 12	2.0	18	107.3	5.1	P	5	2	45	0.095			B107		T(?)	
148 *	23 21.2	58 32	-	-	111.7	- 2.2	P	591.5	10	5600	11.83		461	A105	81	S_1	.77
149 *	23 57.2	67 12	1.2	18	118.0	5.1	2°.3	14	2	175	0.369			B2	1	T	

53. Assuming the source to have a true shape which is Gaussian with half-width φ we obtain $\varphi = 2°.2$, whereas the MSH data give $\varphi = 1°.2$.
55. Possibly related to the spur which projects upwards from the galactic plane at $l^{\text{II}} = 32°$. The diameter of the source is very uncertain.
57. 12N1A, PT24 (Virgo A, M 87).
58. Assuming the source to have a true shape which is Gaussian with half-width φ we obtain $\varphi = 2°.2$, whereas the MSH data give $\varphi = 0°.9$.
59. Coma cluster.
60. LHE338(?). The low LHE flux density is probably due to partial resolution of this extended source.
61. This high-latitude source has an unusually flat spectrum. No evidence of emission or absorption was seen on the Sky Atlas prints.
64. 14N5A, HBH18.
71. Probably a blend of the two radio sources noted in columns 9, 10 and 11 of table 3.
72. 15N1A(?).
78. The source lies between two emission regions; S7 is 2° to the north, and S1 is 1°.5 to the south. The 3C source has a diameter $< 2'$.
80. Some optical absorption present.
81. The source position is about 1° south-east of a very bright emission region (C132), and is surrounded by faint emission. The size W_r might be overestimated due to superposition of the source on the galactic ridge.
82. Broad source with a flat top. Possibly related to the spur at $l^{\text{II}} = 32°$.
83. A small spur.
86. An extended source, with major axis in the declination direction. Possibly two sources. Her A is superposed, lying on the major axis 2°.8 north of the centre, and is not included in the (very uncertain) flux density given.
87. 16N0A, PT34 (Her A).
88. Part of the spur at $l^{\text{II}} = 32°$.
96. 17S2A, PT37. Sagittarius A, the source at the galactic centre. Combination of a thermal and a non-thermal source. From the survey, and from a large number of special measurements (extinction, see paper I), we find for the maximum intensity at the position of Sgr A a value of 567 ± 10 units (547 units uncorrected for detector law). We estimated the background at 310 ± 15 units (305 units uncorrected for detector law).
98. LHE437. Regions of strong absorption partially cover the area. The low LHE flux density is probably due to partial resolution.
99. PT40. Apparently a combination of M 20 (0°.6 to north-east of radio position) and a non-thermal source. M 8 causes a slight bulge in the contours towards the south-west. See remarks on W28 (Westerhout, 1958).
100. The radio position falls roughly between the source (CTB47, W30, MSH18–21) and the source (CTB49, W31, MSH18–23), but is somewhat closer to the former, which is of higher intensity. Our flux value is lower than might be expected from a blending of the two sources, but this may be due to the difficulty of separating the galactic ridge from the source.
101. 18S1A, PT41. NGC 6618, M 17, the Omega nebula. The radio source has an extension of 2°.5 to lower galactic longitudes, which is probably related to IC 4701 and has $I = 10 \pm 5$ units.
102. Part of ridge VIII; perhaps not an individual source.
107. This source is situated in such a manner on the galactic ridge with respect to source 116 that there appears to be a 'hole' in the brightness distribution between them.
110. PT43, LHE450. There is moderate absorption at the radio position, while regions of strong absorption and of moderate emission surround the source. The emission regions include S57 and S58, and are generally of 0°.1 to 0°.5 in diameter. Our wide beam might include more of these than the narrower beams at other frequencies; hence our higher flux density. The spectrum might be thermal.
116. See note to 107.
123. PT45. Flux density is perhaps too high.
126. Perhaps a side-lobe response to Cyg A.
128. A weak emission region, part of the Cygnus complex, is 1° to the north-east. The source is perhaps a side-lobe response to Cyg A.
129. 19N4A, HBH19, PT46 (Cyg A).
130. The source is situated in a region of strong absorption mixed with filaments of moderate emission brightness.
134. 20N4A, HBH20, PT47. Brightest part of Cyg X, near γ Cygni. See, e.g., Westerhout (1958), Pike and Drake (1964), and Yang and West (1964).
135. Part of Cyg X. The low 3C flux density is probably due to partial resolution.
136. HBH21, PT48.
137. Cygnus loop.
138. PT49. NGC 7000 and IC 5076 (the North America and Pelican nebulae).
144. HBH22. The radio source is surrounded by a moderately bright emission nebula (IC 1396a and b).
147. The radio source is situated in a region of weak emission and very strong absorption.
148. 23N5A, HBH23 (Cas A).
149. The radio position agrees with that of the nebula around BD 66° 1676/79. Nearby NGC 7822 is perhaps also part of the radio source. The region is characterized by strong emission and strong filamentary absorption.

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