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AN UPDATE OF THE STATUS OF THE REVISED 3C CATALOG OF RADIO SOURCES; 22 NEW GALAXY REDSHIFTS

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We present an updated catalog of the important optical data for the radio sources in the Revised Third Cambridge Catalog. Optical positions, redshifts, magnitudes, and identifications have been included as well as radio flux densities and spectral indices for the sample of 297 extragalactic 3CR sources. A bibliography of optical/radio data is also given.

In addition to the literature compilation we present new spectroscopic observations of 22 3CR galaxies with previously unpublished redshifts.

Key words: radio sources—optical positions—redshifts bibliography

I. Introduction

In a previous paper (Smith, Spinrad, and Smith 1976, Paper I) we reviewed the status of optical identification and spectroscopy of "The Revised 3rd Cambridge Catalog of Radio Sources" (Bennett 1962). Since that time there has been sufficient progress in the optical work on the 3CR that it appears to be appropriate to update this review. In addition, we present one new optical identification and previously unpublished redshifts for 22 galaxies.

A. *The 3CR Sample*

We list 297 extragalactic sources in the 3CR. Paper I lists sources which we have excluded as being probably Galactic. Despite the fact that the 3CR is the best-studied sample of radio sources, it has been realized that the sample is not complete and unbiased. Veron (1977) has attempted to correct the sample for confusion and resolution of extended sources. He has constructed a sample of 205 sources, 184 from the original 3CR, which satisfy the conditions: $\delta > -5°$, $|b| \geq 10°$, and S_{178}(KPW)[1] $\geq$ 9.0 Jy (Jenkins, Pooley, and Riley 1977). To this list they add the extended sources DA 240, 3C 296, and NGC 6251. They have not attempted to correct flux densities for confusion, thus their sample overlaps with that of Veron, but is not a subset of Veron's sample. Here we will restrict ourselves to the original 297 3CR sources believed to lie beyond the Milky Way.

As noted in Paper I, the advent of large interferometers has led to considerable improvement in positions and structures of radio sources. This has continued and we expect that the VLA will lead to yet higher quality radio data. For the large majority of sources it is now the case that any uncertainty about the identification is due to ambiguity in the interpretation of the radio structure, rather than to the precision of the radio position.

B. *Optical Identifications*

Considerable progress has also been made in optical identifications of 3CR Sources (Kristian, Sandage, and Katem 1978; Laing et al. 1978; Riley, Longair, and Gunn 1980; Gunn et al. 1980). Of the 297 extragalactic 3CR sources our subjective evaluation yields 212 ($\sim$ 70%) good identifications. Of the 29 identifications which we list as unconfirmed, many are good identifications, but the nature of the object (e.g., galaxy or QSO) remains to be determined. Of these 55 sources which we list as unidentified, 30 are at low galactic latitude $|b| \leq 10°$ and/or are in fields with evidence of galactic obscuration. Several others have possible identifications which may be confirmed with high-quality photographic observations. However, many fields for which high-quality photographic material exists have yielded no identification. Identification of these sources awaits the Space Telescope, or the development of even more sensitive ground-based systems, like CCD arrays.

C. *Spectroscopy*

Despite the very long integration times required to obtain spectra of the faintest 3CR identifications, redshifts have been obtained for a number of previously unobserved objects, both galaxies and QSOs. Redshifts are now available for over 3/4 of the galaxies and galaxy candidates in the 3CR and a number of galaxies have now been measured to have redshifts higher than Minkowski's record of 0.461 for 3C 295 (Kristian, Sandage, and Westphal 1978; Smith et al. 1979) with the redshifts

[1]KPW = Kellermann, Pauliny-Toth, and Williams (1969).

in excess of 1.0 now reported for 3C 13 and 3C 427.1 (Spinrad, Stauffer, and Butcher 1980). The remaining candidates are nearly all fainter than $V \approx 20$ and thus considerable effort will be required to complete spectroscopic studies, but there is some hope that this may be accomplished in the foreseeable future.

In Table I we present redshifts for 22 3CR galaxies which we have obtained as a part of an ongoing program of spectrophotometry of 3CR identifications. Most of the redshifts listed in Table I were obtained with the Robinson-Wampler image dissector scanner system on the 3-m Shane Reflector of Lick Observatory. The redshifts of 3C 166, 3C 305.1, and some of the data for 3C 63 were obtained with the KPNO image dissector scanner on the 4-m telescope and the redshift of 3C 275 was obtained with the CTIO ISIT system on the 4-m telescope. Table I lists the galaxies by 3CR number, the redshift, and the features used to determine the redshift, along with a qualitative description of the relative line strengths. One can see from Table I that the majority of the objects have relatively strong emission lines which were used to determine the redshift. While it remains true that the majority of 3CR radio galaxies do show some emission, their prevalence is in part an artifact of the ease of obtaining an emission-line redshift, compared with redshifts for galaxies with pure absorption-line spectra. The difference in integration is approximately a factor of 20!

One object in Table I, 3C 435 has no previously published identification. In Figure 1 we show a photograph (098-02 + GG495) of the field of 3C 435 obtained with the Shane reflector of Lick Observatory. The faint galaxy marked ($V \approx 21$) lies between the asymmetric radio lobes measured by Mackay (1969). Spectroscopy shows that the galaxy has strong [O II] λ3727 ($z = 0.471$), thus we consider the identification secure.

Table III lists our catalog of extragalactic 3CR radio sources, Column (1) gives the catalog number in the *Revised 3CR Catalog of Radio Sources*. An asterisk next to the 3CR number indicates a footnote at the end of the table. Columns (2) and (3) give the 1950 coordinates of the optical object; in a few cases the optical position has been estimated from an accurate published radio position. Column (4) gives the visual magnitude of the object. Magnitudes given in even 0.5-magnitude intervals are normally estimates from the Palomar Sky Survey or direct photographic plates and carry substantial errors (±0.5–1.0 magnitude).

An asterisk indicates variability with amplitude greater than $0^m.1$. Column (5) gives the redshift uncorrected for galactic rotation. Columns (6) and (7) list the flux density at 178 MHz (Jy) and spectral index α_{38}^{750} (where $S_\nu \sim \nu^{-\alpha}$) taken from Kellermann et al. (1969). Between columns (6) and (7) we have included their characterization of the radio spectrum:

TABLE I

REDSHIFTS FOR 3CR GALAXIES

GALAXY	z	SPECTRUM
46	0.4373	strong [OII], [OIII], moderate [NeV], [NeIII]e
55	0.240	moderate [OII], weak [OIII]e, blue continuum
63	0.175	strong [OII], [OIII] moderate Hβ e λ 4000 break abs.
105	0.0889	strong [OIII], Hα e
133	0.2775	strong [OIII], Hβ e
166	0.245	strong [OII], moderate [OIII] e
169.1	0.633:	strong [OII]e, 1-line redshift
187	0.350	λ 4000 break, G abs.
194	0.312:	λ 4000 break, abs.
200	0.458	weak [OII] e, abs.
244.1	0.428	strong [OIII], moderate [OII], Hβ e
258	0.165	moderate [OIII], Hα e; confirms Paper I
288	0.246	weak [OII] e, H-K, λ 4000 break, G abs.
303.1	0.267	strong [OIII], Hα, moderate Hβ e
306.1	0.4421	strong [OIII] e
313	0.461	strong [OIII] e
314.1	0.1197	weak [OII] e, abs.
319	0.192	weak [OIII] e, abs.
340	0.310	abs.
341	0.448	strong [OIII], moderate [OII] e
435	0.471	strong [OII] e, abs.
438	0.290	abs.

