$$\tau_{hardstop-a1} = -k(\theta_1 - \frac{\pi}{2}) - b\dot{\theta}_1, \text{ for } \theta_1 > \frac{\pi}{2}$$
$$\tau_{hardstop-b2} = k(\theta_1 - \theta_2) + b(\dot{\theta}_1 - \dot{\theta}_2), \text{ for } \theta_1 > \theta_2$$
$$\tau_{hardstop-c3} = -k(\theta_3 - \theta_2) - b(\dot{\theta}_3 - \dot{\theta}_2), \text{ for } \theta_3 > \theta_2$$
$$\tau_{hardstop-d4} = k(\theta_3 - \theta_4) + b(\dot{\theta}_3 - \dot{\theta}_4), \text{ for } \theta_3 > \theta_4$$
$$\tau_{hardstop-e5} = -k(\theta_5 - \theta_4) - b(\dot{\theta}_5 - \dot{\theta}_4), \text{ for } \theta_5 > \theta_4$$