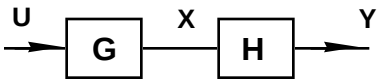
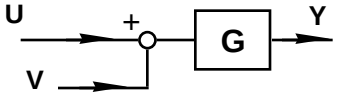
❑ Examples of equivalent block diagrams

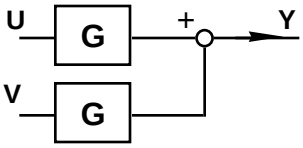
• Blocks in cascade, Y = GHU



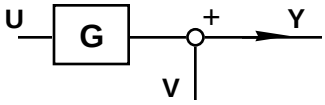
is the same as

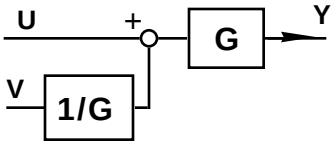
• Moving the summing point, Y = G(U + V) = GU + GV



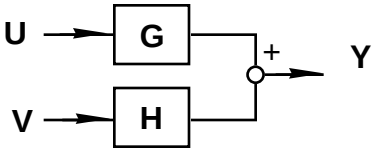


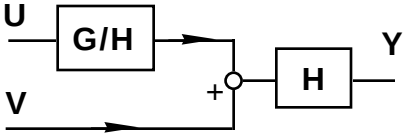
Here Y = GU + V = G(U + V/G)



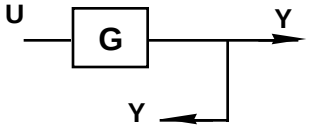


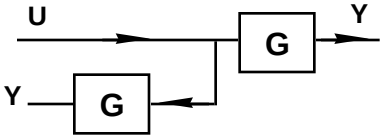
Here, Y = HV + GU = H(V + GU/H)



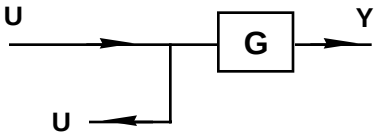


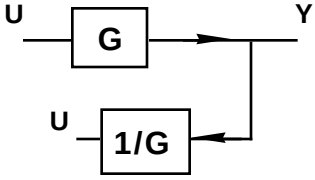
• Moving the pick off point, Y = GU



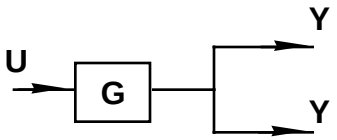


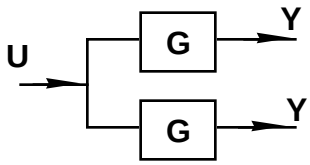
Here U = G(1/G) U and Y = GU



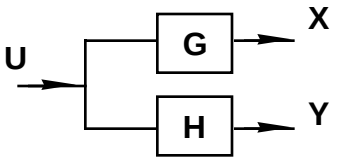


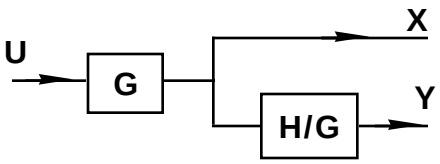
• Moving the branching point



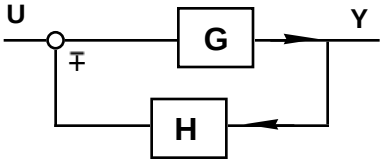


Here, X = GU and Y = HU = (H/G)GU

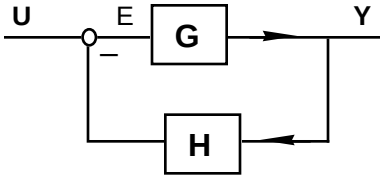


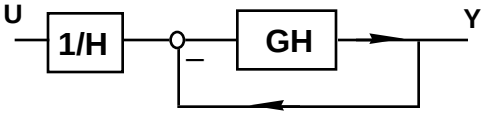


• Close-loop vs open-loop; eliminating a loop (what we derived in the chapter)

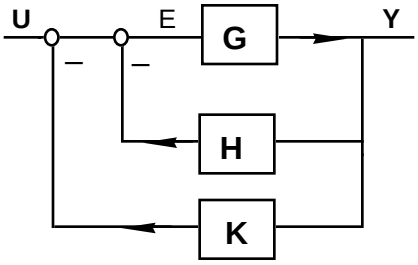


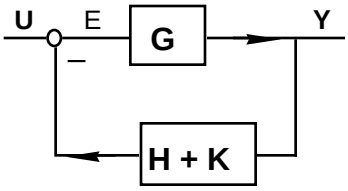
• Change a closed-loop to unity feedback, E = U – HY = H (U/H – Y)





• Combine two feeback paths, E = (U – KY) – HY = U – (K + H)Y





The loop on the right can be reduced to one closed-loop function easily. Another way to do this is to close the inner loop with G and H first.