TABLE II

Synopsis of the Status of the 3CR

297	Probable Extragalactic Sources
163	Radio Galaxies
	15 N Galaxies
	19 Galaxies without Redshift
51	Quasi-Stellar Sources
	1 BL Lacertae Object
34	Unconfirmed Identifications
	26 Possible Galaxies
	8 Possible QSOs
49	Unidentified Sources
	33 Low Latitude Sources ($\lvert b^{II} \rvert \leq 20^\circ$)
	13 Confirmed Empty Fields
33	Galactic Sources, or Chance Coincidence of Unrelated Sources

C− indicates a convex radio spectrum (α steepens with increasing frequency).

C+ indicates a concave radio spectrum (α becomes flatter with increasing frequency).

SC indicates a sharp cutoff below 178 MHz. For these cases the spectral index given is α_{38}^{178}.

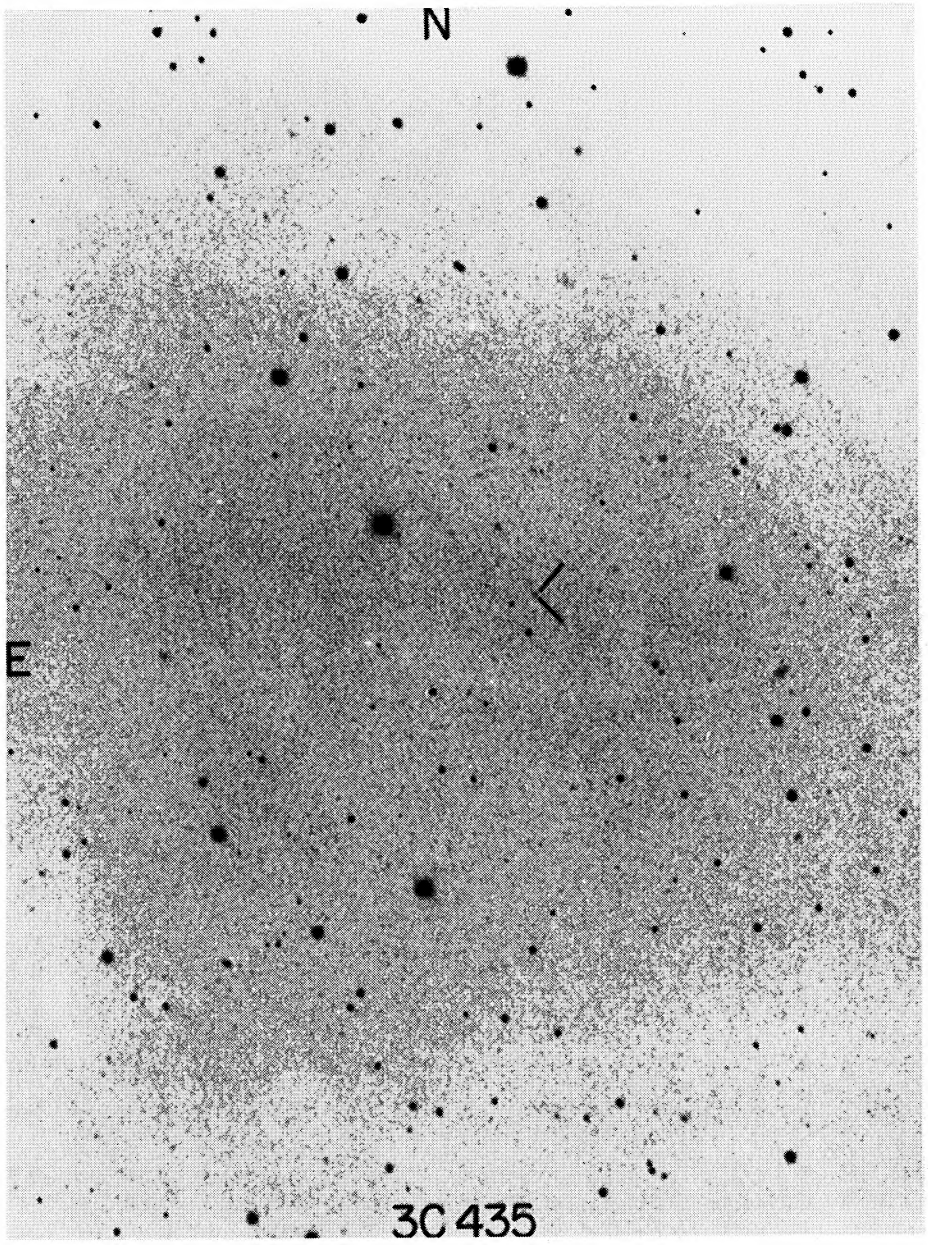

FIG. 1—A red photograph (098−02+GG495) of the field of 3C 435 obtained with the Lick Observatory Shane reflector. Our candidate, a $V = 21$ galaxy, is marked ($\alpha_{1950} = 21^h26^m37^s.0$, $\delta_{1950} = 07°19'46''$). We measure a redshift $z = 0.471$.

CX indicates a complex radio spectrum, probably caused by multiple spectral components.

The remainder of the sources have straight radio spectra characterized by a single power law from 38 MHz. Column (8) lists the galactic latitude of the source. Columns (9)–(11) give the primary references for the optical identification, spectroscopy (redshift), and radio position. For the optical identification we have generally listed the first published identification (ID) with a good finding chart. In cases where a previous paper without a good finding chart published the same ID or where the ID was confirmed by a subsequent, more detailed study, these references are listed under the remarks in column (12). Besides listing additional identification and redshift references, the remarks column gives other names (such as NGC number) and the character of the optical spectrum of radio galaxies (SE = strong emission lines, E = emission lines present but not necessarily strong, WE = weak emission lines, ABS = only stellar absorption features are seen). ABS under remarks for QSOs indicates the presence of absorption features at one or more redshifts. Abbreviations used include:

