Leahy, Roger, & Ballantyne (1997) presented high resolution 1420 MHz total intensity and polarization maps of the Cygnus loop and derived rotation measures. Aschenbach & Leahy (1999) made a comparison between the radio and X-ray emission from supernova remnants. The X-ray emission traces the hot gas behind the shock front, while the radio emission comes from the relativistic electron population emitting synchrotron radiation in the ambient magnetic field. They found that there are significant differences in the distribution of X-ray and radio brightness in the Cygnus loop. Also, significant temperature variations, seen along the rim and in the bright filaments interior to the rim, indicated that the Cygnus loop was caused by a supernova exploding in a cavity.

Uyaniker et al. (2002) suggested that the Cygnus loop may consist of two overlapping remnants. Substantial differences between the northern and southern part as well as in their emission characteristics have been observed (Uyaniker et al. 2004; Patnaude et al. 2002). Some authors proposed that the Cygnus loop consists of two likely interacting SNRs: G74.3-8.4 and G72.9-9.0 (Uyaniker et al. 2002; Leahy 2002). In Sun et al. (2006), from 4800 MHz observations, it is explained that the polarization maps (the difference in the polarization characteristic between the northern and southern part) support previous ideas that the Cygnus loop may consist of two SNRs. Besides, several compact radio sources are located within the boundary of the remnant. The main characteristics of the Cygnus loop in different spectral bands are: (a) in the radio band it is shell, brightest to the north-east, with fainter breakout regions to the south, with spectral variations; (b) in the optical it is a large filamentary loop, brightest to the north-east, not well defined to the south and west; (c) it is a shell in soft X-rays (see e.g., Green 2006).

Some radio maps which include this remnant are the following: the map by Kundu & Becker (1972) at 4940 MHz, Keen et al. (1973) at 2695 MHz, Uyaniker et al. (2004) at 2675 MHz, Leahy et al. (1997) at 1420 MHz, Dickel & Willis (1980) at 610 MHz, Green (1984) at 408 MHz. We found observations of the continuum radio emission at 2720 MHz (Reif et al. 1987), 1420 MHz (Reich & Reich 1986), 820 MHz (Berkhuijsen 1972), 408 MHz (Haslam et al. 1982) and 34.5 MHz (Dwarakanath & Udaya Shankar 1990), in electronic form and used them in this paper.

In our previous paper (Borka Jovanović & Urošević 2009a) we only calculated the temperatures and brightnesses at three frequencies. In this paper we expand the scope of our investigation to: brightness temperatures and surface brightnesses at five frequencies, as well as spectrum, $T-T$ graphs, radio spectral indices, an estimation of environment density and the initial energy of supernova explosion, and the flux density spectrum.

In our calculations, we used brightness temperatures over the whole area of the loop, so the mean temperature we estimated refers to the northern and southern parts together. In this research the average brightness temperatures and surface brightnesses of the Cygnus radio loop are calculated at the five frequencies: 2720, 1420, 820, 408 and 34.5 MHz. Then we study how these results compare with previous results (Roger et al. 1999; Reich, Zhang, & Fürst 2003; Uyaniker et al. 2004) and with current theories of SNR evolution. These theories predict that loops are non-thermal sources which are spreading inside the hot, low density bubbles made by former supernova explosions or by strong stellar winds (see Salter 1983; McKee & Ostriker 1977, and references therein).

Our aim is also to apply the method for the determination of the brightness temperature given in Borka (2007) which was developed for large radio loops, and to show that it is rather efficient in the case of much smaller radio loops, e.g., the Cygnus loop. We also check whether the results obtained using this method agree with the method of $T-T$ graphs and with results obtained with other methods. Our method is quite simple because we are using brightness temperature isolines to define borders of the Cygnus loop at the wide range of frequencies ($\nu_{\max}/\nu_{\min} = 2720\ \mathrm{MHz}/34.5\ \mathrm{MHz} \approx 79$). Other authors use different square or rectangular areas to determine the area of the loop and to calculate spectral indices, the brightness temperature and the flux of the loop (Uyaniker et al. 2004, page 917, and Leahy & Roger 1998, page 786). Also, we calculate the flux from the Cygnus loop and compare our results with results of other authors in different frequency ranges.

2. ANALYSIS

2.1. *Data*

We used the following radio-continuum surveys as the basic source of data in this paper: at 2720 MHz (Reif et al. 1987), 1420 MHz (Reich & Reich 1986), 820 MHz (Berkhuijsen 1972), 408 MHz (Haslam et al. 1982) and 34.5 MHz (Dwarakanath & Udaya Shankar 1990). These surveys are available in electronic form, in Flexible Image Transport Sys-