NASA TECH BRIEF

Ratio Matching of Half-Bridge Weldable Strain Gages, Computer Program

The problem:

To develop a reliable method of making bridge arrays for measuring structural and thermal loads on test specimens.

The solution:

Half-bridge weldable strain gages are particularly adaptable to use in a thermal environment, making it desirable to avoid the addition of dropping resistors in a bridge circuit in order to match bridge arms. This program presents a method for reducing the unbalance of weldable half-bridge strain gage installations.

How it's done:

Low or zero output is a desirable characteristic of strain gage bridges mounted on unstressed structures. This can be achieved by using equal resistance gages for each strain gage in the bridge. An analysis of the wheatstone bridge circuit shows that electrical balance is obtained when the product of the opposite resistance arms is equal. Weldable half-bridge strain gages consist of two adjacent bridge resistances combined in the same package. It is possible to categorize these gages according to resistance ratio. Near-zero unstressed output is obtained by using two half-bridge strain gages when the resistance ratio of one half-bridge gage closely matches the corresponding resistance ratio of the second half-bridge gage.

Each half-bridge gage is measured to determine each resistance to within 0.001 ohm using a digital ohmmeter. The results of these measurements are coded on data processing cards along with gage identification information.

The program calculates the two resistance ratios of each half-bridge gage and outputs a table of gages ranked according to resistance ratio. The tabulation also includes the measured resistances and both calculated ratios, thereby forming a convenient record of gage characteristics.

For a particular installation, two adjacent half-bridge gages are selected from the computer tabulation. An adjacent half-bridge gage may be reserved in the tabulation as a spare in case one gage is inadvertently destroyed.

Notes:

1. This program was written in the FORTRAN IV language for use on the IBM 7094 computer.
2. The program is capable of handling up to 500 half-bridges.
3. Inquiries concerning this program may be directed to:

   COSMIC
   Computer Center
   University of Georgia
   Athens, Georgia 30601
   Reference: B69-10040

Patent status:

No patent action is contemplated by NASA.

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