521   (fairer time merge) This question is the same as the time merge (Exercise 520), but if input is available on both channels, the choice must be made the opposite way from the previous read. If, after waiting for an input, inputs arrive on both channels at the same time, the choice must be made the opposite way from the previous read.

After trying the question, scroll down to the solution.

§ Let b be a binary variable saying "the previous read was on channel d". The specification is S where

$$S = \quad (\sqrt{c} \wedge b \ \vee \ (\sqrt{c} \vee \mathcal{T}c_{rc} < \mathcal{T}d_{rd} \vee \mathcal{T}c_{rc} = \mathcal{T}d_{rd} \wedge b) \wedge \neg\sqrt{d}) \wedge (c?. \ e! \ c. \ b := \bot. \ S)$$
$$\vee \quad (\sqrt{d} \wedge \neg b \ \vee \ (\sqrt{d} \vee \mathcal{T}c_{rc} > \mathcal{T}d_{rd} \vee \mathcal{T}c_{rc} = \mathcal{T}d_{rd} \wedge \neg b) \wedge \neg\sqrt{c})$$
$$\wedge (d?. \ e! \ d. \ b := \top. \ S)$$

$$S \ \Longleftarrow \ \mathbf{if} \ \sqrt{c} \wedge (b \vee \neg\sqrt{d}) \ \mathbf{then} \ c?. \ e! \ c. \ b := \bot \ \mathbf{else} \ ok \ \mathbf{fi}.$$
$$\mathbf{if} \ \sqrt{d} \wedge (\neg b \vee \neg\sqrt{c}) \ \mathbf{then} \ d?. \ e! \ d. \ b := \top \ \mathbf{else} \ ok \ \mathbf{fi}.$$
$$t := t+1. \ S$$