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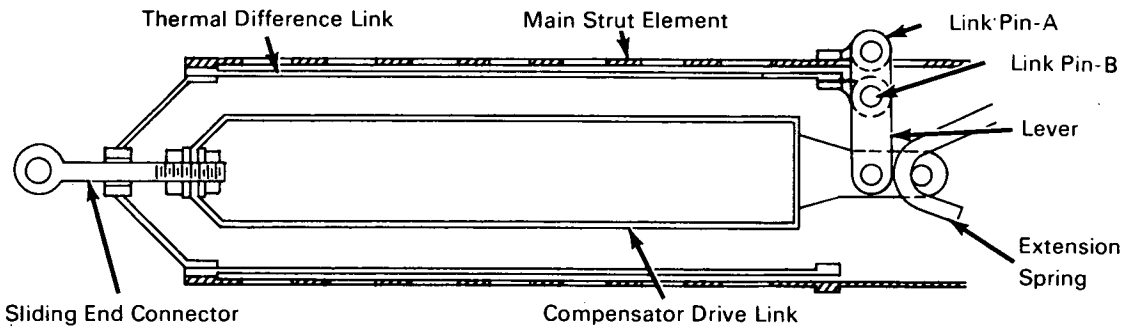
Brief 70-10014

NASA TECH BRIEF

Thermal-Difference Compensation for Structural Members



One Form of the Compensator; Longitudinal Section

The length of a structural member (such as strut or column) can be kept almost constant in environments varying widely in temperature. This is accomplished by a novel mechanism that employs two different metals and a lever.

In one possible arrangement (see fig.) the outer tube of a tubular pinned-end strut (the strut's main element) is made of titanium. Within, and with its outer end bonded (with fasteners or otherwise) to the outer end of the outer tube, is a shorter aluminum tube of slightly smaller diameter, which is the thermal-difference link. The ratio of the coefficients of expansion of aluminum and titanium is about 2.75:1, so that a change in temperature changes the position of pin-B relative to pin-A. This movement of pin-B moves the compensator drive link so that the length of the strut remains constant despite the thermal change in the length of the outer tube.

The extension spring is used to decrease the load on the compensator drive linkage only when the strut is loaded in tension; when the strut is in compression, a compression spring is used. The outer tube is perforated for better exposure of the thermal-difference link to external heat; if necessary the link can be similarly perforated. Highly conductive heat paths can be provided between adjacent tube walls by bonding of strips of aluminum foil or other suitable conductors to the walls.

Notes:

1. Information is also available on a configuration in which the metals of the outer and inner tubes have been reversed.
2. Requests for further information may be directed to:

   Technology Utilization Officer
   Code A&TS-TU
   Marshall Space Flight Center
   Huntsville, Alabama 35812
   Reference: B70-10014

Patent status:

This invention is owned by NASA, and a patent application has been filed. Royalty-free, nonexclusive licenses for its commercial use will be granted by NASA. Inquiries concerning license rights should be made to NASA, Code GP, Washington, D.C. 20546.

Source: R. R. Belew
Marshall Space Flight Center
(MFS-20433)

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