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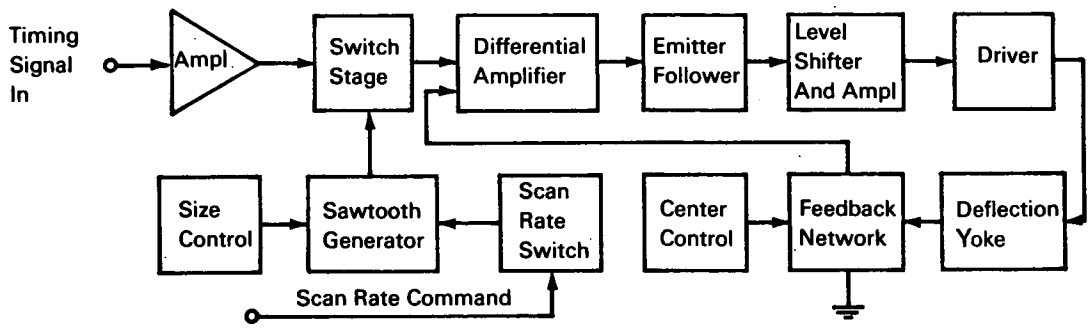
Subminiature Deflection Circuit Operates Integrated Sweep Circuits in TV Camera



The problem:

The stringent requirements of the Apollo program demand a highly reliable magnetic sweep deflection circuit for the hand-held lunar television camera. It must be small in size, low in power dissipation, and retain a linear and stable output without adjustment throughout an Apollo mission.

The solution:

Sweep deflection circuits that convert timing signals from the synchronizer into waveforms that provide a 1/2- by 3/8-inch raster on the vidicon target. Raster lines are linear within ±1% of total deflection and, after original adjustment, raster size remains constant and linear in the presence of wide voltage and temperature fluctuations.

How it's done:

The circuitry illustrated in the block diagram serves both horizontal and vertical sweep deflection circuits since they are identical except for the rc charging networks and the yoke networks. The first amplifier provides the proper gain and phase of the timing pulse to operate the switch stage that in turn recycles the sawtooth generator. The sawtooth generator, a regular rc charging circuit with a constant current transistor, provides linearity to the sweep. Size control is obtained by variations in the transistor base circuit.

The differential amplifier provides gain and isolation plus mixing of the feedback signal with the reference input. This mixed output, after power amplification in the emitter-follower, is amplified and shifted in level to provide the proper operating point for the complementary emitter follower drivers. These drivers feature high efficiency and can provide either yoke with a signal well in excess of the nominal requirement. Gain and drift stabilization of the output is provided by feedback from a resistor in the load circuit. Centering control is also provided in the feedback network that also reduces the nominal open-loop gain from greater than 200 to less than 2.

Notes:

1. Component volume, excluding the yoke is 1.65 cubic inches; power consumption is less than 0.5 watt; output is linear within ±1%; and size and center settings remain constant within ±5% from −55° to +120°C.

(continued overleaf)

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2. The sweeps may be automatically switched to give either a 10 cps, 320 line frame rate or a high resolution 0.625 cps, 1280 line frame rate at the operator's discretion.
3. Inquiries concerning this invention may be directed to:

   Technology Utilization Officer
   Manned Spacecraft Center
   Houston, Texas 77058
   Reference: B67-10155

Patent status:

Inquiries about obtaining rights for the commercial use of this invention may be made to NASA, Code GP, Washington, D.C. 20546.

Source: F. L. Schaff
of Westinghouse Electric Corporation
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