Important Celestial Radio Sources

Introduction

The list of celestial radio sources presented below was obtained from National Radio Astronomy Observatory (NRAO) library. Each column heading is defined below. As presented here, the list is sorted in order of flux density as received on Earth. As an aid in visualizing the location of the more powerful radio sources in the sky with respect to the Milky Way galaxy, an annotated radio map also is provided along with explanations of its important features.

For convenience the tabulation is available online as a Microsoft Excel file, which includes a worksheet sorted in order of right ascension. Readers may download the file and sort the columns according to their own needs. Also available online is an electronic version of the radio map that may be printed in tabloid size 11 in. x 17 in. Both downloads are located at http://www.reeve.com/CelestialRadio.htm

Listing – Definition of column headings

The information below is necessarily brief. Additional information may be found by using an online encyclopedia (for example, http://en.wikipedia.org/wiki/Main_Page) or visiting other online sources such as the National Radio Astronomy Observatory website (http://www.nrao.edu/).

Object Name: Each object is named according its original catalog listing (for celestial object naming conventions, see Tom Crowley's article "Introduction to Astronomical Catalogs" in the October/November 2010 issue of SARA Journal). Most of the objects in the list originally were listed in the 3rd Cambridge catalog (3C) but some are in NRAO's catalog (NRAO).

Right Ascension and Declination: The *right ascension* and *declination* are used together to define the location of an object in the sky according to the *equatorial coordinate system*. Right ascension is given in hour minute second format. Right ascension frequently is abbreviated RA and also is called the *hour angle*. The object will pass through the *celestial meridian* (true south of the observatory for the northern hemisphere) when the RA of the object equals the *sidereal time* at that meridian. The sidereal time can be found by using software (for example, Radio-Sky Sidereal Clock) or by using the US Naval Observatory online calculator (http://tycho.usno.navy.mil/sidereal.html). The declination, abbreviated Dec, is given in degree minute second format and is the number of degrees above (+) or below (–) the celestial equator.

Epoch: Because of precession of the Earth's polar axis, caused mostly by the gravitational effects of the Sun and Moon, the location, and thus the RA and Dec, of celestial objects will change over time. Therefore, the coordinates are given in terms of a specific time reference called epoch. The coordinates for most objects in the table are given for 2000 but a few are referred to 1950. For example, the supernova remnant Crab Nebula drifted over the 50 year period from 05 31 30 RA and 21 59 00 Dec in 1950 to 05 34 32 RA and 22 00 52 Dec in 2000. For most amateur radio astronomy applications, the slow drift in position is unimportant.

Flux Density: The *flux density* is given in units of jansky (abbreviated Jy). A flux density of 1 Jy is equivalent to 1 x 10^{-26} W/m^2-Hz. The table lists sources with a flux density equal to or above 10 Jy. The included radio map shows only shows those sources with flux density equal to or above 40 Jy.

Frequency: The flux densities provided in the table are based on measurements at a specific frequency. The measured flux density of an object varies with frequency according to its radio *spectral index*. The spectral index α is the power exponent in the assumed relationship that flux density is proportional to frequency$^{\alpha}$. The radio spectral index can be found for many objects in Radio-Sky Radio Eyes software program.

Other Name: Many objects have a formal catalog name (Object Name column) and a nickname or other less formal name. Sometimes these other names refer to a visible object that is near a radio object.

