TABLE 1

TEMPERATURES AND BRIGHTNESSES OF THE CYGNUS RADIO LOOP AT 2720, 1420, 820, 408 AND 34.5 MHz

Frequency (MHz)	Temperature limits $T_{\rm min}$, $T_{\rm max}$ (K)	Temperature (K)	Brightness [10^{-22} W/(m^2 Hz Sr)]
2720	0.395, 0.66	0.160 ± 0.005	3.64 ± 0.12
1420	4.2, 4.9	0.49 ± 0.05	3.04 ± 0.30
820	10.1, 14.0	2.30 ± 0.20	4.75 ± 0.40
408	41, 72	15.3 ± 1.0	7.83 ± 0.50
34.5	34500, 70000	13960 ± 700	50.97 ± 2.56

TABLE 2

SPECTRAL INDICES FOR CYGNUS LOOP FROM $T-T$ PLOTS, BETWEEN 2720, 1420, 820, 408 AND 34.5 MHz

Frequency (MHz)	2720	1420	820	408	34.5
2720	···	1.52 ± 0.35	1.96 ± 0.53	2.35 ± 0.26	2.57 ± 0.23
1420	2.22 ± 0.76	···	2.27 ± 0.64	2.60 ± 0.28	2.67 ± 0.25
820	2.64 ± 0.61	3.10 ± 0.64	···	2.82 ± 0.31	2.82 ± 0.10
408	2.67 ± 0.26	2.79 ± 0.28	3.10 ± 0.31	···	2.78 ± 0.15
34.5	2.86 ± 0.23	2.95 ± 0.25	2.92 ± 0.10	2.94 ± 0.15	···

(2009b). As mentioned in these papers, if the value of $T_{\rm min}$ is changed by a small amount, the brightness contours become significantly different. If $T_{\rm min}$ is too small, the area of the spur becomes confused with the background and it becomes obvious that the border has been incorrectly chosen.

The results are given in Tables 1, 2 and 3. $T_{\rm min}$, given in the second column of Table 1, is the lower temperature limit, while $T_{\rm max}$ is the upper temperature of the loop and it is also the upper temperature limit (because there are no other superposed sources). These temperature limits enable us to distinguish the loop from the background. Then we derived the surface brightnesses using equation (1) for each frequency.

The values for the brightnesses in units of 10^{-22} W/ (m^2 Hz Sr) can be compared with results for the flux densities in Jy. The flux densities can be transformed into brightnesses or vice versa, taking into account that the frequencies have to be the same. Knowing the loop size Ω, the flux densities S_ν given in Jy can be transformed to brightnesses given in 10^{-22} W/(m^2 Hz Sr) by:

$$\Sigma_\nu = S_\nu \times 10^{-26}/\Omega\,. \qquad (2)$$

TABLE 3

BRIGHTNESS OF CYGNUS RADIO LOOP REDUCED TO 1000 MHz[a]

Frequency (MHz)	Brightness at 1000 MHz (10^{-22} W/(m^2 Hz Sr))
2720	7.05 ± 0.86
1420	3.84 ± 0.52
820	4.17 ± 0.29
408	4.33 ± 0.07
34.5	5.52 ± 1.40

[a]Using spectral index derived in this paper: $\beta_5 = 2.66 \pm 0.09$ (from the spectrum of all five frequencies 2720, 1420, 820, 408 and 34.5 MHz).

By use of the spectral indices, the brightnesses can be reduced to 1000 MHz according to the relation:

$$\Sigma_{1000} = \Sigma_\nu (1000/\nu)^{(2-\beta)}\,, \qquad (3)$$

where the temperature spectral index $\beta = \alpha + 2$, and α is the spectral index defined by $S_\nu \propto \nu^{-\alpha}$.