TABLE III

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES
I. COMPLETE LISTING OF EXTRAGALACTIC SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
2.0	0 3 48.70	-0 21 6.6	19.35*	1.0370	14.9	.67	-61	47	48	90		QSO
6.1	0 13 35.00	79 0 11.0	22.00	.8400	17.3 C-	.80	17	37	156	11	151ID	GAL
9.0	0 17 49.85	15 24 16.5	18.21	2.0120	17.8	.99	-47	53	54	11	143SP	QSO
11.1	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	12.4	.78	1	-0	-0	16	OBSCURED	
13.0	0 31 33.15	39 7 36.2	21.00	1.0500	12.0	.93	-23	6	167	157	151,161ID,ABS	GAL
14.0	0 33 29.29	18 21 28.8	20.00	-0.0000	10.4 C-	.77	-44	18	-0	157	8,19ID	*GAL
14.1	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	16.1 C-	.82	-3	-0	-0	127	OBSCURED	
15.0	0 34 30.62	-1 25 35.8	15.34	.0730	15.8 C-	.63	-64	92	93	91	WE	GAL
16.0	0 35 19.16	13 3 39.6	19.50	-0.0000	11.2	.85	-50	161	-0	157	ASYM SCE	*GAL
17.0	0 35 47.16	-2 24 10.7	18.02	.2197	20.0	.63	-65	18	67	121	SE	N
18.0	0 38 15.01	9 47 1.0	18.50	.1880	19.0	.68	-53	18	145	16	SE	GAL
19.0	0 38 13.80	32 53 39.7	20.50	.4820	12.1 C-	.62	-30	6	129	157	*CL	GAL
20.0	0 40 20.39	51 47 6.2	19.00	.3500	42.9	.67	-11	27	150	157	151,161ID	GAL
21.1	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	9.0	-0.00	5	-0	-0	126	OBSCURED	
22.0	0 48 6.71	50 55 45.4	20.50	-0.0000	12.1 C-	.75	-12	161	-0	157	157 IDX	*GAL
27.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	26.5 C-	.61	6	-0	-0	106	OBSCURED	
28.0	0 53 8.54	26 8 22.7	17.54	.1952	16.3	1.01	-37	18	67	3	E,CL	GAL
29.0	0 55 1.41	-1 39 50.6	14.07	.0447	15.1	.77	-64	18	94	128	78ID,ABS,CL	GAL
31.0	1 4 39.16	32 8 43.6	12.14	.0167	16.8	.59	-30	18	31	157	N383,ABS,CL	GAL
33.0	1 6 14.54	13 4 14.8	15.19	.0595	54.4	.67	-49	68	67	163	73ID,SE	GAL
33.1	1 6 6.48	72 55 59.2	19.50	.1810	13.0 C-	.69	10	37	35	157	*CL	GAL
33.2	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	5.5	.88	7	-0	-0	126	OBSCURED	
34.0	1 7 32.51	31 31 21.9	20.50	-0.0000	11.9	1.05	-31	161	-0	157	151*G	*GAL
35.0	1 9 5.00	49 12 39.2	15.00	.0670	10.5	.90	-13	18	4	10	WE	GAL
36.0	1 15 3.22	45 20 42.4	20.00	-0.0000	8.2	.89	-17	8	-0	157		*QSO
40.0	1 23 26.00	-1 36 9.0	12.28	.0177	26.0	.75	-63	74	97	68	N545/7,ABS,CL	GAL
41.0	1 23 54.74	32 57 38.3	21.00	-0.0000	10.6	.55	-29	161	-0	166		*GAL
42.0	1 25 42.67	28 47 30.4	20.00	.3950	12.0 C-	.69	-33	19	145	157	8,37ID,SE	GAL
43.0*	1 27 15.04	23 22 51.5	20.00*	-0.0000	11.6	.73	-39	47	-0	157	151ID	*QSO
44.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	7.9	.92	-55	-0	-0	10	10*G CL	
46.0	1 32 34.09	37 38 47.0	19.50	.4373	10.2	1.01	-24	18	147	157	37ID,*CL,E	GAL
47.0	1 33 40.42	20 42 10.2	18.10*	.4250	26.4	.97	-41	55	55	11	96FC	QSO
48.0	1 34 49.82	32 54 20.4	16.20*	.3670	55.0 SC	.07	-29	56	57	122	143SP	QSO
49.0	1 38 28.41	13 38 19.9	21.00	-0.0000	10.3 C-	.62	-47	19	-0	90	8,37,161ID	GAL
52.0	1 45 14.50	53 17 47.0	18.50	-0.0000	13.5 C-	.58	-8	18	-0	118	CL	GAL
54.0	1 52 26.55	43 31 19.0	22.00	-0.0000	8.8	.84	-18	8	-0	166	37ID	*GAL
55.0	1 54 19.50	28 37 4.8	20.80	.2400	22.7	.94	-32	37	147	157	E	GAL
61.1*	2 11 4.00	86 5 20.0	19.00	.1840	31.2 C-	.71	24	95	33	163	RN8,111SP	GAL
63.0	2 18 21.50	-2 10 33.0	18.50	.1750	19.2	.83	-57	18	147	16	12,140ID,SE	GAL
65.0	2 20 37.24	39 47 18.0	23.00	-0.0000	15.2 C-	.76	-20	162	-0	166	8,37,161EF	*GAL
66.0*	2 19 30.03	42 48 29.9	15.21	-0.0000	12.5	.70	-17	43	-0	60	*CL	BLO
66.0*	2 20 1.78	42 45 54.6	12.90	.0215	23.2	.70	-17	97	97	60	ABS,CL	GAL
67.0	2 21 18.05	27 56 57.4	16.00	.3102	10.0 C-	.55	-31	18	35	11	139,37ID	GAL
68.1	2 29 27.24	34 10 34.1	19.00	1.2380	12.8	.80	-24	37	105	157	151ID,69Z	QSO
68.2	2 31 25.56	31 21 10.4	23.00	-0.0000	13.0 C-	1.11	-26	162	-0	11	8,6,161EF	*GAL

TABLE II (Continued)