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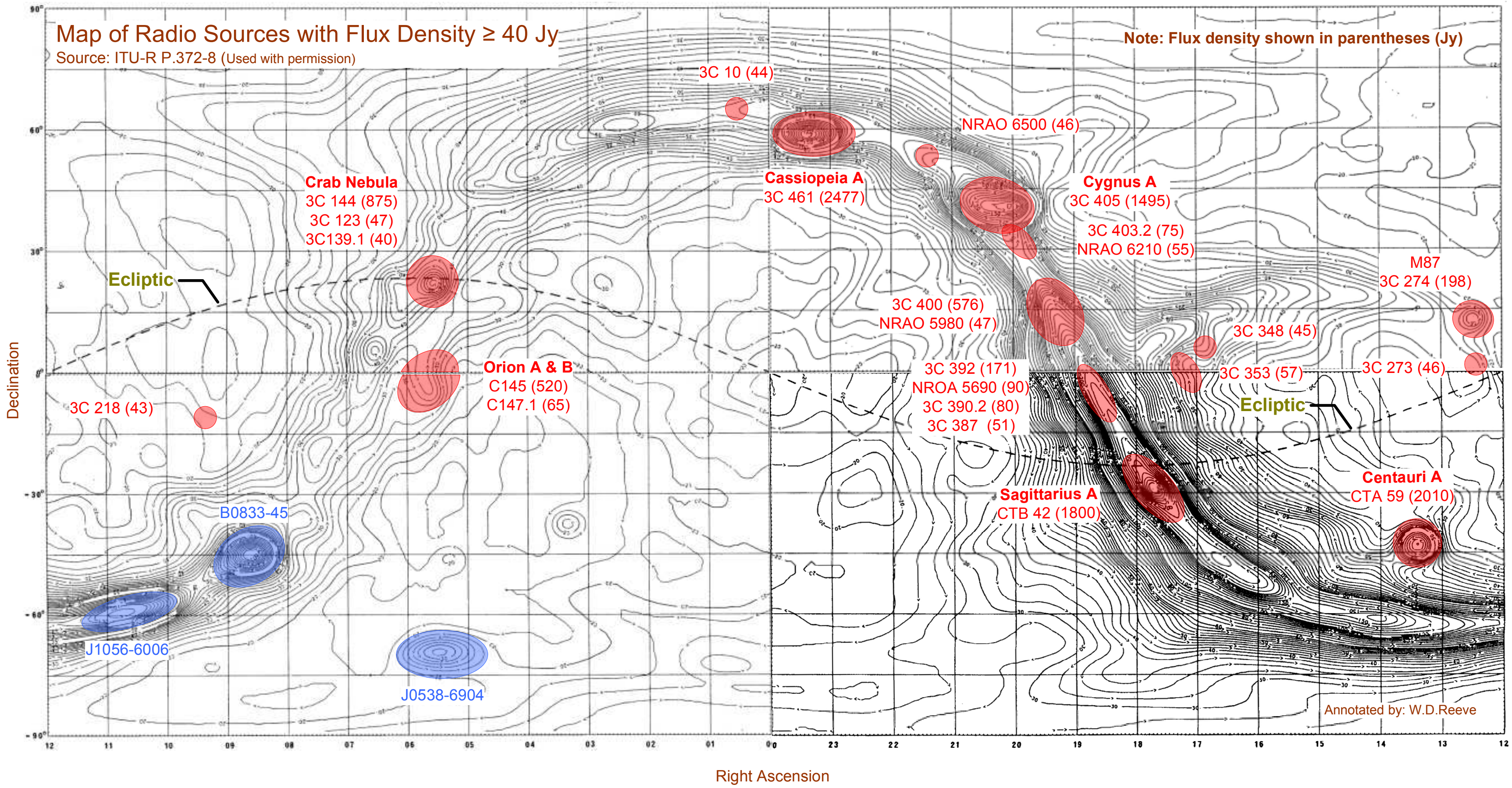
Object Name	RA (hh mm ss)	Dec (dd mm ss)	Epoch	Flux Density (Jy)	Frequency (MHz)	Other Name
3C 461	23 23 24	58 48 54	2000	2477	1,420	SNR-Cassiopeia A
CTA 59	13 22 28	-42 46 00	1950	2010	960	Cent A NGC5128
CTB 42	17 42 09	-28 50 00	1950	1800	960	Sag A Galactic Nuccleus
3C 405	19 59 28	40 44 02	2000	1495	1,420	D Galaxy-Cygnus A
3C 144	05 34 32	22 00 52	2000	875	1,420	SNR-Crab Nebula
3C 400	19 23 42	14 30 33	2000	576	1,420	
3C 145	05 35 17	-05 23 28	2000	520	1,420	Emission Nebula-OrionA
3C 274	12 30 49	12 23 28	2000	198	1,420	Elliptical Galaxy-M87
3C 392	18 56 06	01 18 00	2000	171	1,420	SNR
NRAO 5690	18 35 00	-07 20 00	2000	90	1,420	
3C 390.2	18 47 58	-01 56 43	2000	80	1,420	
3C 403.2	19 54 12	32 54 00	2000	75	1,420	
3C 147.1	05 41 43	-01 54 17	2000	65	1,420	Emission Nebula-OrionB
3C 353	17 20 28	-00 58 47	2000	57	1,420	D Galaxy
NRAO 6210	20 01 42	33 17 00	2000	55	1,420	
3C 387	18 41 00	-05 16 00	2000	51	1,420	
3C 123	04 37 04	29 40 14	2000	47	1,420	Galaxy
NRAO 5980	19 10 19	09 04 07	2000	47	1,420	
3C 273	12 29 07	02 03 09	2000	46	1,420	Quasar
NRAO 6500	21 12 21	52 28 58	2000	46	1,420	
3C 348	16 51 08	04 59 34	2000	45	1,420	D Galaxy
3C 10	00 25 13	64 08 42	2000	44	1,420	SNR-Tycho's Supernova
3C 218	09 18 06	-12 05 44	2000	43	1,420	D Galaxy
3C 139.1	05 22 25	33 29 55	2000	40	1,420	Emission Nebula
NRAO 6620	21 29 24	50 48 00	2000	37	1,420	
NRAO 6020	19 15 42	11 02 00	2000	35	1,420	
3C 398	19 11 09	09 06 24	2000	33	1,420	
NRAO 5720	18 38 15	-06 47 37	2000	30	1,420	
3C 153.1	06 09 36	20 29 19	2000	29	1,420	Emission Nebula
NRAO 1560	04 04 50	51 22 18	2000	26	1,420	
3C 147	05 42 36	49 51 07	2000	23	1,420	Quasar
3C 295	14 11 21	52 12 09	2000	23	1,420	D Galaxy
3C 391	18 49 22	-00 55 21	2000	21	1,420	
