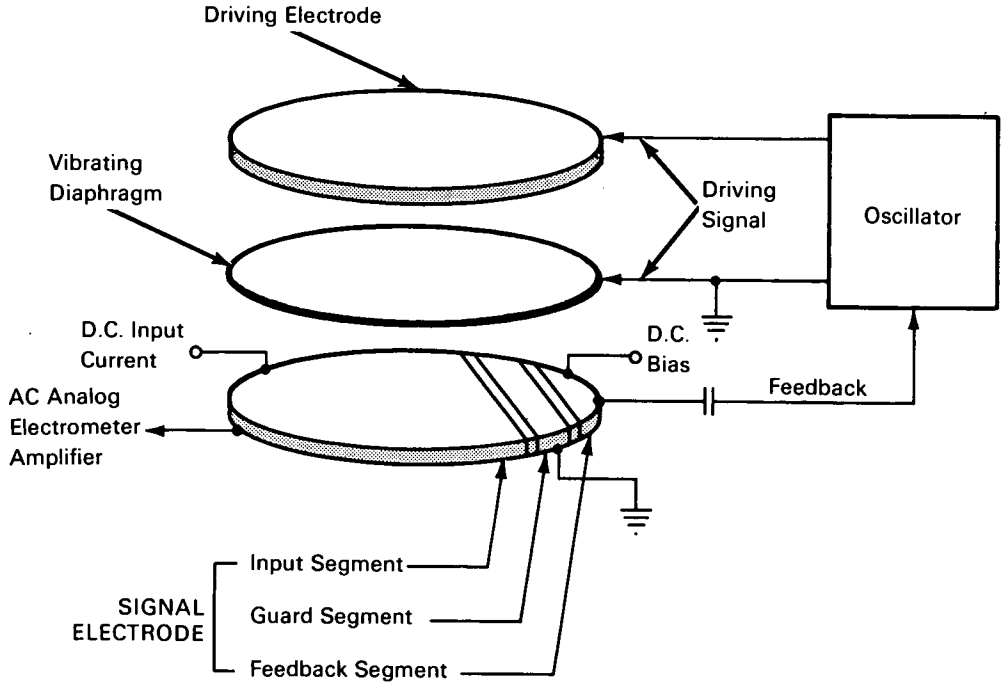
October 1965

Brief 65-10293

NASA TECH BRIEF

Electrostatically Driven Dynamic Capacitor Employs Capacitive Feedback



The problem: To provide regenerative feedback to an oscillator driving a dynamic capacitor in the input stage of an electrometer circuit. Prior art used a variable reluctance pickup having a single input electrode on the side of the vibrating diaphragm opposite the driving electrode. Difficulty has been experienced in providing sufficient feedback from the variable reluctance pickup and in sufficiently reducing its temperature coefficient.

The solution: A circuit that substitutes a three-part signal electrode for the single variable reluctance pickup electrode to supply capacitive feedback to the driving oscillator.

How it's done: The dynamic capacitor consists of three basic elements: a driving electrode, a vibrating diaphragm, and a three-segment signal electrode. Alternating current voltage from the oscillator makes the diaphragm vibrate at its resonant frequency, causing the capacitance between the segmented signal electrode and grounded diaphragm to vary at the same frequency. An ac analog of the dc input is developed between the input segment and ground to drive the associated electrometer amplifier. In the same manner, the fixed dc bias voltage applied to the feedback segment of the signal electrode develops an ac feedback signal in response to diaphragm motion. Because

(continued overleaf)

the bias voltage can be made as large as desired, sufficient feedback signal can be obtained in spite of the poor conversion efficiency of the feedback segment. The guard segment of the signal electrode prevents leakage of the bias voltage to the high-impedance input segment and the grounded diaphragm prevents coupling between the driving and signal electrodes.

Notes:

1. This innovation should be of interest to manufacturers of electrometers.
2. Inquiries concerning this innovation may be directed to:

   Technology Utilization Officer
   Jet Propulsion Laboratory
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   Reference: B65-10293

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

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