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3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
69.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	20.9 C-	.85	-1	-0	-0	11	OBSCURED	
71.0	2 40 7.04	-0 13 34.3	8.91	.0034	16.1 C-	.53	-52	32	31	90	N1068,SE	GAL
75.0	2 55 3.07	5 49 36.2	13.62	.0240	25.8	.75	-45	68	97	113	78ID,ABS,CL	GAL
76.1	3 0 27.28	16 14 36.1	14.86	.0324	12.2	.70	-36	18	93	9	142,139ID,ABS	GAL
78.0	3 5 49.07	3 55 13.1	12.84	.0288	17.8	.51	-45	68	67	90	75ID,N1218,WE	GAL
79.0	3 7 11.31	16 54 37.4	18.56	.2559	30.5 C-	.77	-35	18	67	3	121D,SE,*CL	N
83.1	3 14 57.00	41 40 33.4	12.50	.0255	30.2	.72	-13	25	89	36	N1265,CL	GAL
84.0	3 16 29.56	41 19 51.7	11.87	.0172	62.6 CX	.93	-13	30	31	38	N1275,PERA,CL	GAL
86.0*	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	29.0	.65	-1	-0	-0	11		
88.0	3 25 18.25	2 23 20.4	13.95	.0302	15.3	.58	-42	18	67	113	25ID,E,	GAL
89.0	3 31 43.37	-1 21 26.3	16.00	.1386	20.2	1.00	-43	18	145	24	121D,ABS,CL	GAL
91.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	14.1 C-	.67	-4	-0	-0	16	OBSCURED	
93.0	3 40 51.54	4 48 21.7	18.09	.3580	14.4 C-	.76	-38	59	69	16		QSO
93.1	3 45 35.80	33 44 5.9	19.00	.2440	5.9 C-	.63	-16	18	145	90	371D,SE,CL	GAL
98.0	3 56 10.25	10 17 32.9	14.45	.0306	47.2	.74	-31	68	67	157	77ID,SE	GAL
99.0	3 58 33.28	0 28 10.6	19.10	.4260	10.8 CX	.92	-37	8	46	29	SE,*CL	N
103.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	26.6 C-	.78	-7	-0	-0	9	9*G,M=19	
105.0	4 4 38.54	3 34 27.2	18.50	.0889	17.8	.62	-34	6	147	159	E	GAL
107.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	10.8 C-	.90	-35	-0	-0	24	151,8*G,M=21	
109.0	4 10 54.82	11 4 41.2	17.76*	.3056	21.6	.76	-28	18	93	3	12ID,SE	N
111.0	4 15 .61	37 54 19.0	18.00	.0485	64.6 C+	.75	-9	37	35	123	SE,129Z	GAL
114.0	4 17 27.65	17 46 39.1	22.00	-0.0000	6.5	.90	-22	8	-0	166	37ID	*GAL
115.0	4 29 7.86	41 32 9.5	20.00	.4080	15.7	.20	-4	47	129	71	72ID	*QSO
123.0	4 33 55.00	29 34 20.0	19.85	.2177	185.0	.69	-12	37	153	148	51ZX,E,CL	GAL
124.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	10.3	.96	-28	-0	-0	29	8EF	
125.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	14.1	.90	-4	-0	-0	16	OBSCURED	
129.0	4 45 31.98	44 55 26.8	17.05	.0210	36.4	.89	0	58	52	36	ABS	GAL
129.1	4 46 29.90	44 58 14.0	17.40	.0220	10.5	.89	0	58	52	36	ABS	GAL
130.0	4 48 56.90	51 59 56.0	16.50	.1090	15.5	.86	5	18	145	106	ABS	GAL
131.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	14.6	.78	-8	-0	-0	16	OBSCURED	
132.0	4 53 42.18	22 44 43.9	18.50	.2140	13.7	.67	-13	18	145	157	E,CL	GAL
133.0	4 59 54.27	25 12 12.1	21.00	.2775	22.3	.65	-10	152	147	157	SE	GAL
134.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	74.4	.96	-2	-0	-0	9	OBSCURED	
135.0	5 11 33.78	0 53 7.9	17.05	.1273	17.3	.82	-21	18	94	113	142ID,SE,CL	N
136.1	5 12 58.90	24 55 7.4	17.00	.0640	14.0	.83	-8	18	145	126	SE	GAL
137.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	12.5	.81	8	-0	-0	106	OBSCURED	
138.0	5 18 16.65	16 35 26.4	18.84	.7590	22.2 SC	-.35	-11	47	61	122	62Z	QSO
139.2	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	11.9	.99	-4	-0	-0	106	OBSCURED	
141.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	14.9 C-	.85	-1	-0	-0	16	OBSCURED	
142.1	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	19.4	.90	-15	-0	-0	16	OBSCURED	
147.0	5 38 43.60	49 49 43.3	17.80*	.5450	60.5 SC	-.77	10	55	55	122	96FC	QSO
152.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	12.4 C-	.79	-1	-0	-0	29	8EF	
153.0	6 5 44.75	48 4 49.1	18.50	.2769	15.3 C-	.62	13	18	4	11	12ID,SE,CL	GAL
154.0	6 10 43.70	26 5 30.7	18.00	.5804	23.1	.77	4	3	42	3		QSO
158.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	18.1	.98	0	-0	-0	90	OBSC,151EF	

TABLE III (Continued)

