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Brief 70-10533

AEC-NASA TECH BRIEF

Electronic Flaw Simulator for Eddy Current Probe Calibration

The problem:

Eddy current probes are effective tools for the nondestructive location of flaws in materials. In the past the calibration of probes has consisted of passing the probe coils over materials containing flaws of known dimensions. The major disadvantage is that these reference flaws change in time due to undetected dust collection, chipping, and handling wear.

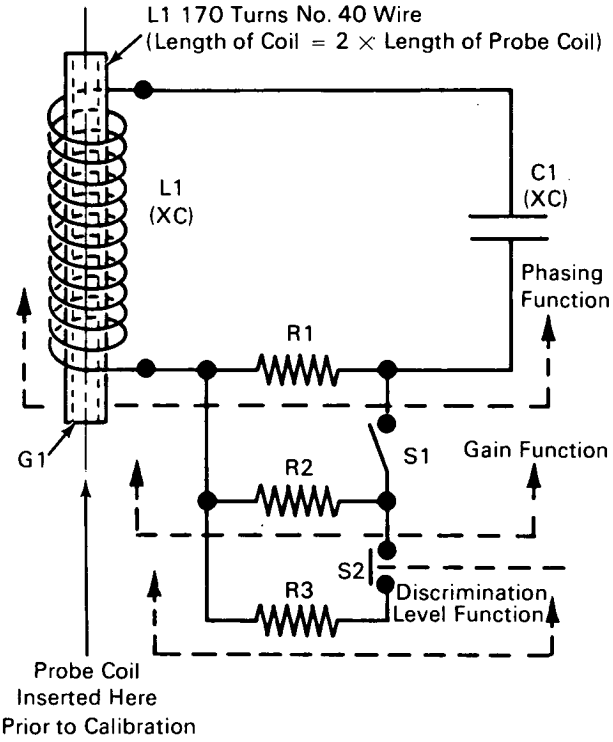
The solution:

An electronic flaw simulator cycled into the eddy current system using switches.

How it's done:

As shown in the figure, the eddy probe coil is inserted into sleeve G1 which is a flaw-free material identical to the material being tested. Next, the probe rf bridge is balanced in the proper phase using the null network (G1, L1, R1 and C1). The proper phase is an optimized reference point of operation, well within the linear response range of the rf bridge, and at the midpoint of the typical variation realized for conductivity effect. System gain adjustment is accomplished by switching S1-R2 into the tank circuit and loading the probe to a selected level within the operating range of the rf bridge. The gain adjustment is included as an integral part of the simulator to assure day-to-day consistency in the operation.

The simulation of a flaw is accomplished by intermittent loading of the probe through a variation in the impedance of the tank circuit. The mechanism by which the probe motion past a flaw is simulated is shown as switch S2; the impedance variation is simulated by R3. The magnitude of the simulated flaw is a reference equivalent volume obtained by measuring the rf bridge sensitivity to a selected physical standard.



A discrimination level reference is thus established wherein any flaws with an equivalent volume equal to or greater than the reference will be recognized.

Notes:

1. This technique provides a system calibration time saving of 1/5 over prior methods.
2. The first electronic simulator has been in use since 1968 without measurable change in performance. Minor maintenance has not adversely affected calibration.

(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: B70-10533

Patent status:

No patent action is contemplated by the AEC or NASA.

Source: C.D. Cowfer and L.J. Almasy of Westinghouse Astronuclear Lab. under contract to Space Nuclear Propulsion Office (NUC-10211)