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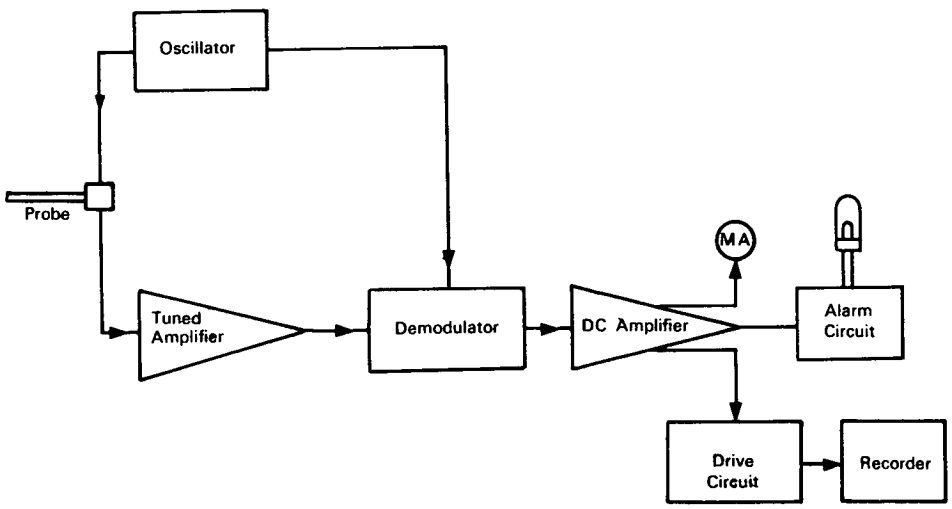
NASA TECH BRIEF

Portable Self-Powered Device Detects Internal Flaws in Tubular Structures



The problem: Detecting internal mechanical flaws or the presence of hard spot impurities in electrically conductive tubing or complex tubular structures.

The solution: A portable probe and associated eddy-current-sensitive circuitry that can detect internal flaws in an electrically conductive tubular channel by recording the change in conductivity at the point of defect.

How it's done: The probe is inserted into the tubular channel. A differential transformer in the tip of the probe sets up a magnetic field in response to a signal from the oscillator. A portion of the field path is through the conductive wall of the tubular channel. If there are no flaws, the magnetic fields will be equal and opposite and will have equal and opposite linkage with the differential transformer coil. If a flaw is present, an imbalance in the flux linkage will induce a current in the coil. This current is routed through the tuned amplifier, demodulator, and dc amplifier to drive a milliammeter and an indicator lamp, and to provide an external recorded signal.

Notes:

1. In its present form the probe can analyze tubing 90 mils in diameter and 4 feet long. With development, the diameter could be reduced to 40 mils; there do not appear to be any reasonable limits to length. Since the probe is insensitive to hole diameter, it can measure flaws in large tubing.

2. The frequency at which the unit operates is a function of the material being examined. This unit was employed in the testing of graphite, for which a frequency of 200 kc was particularly effective.

(continued overleaf)

3. 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
Reference: B66-10028

Patent status: NASA encourages commercial use of this innovation. No patent action is contemplated by NASA.

Source: G. Gilmour of
Westinghouse Astronuclear Laboratory
under contract to
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(NU-0019)