Corner Configuration Notes for the Single-Stage HAM Isolation System.

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These are notes on the configuration of the instruments and actuators at the 3 'corners' of the single stage HAM isolation and alignment system for Advanced LIGO. This document is meant to accompany the Single Stage HAM requirements document, E030180-02, and to illustrate some of the requirements. This document is not a requirements document; it simply tries to help explain what the requirements mean. A similar document, D030169-02, was compiled for the systems with two active stages.

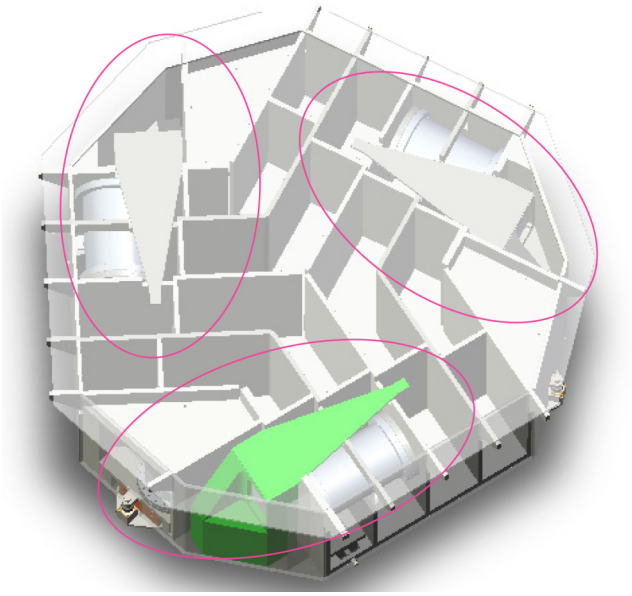

Figure 1. View from above of stage 1 of the conceptual design.

Figure 1 shows a view from above of the conceptual design. The table top is transparent. One of the 3 triangular springs has been highlighted in green, along with its support post. The magenta ovals contain the components for the 3 'corners' of stage 0. Note the 3-fold symmetry of the system.

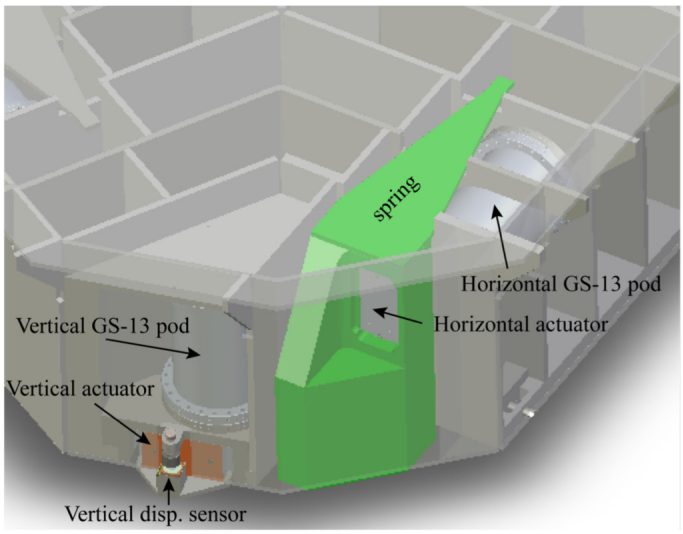

Figure 2. Isometric view of 1 'corner' of stage 0.

Figure 2 shows one ‘corner’ of the system. The spring and support post are shown in green. Also visible are the vertical and tangential actuators, the vertical and tangential GS-13 seismometer pods, and the vertical displacement sensor. The tangential displacement sensor is not shown in this view. The displacement sensor measures the relative motion of stage 0 (the support structure, which is mostly hidden in these views) and stage 1 (the isolated table assembly). The GS-13 seismometers measure the inertial motion of stage 1 and are sealed into UH[illegible]ods. The actuators apply forces between stage 0 and stage 1. The springs and flexures carry the static load of stage 1 and its payload. The actuators apply relatively small forces in parallel to the springs and flexures.