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3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
165.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	13.5 C-	.73	9	-0	-0	113	151*FT OBJ	
166.0	6 42 24.73	21 25 2.8	19.50	.2450	14.7 C+	.96	8	18	147	5	E	GAL
169.1	6 47 35.46	45 13 1.2	20.90	.6330	7.3	.89	19	151	147	10	E,1-LINE	GAL
171.0	6 51 11.00	54 12 48.0	18.89	.2384	19.5	.74	22	18	67	11	77ID,SE	N
172.0	6 59 3.90	25 18 12.0	20.00	-0.0000	14.0 C-	.75	13	161	-0	149	PR,8EF,149*G	GAL
173.0	6 58 56.67	38 1 46.1	20.00*	-0.0000	8.7 C-	.67	18	19	-0	90		*QSO
173.1	7 2 47.76	74 54 16.2	18.50	.2920	15.4 C-	.81	27	18	145	157	151ID,ABS,CL	GAL
175.0	7 10 15.44	11 51 23.7	16.60	.7680	17.6	.96	10	18	48	157		QSO
175.1	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	11.4 C-	.80	12	-0	-0	157	8EF,162*OBJ	
180.0	7 24 33.27	-1 58 24.4	19.00	-0.0000	15.1	.81	7	18	-0	113	140ID	GAL
181.0	7 25 20.36	14 43 47.2	18.92*	1.3820	14.5	.86	15	47	63	11		QSO
184.0	7 33 58.89	70 30 1.8	22.50	-0.0000	13.2 C-	.74	30	152	-0	157	151EF,162ID	GAL
184.1	7 34 28.20	80 33 32.0	17.00	.1182	13.0 C-	.66	29	18	4	3	35Z,SE,CL	GAL
186.0	7 40 56.61	38 0 33.2	17.60	1.0630	14.1	1.02	26	47	61	3		QSO
187.0	7 42 27.94	2 7 44.6	19.50	.3500	8.1	.97	13	18	147	113	ABS	GAL
190.0	7 58 45.05	14 23 4.3	20.00	1.1970	15.0	.80	22	18	69	90	19,152ID	QSO
191.0	8 2 3.77	10 23 57.0	18.40	1.9560	13.0	.92	21	47	99	71	64ABS	QSO
192.0	8 2 35.41	24 18 26.9	15.46	.0599	21.0	.77	26	18	26	157	12ID,4Z,SE,CL	GAL
194.0	8 6 37.66	42 36 55.5	20.00	.3120	9.9 C-	.75	32	19	147	11	ABS,8ID	GAL
196.0	8 9 59.42	48 22 7.9	17.60*	.8710	68.2 C-	.68	33	56	61	11		QSO
196.1	8 12 57.32	-2 59 13.9	17.50	.1980	18.6	1.09	17	18	145	41	140ID,SE	GAL
197.1	8 18 .86	47 12 11.0	16.50	.1301	8.1	.70	35	18	103	3	ABS,CL	GAL
198.0	8 19 52.33	6 6 47.0	16.78	.0815	9.7 C-	.79	23	18	67	113	68ID,SE,CL	GAL
200.0	8 24 21.43	29 28 42.2	20.00	.4580	14.0	.85	33	18	147	157	139,152ID,E	GAL
204.0	8 33 18.23	65 24 5.9	18.21	1.1120	10.5	1.00	36	47	63	11		QSO
205.0	8 35 10.13	58 4 51.4	17.62	1.5340	12.6	.84	37	18	65	11	ABS	QSO
207.0	8 38 1.72	13 23 5.6	18.15	.6840	13.6 C+	.80	30	47	48	11		QSO
208.0	8 50 22.68	14 4 17.3	17.42	1.1100	18.5 C-	.90	33	59	66	157	63Z,143SP	QSO
208.1	8 51 53.28	14 17 19.5	20.00	-0.0000	8.1 C-	.62	34	19	-0	90		*QSO
210.0	8 55 10.80	28 2 32.7	21.00	-0.0000	9.5 C-	.80	39	39	-0	5		*GAL
212.0	8 55 55.59	14 21 25.3	19.06	1.0490	15.1 C-	.79	35	18	69	157	92ID	QSO
213.1	8 58 5.15	29 13 34.5	19.00	.1940	6.6	.56	40	18	145	5	SE,CL	GAL
215.0	9 3 44.15	16 58 15.7	18.27	.4110	11.4	.94	37	47	61	11		QSO
216.0	9 6 17.07	43 5 58.6	18.48	.6680	20.2 C+	.72	43	53	69	157		QSO
217.0	9 5 41.42	38 0 29.9	22.00	-0.0000	11.3 C-	.75	43	152	-0	157		GAL
219.0	9 17 50.66	45 51 43.9	17.22	.1744	41.2 C-	.74	45	68	67	154	76ID,SE,CL	GAL
220.1	9 26 31.87	79 19 45.4	20.50	-0.0000	15.8 C-	.82	33	152	-0	157	18X	GAL
220.2	9 27 29.95	36 14 36.9	19.00	1.1570	7.2 C-	.62	47	18	21	157		QSO
220.3	9 31 10.46	83 28 55.0	20.80	-0.0000	15.7 C-	.68	31	162	-0	157	CL,151EF	GAL
222.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	11.3 C-	1.01	38	-0	-0	71	72EF	
223.0	9 36 50.91	36 7 34.9	17.06	.1368	14.7	.71	49	18	26	3	12ID,SE,CL	GAL
223.1	9 38 18.80	39 58 22.0	16.36	.1075	6.0	.58	49	18	26	3	SE	GAL
225.0*	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	28.9 C-	.80	44	-0	-0	157	152EF,2 SRCES	
225.0*	9 39 32.40	13 59 29.0	19.00	-0.0000	28.9 C-	.80	44	8	-0	157	TWO SOURCES	*GAL
226.0	9 41 36.16	10 0 3.8	22.00	-0.0000	15.0 C-	.82	43	152	-0	157	139,18X,151EF	GAL

TABLE III (Continued)

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES
I. COMPLETE LISTING OF EXTRAGALACTIC SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
227.0	9 45 6.61	7 39 17.1	16.33	.0861	30.4	.78	42	18	94	113	25ID,SE	N
228.0	9 47 27.63	14 34 2.5	20.50	-0.0000	21.8	.80	46	152	-0	157	8EF	GAL
230.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	21.1	.82	39	-0	-0	71	72ID=*(115)	
231.0	9 51 42.70	69 54 59.0	8.39	-.0002	14.6 C-	.25	40	100	31	124	M82,E	GAL
234.0	9 58 57.42	29 1 37.4	17.27	.1848	31.4 C-	.83	53	25	67	3	77ID,SE	N
236.0	10 3 5.39	35 8 48.5	15.97	.0989	11.3	.82	54	18	94	11	E	GAL
237.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	20.9 C-	.49	47	-0	-0	90		
238.0	10 8 23.10	6 39 26.5	22.00	-0.0000	16.6 C-	.76	47	6	-0	90		*GAL
239.0	10 8 38.97	46 43 8.4	23.00	-0.0000	13.2 C-	.97	53	162	-0	11	18X,152EF	*GAL
241.0	10 19 9.44	22 14 40.7	22.60	-0.0000	11.6 C-	.94	56	162	-0	157	8,152EF	*GAL
244.1	10 30 18.80	58 30 4.0	19.00	.4280	20.3 C-	.80	51	18	147	157	12ID,SE,CL	GAL
245.0	10 40 5.96	12 19 15.9	17.25	1.0290	14.4	.72	56	53	54	157	87Z	QSO
247.0	10 56 8.38	43 17 30.6	20.00	-0.0000	16.8 C-	.70	62	152	-0	157	8EF	*GAL
249.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	16.9 C-	.81	51	-0	-0	16	8EF	
249.1	11 0 27.44	77 15 8.2	15.72*	.3110	12.5	.82	38	47	63	11	86,145Z,12ID	QSO
250.0	11 6 11.31	25 17 18.3	21.50	-0.0000	11.9 C-	1.00	67	152	-0	157	8EF,162ID	*GAL
252.0	11 8 48.93	35 57 .1	21.50	-0.0000	11.0	1.08	67	152	-0	157	151EF	GAL
254.0	11 11 53.30	40 53 41.6	17.98	.7340	19.9 C-	.85	66	107	54	11		QSO
255.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	12.5 C-	.76	53	-0	-0	91	8EF	
256.0*	11 18 4.15	23 44 21.2	21.00	-0.0000	9.3	.87	69	151	-0	71	72IDX,145ZX	GAL
257.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	9.7	.84	60	-0	-0	121		
258.0	11 22 6.42	19 35 58.8	19.50	.1650	9.7 C+	1.27	69	18	145	27	E,CL	GAL
263.0	11 37 8.97	66 4 28.2	16.32*	.6463	15.2	.76	50	47	86	11	145Z	QSO
263.1	11 40 49.20	22 23 35.0	20.00	-0.0000	18.2 C-	.76	74	8	-0	157		*GAL
264.0	11 42 29.56	19 53 2.8	12.74	.0208	26.0	.76	73	18	67	160	25ID,N3862,CL	GAL
265.0	11 42 52.39	31 50 29.0	22.00	.8110	19.5 C-	.91	75	151	156	157	18X,150Z,SE	GAL
266.0	11 43 4.27	50 2 47.0	22.50	-0.0000	11.1 C-	.87	64	152	-0	157	18X	GAL
267.0	11 47 22.11	13 4 .2	21.50	-0.0000	14.6 C-	.81	70	162	-0	157	152IDX	*GAL
268.1	11 57 48.12	73 17 30.6	21.50	-0.0000	21.4 C-	.56	44	152	-0	157	8*GS NEARBY	GAL
268.2	11 58 24.80	31 50 2.0	19.26	.3620	9.7	.91	78	18	145	3	151ID,SE,CL	GAL
268.3	12 3 54.28	64 30 18.6	20.00	.3710	10.7 C-	.46	52	8	145	11	129Z,SE,CL	GAL
268.4	12 6 42.06	43 56 2.0	18.42*	1.4000	10.3 C-	.74	71	18	65	11	151*G NRBY	QSO
270.0	12 16 50.02	6 6 8.5	10.40	.0073	51.8	.53	67	68	31	113	79ID,N4261,CL	GAL
270.1	12 18 3.95	33 59 50.0	18.61	1.5190	13.6 C-	.67	81	47	63	157	ABS	QSO
272.0	12 22 .88	42 23 13.3	20.00	-0.0000	10.3	.83	74	18	-0	157	8,162ID	*QSO
272.1	12 22 31.45	13 9 49.6	9.36	.0031	19.5	.57	74	25	31	157	N4374,WE,CL	GAL
273.0	12 26 33.35	2 19 42.0	12.80*	.1580	62.8 CX	.25	64	101	102	92	111SP	QSO
274.0	12 28 17.60	12 40 2.0	8.74	.0043	1050.0	.79	75	80	31	120	M87,30SP,CL,E	GAL
274.1	12 32 56.75	21 37 5.9	20.00	.4220	16.5 C-	.83	83	18	150	157	151ID	GAL
275.0	12 39 45.16	-4 29 53.9	21.00	.4800	14.5 C-	.61	58	8	165	16	CL	GAL
275.1	12 41 27.62	16 39 18.6	19.00	.5570	18.3 C-	.84	79	47	61	157		QSO
277.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	7.5	.89	67	-0	-0	9	151EF	
277.1	12 50 15.13	56 50 36.4	17.93	.3200	8.5 C-	.59	60	47	63	11	143SP	QSO
277.2	12 51 3.80	15 58 47.0	21.50	-0.0000	12.0	.96	78	152	-0	157	151EF	GAL
277.3	12 51 46.29	27 53 49.5	15.94	.0857	12.4	.71	89	18	67	11	E,COMA A	GAL

