

$$\boxed{A} \boxed{B^T} = \boxed{Q_A} \boxed{R_A} \boxed{R_B^T} \boxed{Q_B^T} = \boxed{Q_A} \boxed{C} \boxed{Q_B^T} = \boxed{Q_A} \boxed{\tilde{U}_C} \boxed{S_C} \boxed{\tilde{V}_C^T} \boxed{Q_B^T} = \boxed{U_C} \boxed{S_C} \boxed{V_C^T}$$