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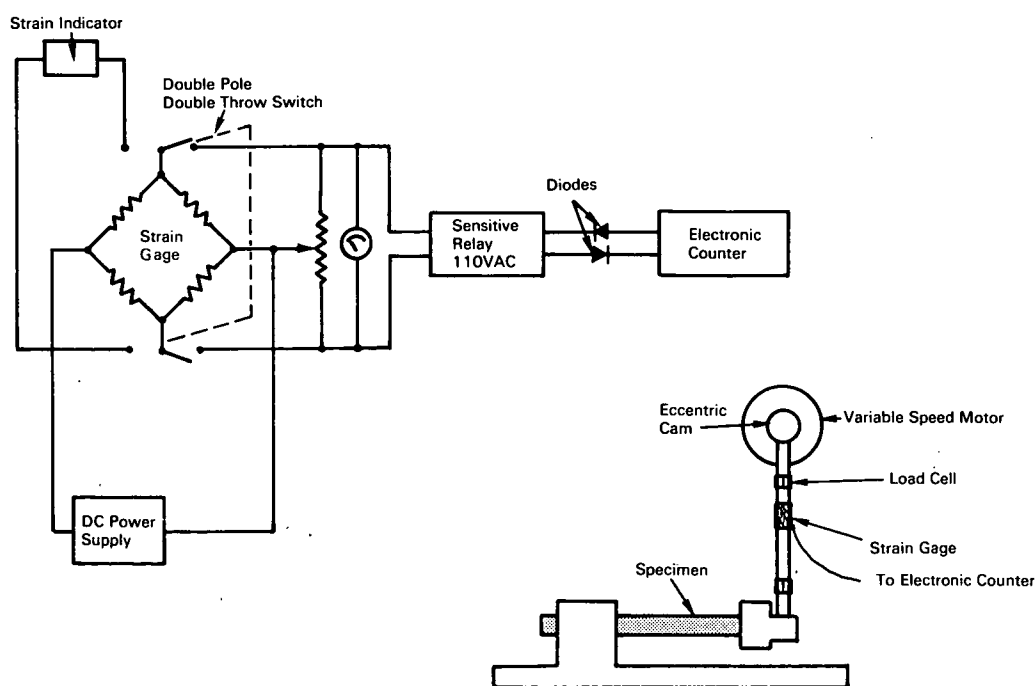


# AEC-NASA TECH BRIEF



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## Strain Gage Circuitry Provides Fatigue Testing Machine with Accurate Cycle Count



### The problem:

To devise a method of testing brittle specimens to determine the number of cycles to fatigue failure. This requires that the fatigue testing machine cycle counter be stopped immediately upon onset of failure. Prior art used control circuits that were activated only when the test specimen was completely sheared. Specimens which showed signs of fatigue but did not shear did not activate the cutoff switch and the cycle counter continued counting nonexistent cycles. A control circuit design was required which would instantly stop the testing machine cycle counter at the first sign of fatigue.

### The solution:

The loading arm of the fatigue tester is equipped with a strain gage to record the loading applied to the component. A control circuit utilizes this strain gage to operate the cycle counter. As the component starts to break, the load on the loading arm is reduced and the strain gage stops the operation of the cycle counter.

### How it's done:

The strain gage bridge on the loading arm is powered by a dc power supply and its output is nulled by a balanced potentiometer which permits a signal to be fed to an ultrasensitive relay which switches 110 volts to the electronic counter each time the

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specimen is loaded. A microvoltmeter is connected across the gage output to check the null position of the balanced potentiometer. This circuit is able to detect load arm movements independently of rate of speed. When the specimen starts to break, counting automatically stops. The diodes shown in the counting circuit permit only one counting pulse per fatigue cycle to reach the counter.

**Notes:**

1. A double throw, 4-pole switch is installed across the leads of the strain gage permitting the strain gage to be transferred from the control circuit to a strain indicator which measures the loading on the loading arm.

2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer  
AEC-NASA Space Nuclear Propulsion  
Office  
U.S. Atomic Energy Commission  
Washington, D.C. 20545  
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**Patent status:**

No patent action is contemplated by AEC or NASA.

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