TABLE III (Continued)

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES
I. COMPLETE LISTING OF EXTRAGALACTIC SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
280.0	12 54 41.40	47 36 30.0	20.00	-0.0000	23.7 C-	.72	70	8	-0	11	PAIR,CL,162ID	GAL
280.1	12 58 14.09	40 25 16.2	19.44	1.6590	11.9	.88	77	47	61	157		QSO
284.0	13 8 41.39	27 44 3.1	18.00	.2394	11.4	.92	86	18	4	3	SE,CL	GAL
285.0	13 19 5.29	42 50 56.1	15.99	.0794	11.4	.85	73	18	94	9	139ID,WE	GAL
286.0	13 28 49.95	30 46 .1	17.25	.8460	24.0 C-	.19	81	56	87	122	104ABS	QSO
287.0	13 28 16.12	25 24 37.1	17.67	1.0550	16.0 C-	.36	81	59	54	122		QSO
287.1	13 30 20.46	2 16 9.0	18.27	.2159	8.2 C+	.63	63	18	26	113	142ID,SE	N
288.0	13 36 38.65	39 6 22.8	16.50	.2460	18.9 C-	.74	75	18	147	11	CL	GAL
288.1	13 40 30.02	60 36 47.9	18.12	.9610	9.0 C-	.78	56	18	65	11	139ID	QSO
289.0	13 43 27.36	50 1 32.0	23.00	-0.0000	12.0 C-	.71	65	162	-0	157	8EF	*GAL
293.0	13 50 3.24	31 41 33.9	14.32	.0452	12.7 C-	.54	76	17	26	15	93Z,E	GAL
293.1	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	9.2	.99	72	-0	-0	9	18ID=*(115)	
294.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	10.3	1.10	72	-0	-0	157	8EF	
295.0	14 9 33.29	52 26 13.9	20.11	.4610	83.5 SC	.08	61	81	81	11	E,CL	GAL
296.0	14 14 25.96	11 2 15.1	12.21	.0237	13.0 CX	.61	62	18	26	113	IC5532,ABS	GAL
297.0	14 14 47.70	-3 46 56.0	20.00	-0.0000	10.3 C+	.99	52	130	-0	121		*QSO
298.0	14 16 39.09	6 42 20.8	16.79	1.4390	47.5 SC	.31	61	107	61	112	ABS,96FC	QSO
299.0	14 19 6.39	41 58 30.3	19.43	.3670	11.8 C-	.61	67	18	45	3	8ID,SE,CL	GAL
300.0	14 20 40.10	19 49 12.4	18.00	.2700	17.9	.78	68	18	14	3	142ID	GAL
300.1*	14 25 57.64	-1 10 48.3	19.00	.3080	14.1 C-	.68	53	17	145	128	140ID,ABS,CL	GAL
303.0*	14 41 24.84	52 14 18.7	17.29	.1410	11.2	.74	58	133	132	131	CL,QSO NRBY	N
303.1	14 43 53.12	77 20 4.6	19.00	.2670	12.4 SC	.05	38	151	147	157	18X,SE	GAL
305.0	14 48 17.58	63 28 36.4	13.74	.0410	15.7	.79	49	18	26	11	12ID,11065,SE	GAL
305.1	14 47 49.00	77 8 46.0	21.00	-0.0000	12.4 SC	.03	39	8	-0	157		GAL
306.1	14 52 24.50	-4 8 47.0	19.00	.4421	13.5	.82	47	18	147	126	CL,SE	GAL
309.1	14 58 57.94	71 52 12.2	16.78	.9040	22.7 C-	.45	41	18	62	122	65,48Z,ABS	QSO
310.0	15 2 46.84	26 12 34.4	15.24	.0540	56.0 C-	.89	60	68	67	10	76ID,E,GROUP	GAL
313.0	15 8 32.66	8 2 48.2	19.00	.4610	20.6	.84	52	17	147	9	E	GAL
314.1	15 10 11.41	70 57 9.3	17.00	.1197	10.6 C-	.92	42	18	147	10	E,ABS,CL	GAL
315.0	15 11 30.72	26 18 38.8	16.80	.1083	18.9	.79	58	68	67	160	76ID,SE,CL	GAL
317.0	15 14 17.00	7 12 16.7	13.50	.0350	49.0 C-	.92	50	25	67	16	76ID,E,CL	GAL
318.0	15 17 50.64	20 26 52.7	20.90	.7520	12.3 C-	.69	55	18	49	122	WE,CL	N
318.1*	15 19 25.05	7 53 14.3	15.00	.0460	11.3 C-	1.60	49	139	145	146	N5920,ABS,CL	*GAL
319.0	15 22 43.83	54 38 38.7	18.50	.1920	15.3	.81	51	17	147	164	E,ABS,CL	GAL
320.0	15 29 29.70	35 43 48.5	18.00	.3420	9.1 C-	.74	55	18	145	10	ABS,CL	GAL
321.0	15 29 33.44	24 14 26.5	16.00	.0960	13.5 C-	.73	54	44	145	157		GAL
322.0	15 33 46.20	55 46 46.0	22.00	-0.0000	10.1 C-	.73	49	161	-0	157	18X,151,152EF	*GAL
323.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	8.4 C-	.84	46	-0	-0	9	18I4=*(115)	
323.1	15 45 31.09	21 1 27.5	16.69*	.2640	9.7 C-	.62	49	18	65	11	111SP,CL	QSO
324.0	15 47 37.30	21 34 42.0	20.00	-0.0000	15.8 C-	.82	49	8	-0	157	162ID,CL	GAL
325.0	15 49 14.30	62 50 19.0	21.00	-0.0000	15.6 C-	.63	44	151	-0	157	152ID	*QSO
326.0	-0 -0 -0.00	-0 -0 -0.0	17.00	.0895	12.1 CX	.73	48	2	145	10	18X,PAIR	GAL
326.1	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	8.2	.43	47	-0	-0	157	8EF	
327.0	15 59 55.67	2 6 13.2	15.88	.1039	35.3 C-	.74	38	68	67	113	77ID,SE,CL	GAL
327.1	16 2 13.00	1 25 59.0	20.00	-0.0000	23.6 C-	.81	37	151	-0	90	17X,*CL	*GAL

