Emission spectra of RuN and VN have been investigated at high resolution using a Fourier transform spectrometer. The RuN molecules were generated in a ruthenium hollow cathode lamp by exciting a mixture of about 2.5 Torr of Ne and 5 mTorr of N₂. New bands with origins near 17758.1, 18866.4, 19800.4 and 20721.5 cm⁻¹ have been assigned as the 0-1, 0-0, 1-0 and 2-0 bands of a new \( ^5\Sigma^+ - ^3\Sigma^+ \) system with the lower state as the ground state. This transition has been labeled as the \( F^3\Sigma^+ - X^3\Sigma^+ \) where the \( F^3\Sigma^+ \) state arises from the \( 1\sigma^22\sigma^2\pi^4\sigma^4 \) configuration. A rotational analysis of these bands provides the principal equilibrium constants for the ground state of RuN as, \( \Delta G(\frac{1}{2}) = 1108.3235(22) \) cm⁻¹, \( B^0_{\lambda} = 0.5545023(42) \) cm⁻¹, \( \alpha_s = 0.0034468(57) \) cm⁻¹, \( r_e = 1.5714269(60) \) Å. The excited \( F^3\Sigma^+ \) state has equilibrium constants of \( \omega_\lambda = 946.8471(40) \) cm⁻¹, \( \omega_\lambda \alpha_s = 6.4220(14) \) cm⁻¹, \( B^0_{\lambda} = 0.50085(21) \) cm⁻¹, \( \alpha_s = 0.00375(10) \) cm⁻¹, \( r_e = 1.65345(34) \) Å. This transition is analogous to the \( E^3\Sigma^+ - X^3\Sigma^+ \) system of RhC [Balfour et al., J. Mol. Spectrosc. 198, 393 (1999)].

The VN molecules were formed from the reaction of \( VOCl_3 \) vapor with active nitrogen and were excited in a microwave source. A new band observed near 17433 cm⁻¹ has been assigned as the 0-0 band of the \( ^4\Phi-^4\Delta \) transition of VN with the lower \( a'\Delta \) state common to the lower state of the \( e^3\Pi-a'\Delta \) transition observed previously [Ram, Bernath and Davis, J. Mol. Spectrosc. 210, 110 (2001)].