NASA TECH BRIEF

Langley Research Center

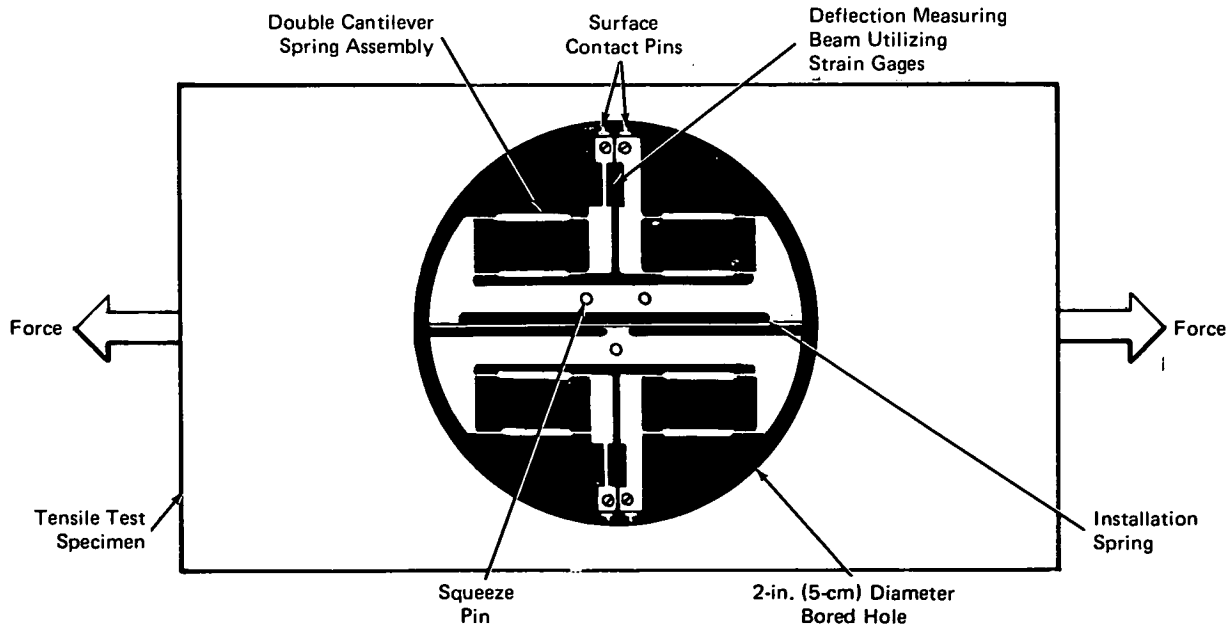
A Self-Supporting Strain Transducer

A strain transducer designed for measuring surface strains in the hole walls is used by the Langley Research Center Materials Division in low-cycle rate, high strain level fatigue studies of aircraft structural materials.

This transducer (see figure) features simplicity, since the self-contained mechanical measuring system is hand-mounted by simply compressing the installation spring and inserting the device into a hole of matching size. Diametrically opposed measuring heads are held in place by a compliant, motion compensating spring loading system. It is self-aligning as each contact pin maintains constant contact with the surface being measured.

The strain transducer is constructed from one piece, with the exception of the sharpened pins which contact the surface of the hole wall. A centrally located installation spring is compressed by finger pressure which allows the device to be inserted into the hole. Independent spring action allows each pin to maintain positive contact over a range of opposing contact pin spacing irregularities.

This device incorporates two independent measuring systems. Each system is equipped with a pair of contact pins with 0.1-inch (2.5-mm) spacing between pins. This spacing defines the gage length on which measurements are made. When the surface between the pins of a pair is stretched or compressed during loading of the test specimen, the spring-loaded pins remain in intimate contact with the surface, and the separation between the pins changes to follow the specimen motion. One pin support arm of each pin pair is a flat cantilever spring arrangement which is designed to deflect in a predictable fashion due to the separation motion between the pairs of pins.



Strain Transducer

(continued overleaf)

Conventional strain gages are installed on this cantilever and are calibrated to yield an electrical signal which is proportional to the distance between pins. The strain level in this measuring beam is controlled by design to provide for measurements over an almost unlimited number of load cycles.

Note:

No additional documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer
Langley Research Center
Mail Stop 139A
Hampton, Virginia 23665
Reference: B73-10201

Patent status:

This invention is owned by NASA, and a patent application has been filed. Inquiries concerning nonexclusive or exclusive license for its commercial development should be addressed to:

Patent Counsel
Langley Research Center
Mail Stop 456
Hampton, Virginia 23665

Source: Ira S. Hoffman
Langley Research Center
(LAR-11263)