Some radio-source data

Franck F5SE, kozton@free.fr

Foreword

In the following, flux is given in Jansky (Jy), as well as in dB(W/m²/Hz).
One Jansky = 10^{-26} W/m²/Hz, or, in logarithmic format, – 260 dB(W/m²/Hz).

Radio-sources are classified in right ascension increasing order.

Taurus A

This radio-source is linked to the well-known Crab Nebula, remnents of a supernova observed by Chinese astronomers in July 1054 AD.

Equatorial coordinates (2000.0): $\alpha = 5^h34^m32^s$, $\delta = +22°00'52"$

Flux, between 1000 MHz and 35000 MHz
$\log S = 3.915 - 0.299 \log F$ *S* in Jansky (Jy). *F* in MHz
$S_{dB} = -220.85 - 2.99 \log F$ *S* in dB(W/m²/Hz). *F* in MHz:

The table below gives flux values for the VHF and above ham bands.

Within the validity range of the formula, accuracy of the value given in dB is about ±0.4 dB, so roughly ±4% on the same value given en Jy.

Band (MHz)	Jansky (Jy)	dB(W/m²/Hz)
144	1860.6	-227.3
432	1339.6	-228.7
1296	964.6	-230.2
2320	810.4	-230.9
3470	718.5	-231.4
5760	617.5	-232.1
10368	518.0	-232.9

See paper about measurements made on Taurus A at 435 MHz using ham-like equipment, by Christian Monstein, HB9SCT.

http://www.monstein.de/astronomypublications/TaurusA/ORIONTAU.htm

Virgo A

This radio-source is linked to the famous elliptical galaxy M87, main representative of Virgo's galaxy cluster.

Equatorial coordinates (2000.0): $\alpha = 12^h30^m49.4^s$, $\delta = +12°23'28"$

Flux, between 400 MHz and 25000 MHz
$\log S = 5.023 - 0.856 \log F$ S in Jansky (Jy), F in MHz
$S_{dB} = -209.77 - 8.56 \log F$ S in dB(W/m²/Hz), F in MHz:

The table below gives flux values for the VHF and above ham bands.

Within the validity range of the formula, accuracy of the value given in dB is about ±0.4 dB, so roughly ±4% on the same value given en Jy.

Band (MHz)	Jansky (Jy)	dB(W/m²/Hz)
144	1497.8	-228.2
432	584.8	-232.3
1296	228.4	-236.4
2320	138.7	-238.6
3470	98.3	-240.1
5760	63.7	-242.0
10368	38.5	-244.1

See paper about measurements made on Virgo A at 435 MHz using ham-like equipment, by Christian Monstein, HB9SCT.

http://www.monstein.de/astronomypublications/VirgoA/virgo.pdf

Sagittarius A

This radio-source is located at the center of our Galaxy. Most of the astronomers think the Galaxy center is occupied by a supermassive black hole, whose mass is estimated at several millions solar masses, so about 2.10^{36} kg. If this happens to be true, Sagittarius A is the most likely candidate for the "black hole grade". Estimated distance, about 30000 light-years.

Equatorial coordinates (2000.0): $\alpha = 17^h45^m40.0409^s$, $\delta = -29°00'28.118"$

Neither data nor any formula giving the flux vs. frequency were available at this writing.

Band (MHz)	Jansky (Jy)	dB(W/m²/Hz)
144		
432		
1296		
2320		
3470		
5760		
10368		

The Sun excepted, this is the most powerfull radio-source in the sky.