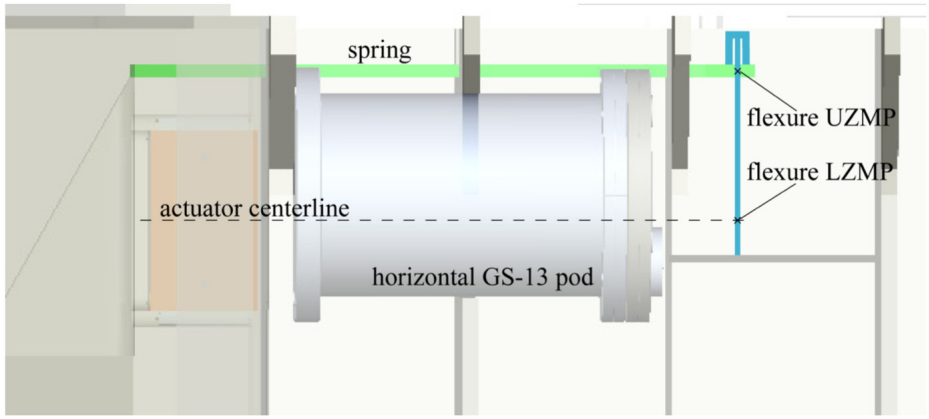

Figure 3. Side view of the horizontal (tangential) actuator, GS-13 pod, spring and flexure.

Figure 3 is a side view of some of the horizontal (tangential) components, including the horizontal actuator, the horizontal GS-13 seismometer pod, the spring (in green), and the flexure (in blue, with ‘top hat’). The upper zero moment point (UZMP) of the flexure is within 1 mm of the mid-plane of the spring and the lower zero moment point (LZMP) is within 1 mm of the actuator centerline. The centerline of the horizontal GS-13 pod is parallel (to within 1 mrad) to the actuator centerline, but offset [illegible]w centimeters. This picture shows the BSC style pod. The HAM pod shall be mounted the other way around, i.e. the flange end shall be adjacent to the actuator to maximize the connection stiffness between the actuator and the seismometer within the pod (which is mounted to the flange).

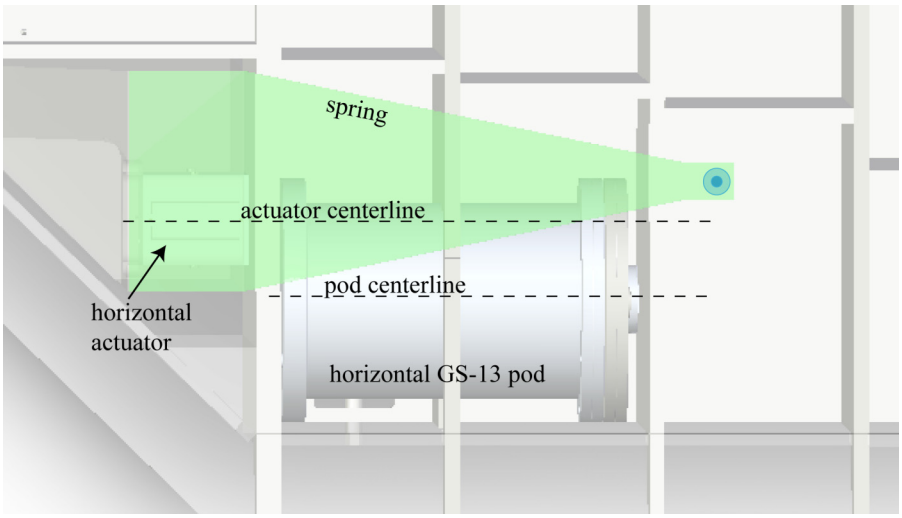

Figure 4. Top view of the horizontal components in one ‘corner’.

Figure 4 shows a top view of some of the horizontal components in one corner. As with the horizontal view, the centerlines of the GS-13 pod and the horizontal actuator are parallel, but offset by several centimeters. In this design, the centerline of the spring is also parallel to the horizontal actuator, but that is not a design requirement.