TABLE III (Continued)

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1. COMPLETE LISTING OF EXTRAGALACTIC SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
330.0	16 9 14.17	66 4 24.0	20.30	.5490	27.8	C- .68	41	8	50	157	129Z,SE,CL	GAL
332.0	16 15 47.27	32 29 45.0	16.00	.1515	5.6	C- .63	45	17	4	3	SE,CL	GAL
334.0	16 18 7.26	17 43 30.1	16.41*	.5550	10.9	.97	41	17	87	157	88Z,143SP	QSO
336.0	16 22 32.21	23 52 2.0	17.47	.9270	11.5	C- .73	42	47	61	11		QSO
337.0	16 27 18.00	44 25 35.7	20.00	-0.0000	11.8	C- .59	44	8	-0	157	152ID,CL	*GAL
338.0	16 26 55.38	39 39 36.6	12.63	.0298	46.9	C- 1.09	44	74	83	9	N6166,WE,CL	GAL
340.0	16 27 30.26	23 26 45.4	19.00	.3100	10.1	.73	41	152	147	157		GAL
341.0	16 26 2.42	27 48 13.9	19.50	.4480	10.8	C- .80	42	18	147	157	152ID	GAL
343.0	16 34 1.12	62 51 42.4	20.60	.9880	12.4	C- .34	39	72	20	122		QSO
343.1	16 37 55.22	62 46 35.0	20.74	.7500	11.5	C- .28	39	72	155	122	E,CL	GAL
345.0	16 41 17.70	39 54 11.1	15.96*	.5940	10.8	CX .30	41	59	87	122	88Z,143SP	QSO
346.0	16 41 34.55	17 21 20.7	17.00	.1610	10.9	CX .53	36	18	145	11	142,139ID,WE	GAL
348.0	16 48 39.98	5 4 35.0	16.90	.1540	351.0	1.00	29	68	85	113	84ID,HERA,E	GAL
349.0	16 58 4.44	47 7 26.3	19.00	.2050	13.3	.76	38	17	145	157	SE	GAL
351.0	17 4 3.49	60 48 30.9	15.28*	.3710	13.7	.70	36	18	87	3	143SP	QSO
352.0	17 9 18.00	46 5 6.0	21.00	.8057	11.3	C- .84	36	8	156	157	SE	GAL
353.0	17 17 53.29	-0 55 49.5	15.36	.0304	236.0	.71	20	68	67	113	75ID,E	GAL
356.0	17 23 6.66	51 0 18.2	21.00	-0.0000	11.3	.97	34	161	-0	157	8EF	*GAL
357.0	17 26 27.41	31 48 23.9	15.50	.1664	9.7	C- .61	31	18	4	3	139ID,WE,CL	GAL
368.0	18 2 45.56	11 1 13.1	21.60	-0.0000	13.8	1.15	15	152	-0	157	151EF,162ID	*GAL
371.0	18 7 18.47	69 48 59.0	14.81*	.0500	3.7	CX .43	29	18	26	122	109SP,E	N
379.1	18 25 55.93	74 19 6.8	18.00	.2560	7.4	.76	28	18	145	163	SE	GAL
380.0	18 28 13.56	48 42 40.0	16.81*	.6910	59.4	C+ .74	24	59	87	157	88Z,143SP	QSO
381.0	18 32 24.43	47 24 39.0	17.24	.1605	16.6	C- .68	23	18	94	3	SE	GAL
382.0	18 33 12.11	32 39 15.1	14.66	.0578	19.9	.65	17	18	67	116	25ID,82SP,SE	GAL
386.0*	18 36 12.84	17 9 7.4	-0.00	.0170	23.9	C- .59	11	25	70	10	67X,145Z,ABS	GAL
388.0	18 42 35.44	45 30 21.7	15.32	.0908	24.6	C- .65	20	25	67	11	WE,CL	GAL
389.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	21.0	-0.00	0	-0	-0	-0	OBSCURED	
390.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	21.0	.74	6	-0	-0	16	OBSC,151*QSO	
390.3	18 45 37.80	79 43 3.4	14.50*	.0561	47.5	.70	27	18	26	163	12ID,SE,82SP	N
394.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	15.1	C- .78	4	-0	-0	90	OBSCURED	
395.1	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	13.5	.89	9	-0	-0	24		
401.0	19 39 38.97	60 34 32.9	18.00	.2010	20.9	C- .68	18	17	145	157	12,37ID,CL,AB	GAL
402.0	19 40 22.50	50 29 29.0	14.00	.0239	10.1	C- .56	13	17	4	3	ABS,CL	GAL
403.0	19 49 44.57	2 22 37.1	15.42	.0590	17.8	.52	-12	17	134	113	142ID	GAL
403.1	19 49 55.20	-1 25 7.2	16.00	.0554	13.5	1.01	-14	18	4	128	140ID,ABS,CL	GAL
405.0	19 57 44.43	40 35 45.2	16.22	.0565	8700.0	C- .66	6	30	30	28	108SP,CYGA,SE	GAL
409.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	76.6	C- .78	-6	-0	-0	16	OBSCURED	
410.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	34.6	C- .57	-4	-0	-0	106	OBSC,151*6	
411.0	20 19 44.19	9 51 33.8	19.70*	.4670	16.5	C- .79	-15	40	40	11	151ID,SE,CL	N
415.2	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	8.8	1.02	8	-0	-0	9	151EF	
418.0	20 37 7.30	51 8 35.0	20.00	1.6860	13.1	C+ .43	6	8	69	71		QSO
424.0	20 45 44.40	6 50 10.2	18.00	.1270	14.6	.85	-22	17	145	16	142ID,WE,CL	GAL
427.1	21 4 44.80	76 21 9.5	22.00	1.1750	26.6	C- .92	19	6	167	148	ABS	GAL
428.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	16.6	.71	1	-0	-0	106	OBSCURED	