NRAO 1650	04 11 05	51 09 08	2000	19	1,420	
3C 161	06 27 10	-05 53 05	2000	19	1,420	
NRAO 5790	18 46 07	-02 43 24	2000	19	1,420	
3C 270	12 19 23	05 49 33	2000	18	1,420	Elliptical Galaxy
3C 48	01 37 41	33 09 35	2000	16	1,420	Quasar
3C 111	04 18 21	38 01 36	2000	15	1,420	
3C 286	13 31 08	30 30 33	2000	15	1,420	Quasar
NRAO 5840	18 53 20	01 14 54	2000	15	1,420	
3C 84	03 19 48	41 30 42	2000	14	1,420	Seyfert Galaxy
3C 196	08 13 36	48 13 03	2000	14	1,420	Quasar
3C 380	18 29 32	48 44 47	2000	14	1,420	Quasar
NRAO 5890	19 01 48	01 46 53	2000	14	1,420	
3C 396	19 03 58	05 22 30	2000	14	1,420	
3C 397	19 07 40	07 08 39	2000	14	1,420	
3C 409	20 14 28	23 34 58	2000	14	1,420	
3C 33	01 08 53	13 20 14	2000	13	1,420	Elliptical Galaxy
3C 20	00 43 09	52 03 34	2000	12	1,420	Galaxy
NRAO 5670	18 32 00	-02 04 00	2000	12	1,420	
3C 390.3	18 42 09	79 46 17	2000	12	1,420	N Galaxy
3C 433	21 23 45	25 04 18	2000	12	1,420	D Galaxy
3C 434.1	21 25 04	51 52 52	2000	12	1,420	
3C 279	12 56 11	-05 47 22	2000	11	1,420	Quasar
NRAO 6070	19 18 06	12 12 00	2000	11	1,420	
3C 452	22 45 49	39 41 16	2000	11	1,420	Elliptical Galaxy
3C 454.3	22 53 58	16 08 54	2000	11	1,420	Quasar
NRAO 6010	19 14 20	11 09 06	2000	10	1,420	
3C 410	20 20 07	29 42 14	2000	10	1,420	

Celestial Radio Map



This Celestial Radio Map is a composite of four individual quadrant maps from the referenced source. Annotations show the approximate locations of sources with flux density ≥ 40 Jy. The S-shaped region where the contour lines are close together is the Milky Way galaxy. The contour lines represent lines of constant *noise temperature* as measured at 408 MHz. The *ecliptic* is indicated by a dashed line. The ecliptic is the path the Sun follows in the sky as viewed on Earth and is the intersection of the *celestial sphere* with the ecliptic *plane*.