Space station

This problem is still work in progress.

Imagine a space station, to which we attach a reference frame I. We assume that this frame is inertial over the time scale we will consider. Around this space station moved a satellite, to which we attach a frame S. Inside that satellite is a gyroscope, whose body B can rotate freely with respect to the satellite thanks to a gimbal.

1. Show that the angular velocity of the body with respect to the space station, expressed in the satellite frame, satisfies:

$$ {}_S\omega_{IB} = {}_S\omega_{IS} + R_{SBB}\omega_{SB} $$