TABLE III (Continued)

THE REVISED THIRD CAMBRIDGE CATALOG OF RADIO SOURCES
I. COMPLETE LISTING OF EXTRAGALACTIC SOURCES

3CR	RIGHT ASCENSION (1950)	DECLINATION	V MAG	Z	S(178)	SPECTRAL INDEX	GAL LAT	REFERENCES ID	REFERENCES Z	REFERENCES RADIO	REMARKS	ID
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
430.0	21 17 2.66	60 35 26.7	15.00	.0541	33.7	.74	8	18	4	3	25ID,ABS,CL	GAL
431.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	24.2 C-	.94	0	-0	-0	24	OBSCURED	
432.0	21 20 25.53	16 51 46.4	17.96	1.8050	11.0 C-	.95	-23	18	63	157	371D,143SP	QSO
433.0	21 21 30.50	24 51 33.0	16.24	.1016	56.0 C-	.72	-18	25	67	11	76ID,37,SE	GAL
434.0	21 20 54.40	15 35 11.7	20.84	.3220	4.8 C-	.63	-24	37	145	11	151ID,WE,CL	GAL
435.0	21 26 37.00	7 19 46.0	21.00	.4710	11.6	.86	-30	147	147	10	18X,E	GAL
436.0	21 41 57.94	27 56 30.6	18.18	.2145	17.8	.85	-19	18	67	3	12,37ID,SE	GAL
437.0	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	14.6 C-	.74	-28	-0	-0	166	8,37EF,151*G	
438.0	21 53 45.50	37 46 14.0	19.18	.2900	44.7 C-	.84	-13	37	147	157	151ID,129Z	GAL
441.0	22 3 49.27	29 14 43.8	21.00	-0.0000	12.6	.78	-21	161	-0	166	*CL	GAL
442.0	22 12 19.50	13 35 41.0	13.66	.0263	20.6 C-	.88	-34	68	85	10	N7236/7,771D	GAL
445.0	22 21 14.66	-2 21 26.8	15.77	.0562	24.8	.85	-47	25	67	28	SE,CL	N
449.0	22 29 7.71	39 6 4.4	13.20	.0171	11.5	.55	-16	18	94	10	ABS,CL	GAL
452.0	22 43 33.00	39 25 25.6	16.00	.0811	54.4	.76	-17	18	67	3	37ID,SE	GAL
454.0	22 49 7.71	18 32 45.1	18.40*	1.7570	11.6	.81	-36	18	63	157	142,371D	QSO
454.1	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	9.8 C-	.82	11	-0	-0	11	37*CL,M=21.	
454.2	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	8.8 C-	.61	5	-0	-0	106	OBSCURED	
454.3	22 51 29.47	15 52 54.3	16.10*	.8600	13.0 CX	.09	-39	23	48	122	65Z,143SP	QSO
455.0	22 52 34.58	12 57 34.1	19.70	.5427	12.8 C-	.70	-41	22	22	157		QSO
456.0	23 9 56.65	9 3 7.8	18.54	.2330	10.6 C-	.69	-46	18	67	90	SE	GAL
458.0	23 10 21.90	5 0 26.0	20.00	.2900	14.5 C-	.76	-50	8	145	113	SE,CL	GAL
459.0	23 14 2.30	3 48 56.0	17.55	.2199	25.6 C-	.74	-51	18	67	90	12ID,93Z,E	N
460.0	23 18 59.67	23 30 20.7	18.80	.2680	10.3	.93	-35	19	35	11	8,37ID,129Z,C	GAL
465.0	23 35 59.00	26 45 18.0	13.29	.0293	37.8	.72	-33	25	67	116	N7720,76ID,SE	GAL
466.1	-0 -0 -0.00	-0 -0 -0.0	-0.00	-0.0000	30.0 C-	.78	3	-0	-0	157	OBSCURED	
469.1	23 52 58.90	79 38 37.0	21.00	-0.0000	12.4	1.01	18	37	-0	166	162ID	*GAL
470.0	23 56 2.90	43 48 9.0	-0.00	-0.0000	10.1 C-	.72	-18	-0	-0	3	151EF,162*OBJ	

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NOTES TO TABLE III

Relevant notes for 3C 43, 3C 61.1, 3C 66, 3C 86, 3C 225, 3C 318.1, and 3C 386 may be found in Paper I.

3C 256 The original finding chart for 3C 256 (72) marked the incorrect galaxy. Observations repeated by these authors (145) were for that object, which is likely to be unrelated to the ratio source. The corrected identification has been published by Kristian, Sandage, and Katem (151). To our knowledge no spectroscopic observations have been reported.

3C 300.1 The optical/radio position difference is $\Delta\alpha$ = 16" ± 1", $\Delta\delta$ = 2".3 ± 1".0 for this galaxy (Veron, private communication); thus Wyndham's identification (18) is questionable. Our optical observations (145) show no evidence for activity.

3C 303 The optical and radio structure of this source have been studied by Kronberg et al. (131). In addition to the radio component associated with the N galaxy, there is a western component which coincides with a trio of faint UV-excess objects. The brightest of these is a QSO with z = 1.57. A fainter object is extended and coincides precisely with a compact radio component. The spectroscopic nature of this object and the relationship of the UV excess objects to the radio source is uncertain.

CL cluster
EF empty field
FC finding chart
G galaxy
ID identification
N NGC
Q QSO
SP spectrophotometry
X indicates that the reference number preceding gives an incorrect identification or redshift
* probable or possible

Column (13) gives the identification GAL, N(galaxy), QSO, or BLO (BL Lac object), again a preceding asterisk indicates a probable or possible identification.

Some judgment necessarily enters into the choice of primary references, especially the radio reference, and into the classification of the identification as reliable or uncertain. In some cases, we list not the highest resolution radio study, but rather the best map. For others the references will list previous complimentary studies. We have compared the optical positions with the radio positions given in the listed radio references for all 297 sources. In a few cases (noted in the remarks) published identifications have been discarded due to poor radio-optical position agreement. Particularly complex cases are noted in the footnotes at the end of the table.

II. Conclusion

Comparison of Tables II and III with Paper I (Tables I and II) provides a measure of the progress in the optical work on the 3CR. The remaining optical work will go more slowly because of the faintness of the remaining objects. Even so, the 3CR remains the most tractable radio sample for completeness of optical work and we expect that application of even better detector systems will result in continued progress toward this end.

We are continuing to maintain this computerized listing of the 3CR. We are grateful to those astronomers, particularly J. Kristian and M. Longair, who have continued to communicate their new results for inclusion. This work has been supported by the NSF via grants AST 79-22032 and AST 77-26897 to UCSD and Berkeley, respectively.

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