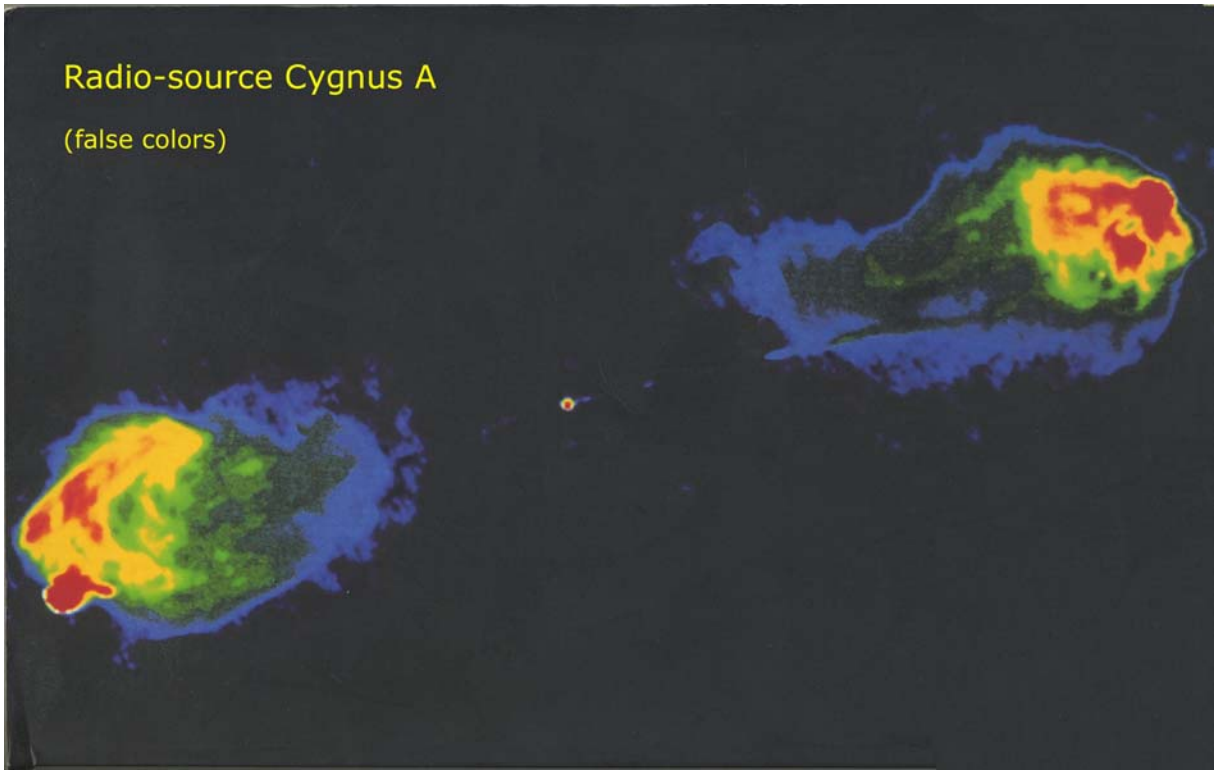
Omega Nebula

This radio-source is located inside the constellation of Sagittarius. Estimated distance: 5000 to 6000 light-years.

Equatorial coordinates (2000.0): $\alpha = 18^h20^m26^s$, $\delta = -16°10'36"$

Neither data nor any formula giving the flux vs. frequency were available at this writing.

Band (MHz)	Jansky (Jy)	dB(W/m²/Hz)
144		
432		
1296		
2320		
3470		
5760		
10368		



Cygnus A

Extra-galactic radio-source (see picture on previous page). Its origin is not yet clearly explained. Estimated distance: 500 to 550 millions light-years (real nice DX, isn't it !!).

Equatorial coordinates (2000.0): $\alpha = 19^h59^m33^s$, $\delta = +40°43'41"$

Flux, between 20 MHz and 2000 MHz	Flux, between 2000 MHz and 31000 MHz
$\log S = 4.695 + 0.085 \log F - 0.178 \log^2 F$ S in Jansky (Jy), F in MHz	$\log S = 7.161 - 1.244 \log F$ S in Jansky (Jy), F in MHz
$S_{dB} = -213.05 + 0.85 \log F - 1.78 \log^2 F$ S in dB(W/m²/Hz), F in MHz:	$S_{dB} = -225.71 - 12.44 \log F$ S in dB(W/m²/Hz), F in MHz:

Within the validity range of the first formula, accuracy of the value given in dB is about ±0.2 dB, so roughly ±2% on the same value given in Jy.

Within the validity range of the second formula, accuracy of the value given in dB is about ±0.5 dB, so roughly ±5% on the same value given in Jy.

The table below gives flux values for the VHF and above ham bands.

Band (MHz)	Jansky (Jy)	dB(W/m²/Hz)
144	11200.6	-219.5
432	4815.8	-223.2
1296	1718.1	-227.6
2320	922.5	-230.4
3470	571.3	-232.4
5760	304.1	-235.2
10368	146.4	-238.3

Signal polarization is not purely randomly scattered, but shows some amount of ellipticity, without, however, being completely linear.

Estimated power of Cygnus A at 432 MHz.

Path (550 million light-years) attenuation, roughly 520 dB.
Flux density at origin: $S = -223.2 + 520 = +296.8$ dB(W/m²/Hz) !!!

If the radio-source was located at Sun's position (150 million km), the flux density at Earth level would amount to +48.2 dB(W/m²/Hz). Under such conditions, a receiver with a bandwidth of 2500 Hz, linked to a 1 m² capture area antenna, would collect a power level of… +82.2 dBW, or, expressed in power units, about 165 MW !!!!

Cassiopeia A

This radio-source is linked to the remnents of a supernova observed either in 1665, or in 1680.

Equatorial coordinates (2000.0): $\alpha = 23^h23^m24^s$, $\delta = +58°48'54"$

Flux formula between 300 MHz and 31000 MHz.
As flux slightly decreases from year to year, this formula splits in two parts:

1) Frequency only dependant part:

$$A = 5.745 - 0.77 \log F$$

2) Frequency and time dependant secular part:

Epoch of origin: 1980,0

$$B = \left(0.0187 - 0.003 \log F\right)\left(y - 1980.0\right)$$

where y is the current year.

The full formula then reads:

$$S = \left(1 - B\right) 10^A$$

S in Jansky (Jy), F in MHz.

The table below gives flux values for the VHF and above ham bands.

Within the validity range of the full formula, global accuracy of the value given in dB is about ±0.4 dB, so roughly ±4% on the same value given en Jy.

	1980.0		2008.5	
Bande (MHz)	Jansky (Jy)	dB(W/m²/Hz)	Jansky (Jy)	dB(W/m²/Hz)
144	12107.7	-219.2	7889.2	-221.0
432	5196.1	-222.8	3597.7	-224.4
1296	2229.9	-226.5	1634.9	-227.9
2320	1424.2	-228.5	1075.0	-229.7
3470	1044.6	-231.5	804.1	-230.9
5760	707.1	-231.5	557.6	-232.5
10368	449.7	-233.5	364.4	-234.4

Over the past 28 years, flux has decreased by an amount of 1.8 dB on lower part of spectrum, and only 0.9 dB on higher part of spectrum.