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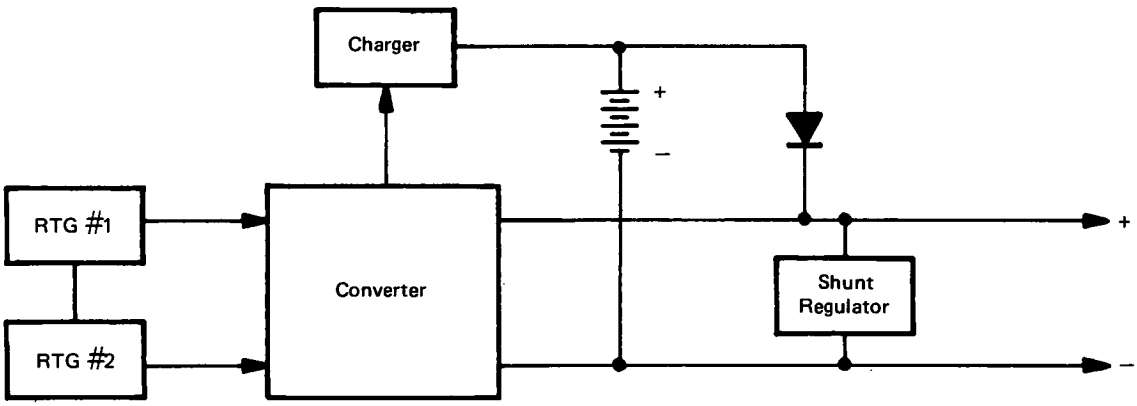
NASA TECH BRIEF

Langley Research Center

Radioisotope Thermal Generator (RTG) Power Conditioner



Block Diagram for Converter-Charger Regulator

The dc converter and battery charger pair as shown in the diagram is a new version of the basic boost regulator. The new regulator: (a) permits operation with high-impedance radioisotope thermal generators at conversion efficiencies typically above 90 percent; (b) does not require input filtering; (c) eliminates current spiking; and (d) is simple, efficient, and reliable.

The input to the converter-charger (see block diagram) is two series-connected RTG's with a low-frequency equivalent circuit consisting of a Thevenin battery in series with a Thevenin resistance. The Thevenin resistance permits the voltage sense point of the boost regulators to be the input to the dc converter and, in turn, allows continuous operation at peak power without any form of peak power tracking.

The output of the converter is connected to a bus distributed throughout the power system. Because the converter senses the voltage input to it, any fluctuation in load on the converter will result in a change in output bus voltage (the bus will go either high or low). In the event of a heavy load, the batteries, which are diode decoupled from the bus, are brought on line. With a very light load, the surplus energy is diverted and used for battery charging. When the batteries are fully charged, a shunt regulator dissipates the surplus energy into a load bank.

Notes:

1. The converter-charger pair could be adapted for other power levels by changing the transistor, the diode, the capacitor bank, and the inductor to new components with values sized for those current levels.
2. Requests for further information may be directed to:
   Technology Utilization Officer
   Langley Research Center
   Mail Stop 139-A
   Hampton, Virginia 23665
   Reference: B74-10022

Patent status:

NASA has decided not to apply for a patent.

Source: William S. Stacey of
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Category 02, 03