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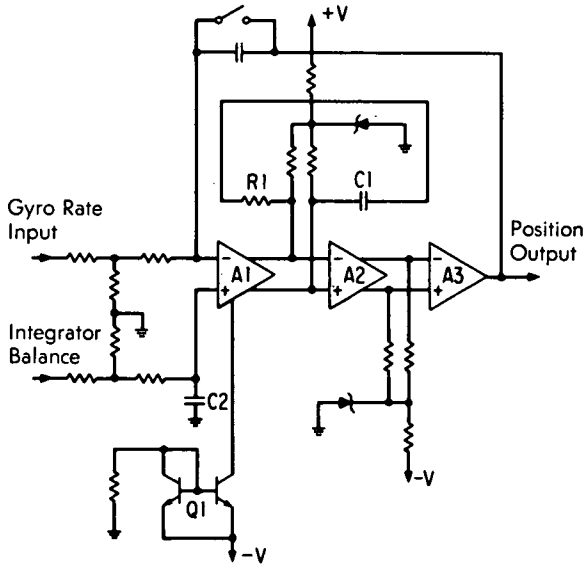
NASA TECH BRIEF

NASA Pasadena Office

Electronic Integrator for Gyro Rate Output Voltages

A circuit which integrates spacecraft gyro output voltages to provide analog position signals has recently been developed; accurate integration is provided by an all-solid-state system which uses no choppers and takes advantages of commercially available



flight-qualified components. The system employs a pair of transistors in a differential input stage which is an integral part of a temperature-controlled semiconductor substrate.

Amplifier A-1, in the diagram, is the differential input stage; it operates with a gain of 70 at a collector current of 10 microamperes. Amplifier A-2 is used as a pair of emitter followers to isolate the temperature-dependent input offset current of A-3 from the collector currents of A-1. A constant current source, Q-1, supplies power to A-1. Total open-loop gain is in excess of 10^7; frequency compensation is provided by the combination of C-1 and R-1.

A T-network is used at the integrator input to provide the proper integrator gain without raising the input impedance to unworkable levels. Integrator balance is obtained by injecting current to the other differential input to the integrator. Capacitor C-2 provides increased immunity to noise introduced by high-frequency pickup. Drift performance is of the order of 0.3 percent of full scale in one hour, independent of initial DC output voltage over a temperature range of 10° to 43°C.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
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4800 Oak Grove Drive
Pasadena, California 91103
Reference: TSP72-10555

Patent status:

NASA has decided not to apply for a patent.

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under contract to
NASA Pasadena Office
(NPO-11499)

Category 01