$$\varrho_j^A = \frac{a}{4}(2j - r - 1) = \frac{a}{2}(j-1) - \frac{a}{4}(r-1) = -\varrho_{r+1-j}^A$$

$$\varrho_j = \frac{a}{2}(j-1) + \frac{c}{2} + \frac{b}{4}$$

$$\varrho_j = \varrho_j^A + Y/2r + V/4r$$

$$\text{RHS} = \frac{a}{2}(j-1) - \frac{a}{4}(r-1) + \frac{c}{2} + \frac{a}{4}(r-1) + \frac{b}{4} = \frac{a}{2}(j-1) + \frac{c}{2} + \frac{b}{4} = \text{LHS}$$

$$p_0 - 1 = \frac{a}{2}(r-1) + Y/r + V/2r$$

$$p_0 - 1 = \frac{X + Y + V/2}{r} - 1 = 1 + \frac{a}{2}(r-1) + c + \frac{a}{2}(r-1) + \frac{b}{2} - 1 = a(r-1) + c + \frac{b}{2}$$
$$= \frac{a}{2}(r-1) + c + \frac{a}{2}(r-1) + \frac{b}{2} = \frac{a}{2}(r-1) + Y/r + V/2r$$

$$\prod_j \Gamma_{\Lambda_j - \frac{p_0 - 1}{2}} = \Gamma^{\Omega}_{\Lambda + \varrho - Y/r + V/2r} = \Gamma^{\Omega}_{\Lambda + \varrho^A - Y/2r + V/4r}$$

$$\varrho_j^A - Y/2r + V/4r - \frac{a}{2}(j-1) = -\frac{a}{4}(r-1) - Y/2r + V/4r = -\frac{p_0 - 1}{2}$$

$$\prod_j \Gamma_{\nu_{\mathbb{C}} - \varrho_j - \frac{p_0 - 1}{2}} = \Gamma^{\Omega}_{\nu_{\mathbb{C}} - Y/r + V/2r}$$

$$\Lambda_j = \nu_{\mathbb{C}} - \varrho_j \Longrightarrow \Lambda + \varrho - Y/r + V/2r = \nu_{\mathbb{C}} - Y/r + V/2r$$

$$\Gamma^{\Omega}_{\nu_{\mathbb{C}}} = \prod_{j} \Gamma_{\nu_{\mathbb{C}} + \varrho_{j} - \frac{p_{0}-1}{2}}$$

$$\Lambda_{j} = \nu_{\mathbb{C}} + \varrho_{r+1-j} = \nu_{\mathbb{C}} + \varrho^{A}_{r+1-j} + Y/2r + V/4r$$
$$\Longrightarrow \Lambda_{j} + \varrho^{A}_{j} - Y/2r + V/4r = \nu_{\mathbb{C}} + \underbrace{\varrho^{A}_{r+1-j} + \varrho^{A}_{j}}_{=0} = \nu_{\mathbb{C}}$$

$$\frac{\Gamma^{\Omega}_{\nu_{\mathbb{C}} + \lambda + \varrho - Y/r + V/2r} \Gamma^{\Omega}_{\nu_{\mathbb{C}} - \lambda + \varrho - Y/r + V/2r}}{\Gamma^{\Omega}_{\nu_{\mathbb{C}}} \Gamma^{\Omega}_{\nu_{\mathbb{C}} - Y/r + V/2r}} = \frac{\Gamma^{\Omega}_{\nu_{\mathbb{C}} + \lambda + \varrho^{A} - Y/2r + V/4r} \Gamma^{\Omega}_{\nu_{\mathbb{C}} - \lambda + \varrho^{A} - Y/2r + V/4r}}{\Gamma^{\Omega}_{\nu_{\mathbb{C}}} \Gamma^{\Omega}_{\nu_{\mathbb{C}} - Y/r + V/2r}}$$