Deriving reliability from Lord's k, Hanson (1991) p. 2-3:

$$k = \frac{n\big[(n-1)(\sigma^2 - \sigma_e^2) - n\sigma^2 + \mu(n-\mu)\big]}{2\big[\mu(n-\mu) - (\sigma^2 - \sigma_e^2)\big]} \tag{1}$$

$\sigma_e^2 = \sigma^2(1-r)$. Replacing and simplifying yields:

$$k = \frac{n\big[-r\sigma^2(n-1) - n\sigma^2 + \mu(n-\mu)\big]}{2\big[\mu(n-\mu) - r\sigma^2\big]} \tag{2}$$

Solving for r:

$$r = \frac{-2k\mu_1^2 + 2kn\mu_1 + n\mu_1^2 - \mu_1 n^2 + \sigma_2 n^2}{\sigma_2(2k + n^2 - n)} \tag{3}$$