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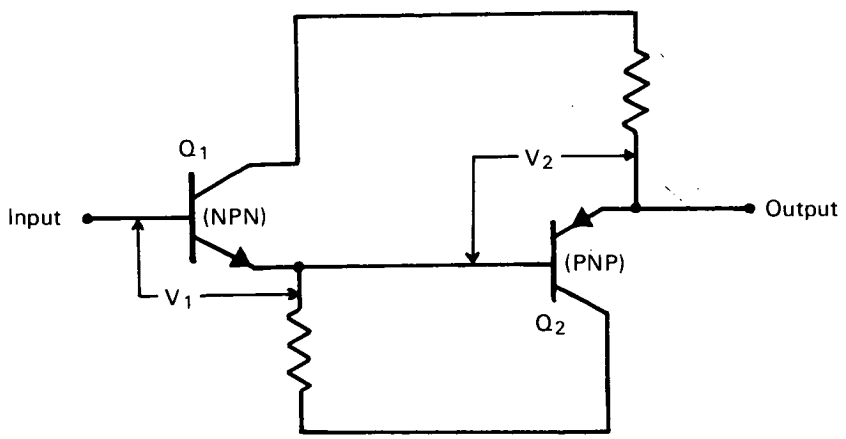
Brief 63-10493

NASA TECH BRIEF

Two-Stage Emitter Follower Is Temperature Stabilized



The problem: To design a temperature-stabilized emitter-follower circuit. The output voltage of a transistor used in the conventional emitter-follower circuit varies with environmental temperature changes.

The solution: A two-stage circuit employing one NPN and one PNP transistor. Voltage variations due to temperature changes in the first stage are canceled by variations of equal magnitude and opposite polarity in the second stage.

How it's done: The two transistors are connected as shown in the circuit diagram. An increase in temperature will cause the base-to-emitter voltage V_1 of NPN transistor Q_1 to become less positive. The base-to-emitter voltage V_2 of PNP transistor Q_2, on the other hand, will become less negative to a nearly equal degree, so that the temperature-induced variations in V_1 and V_2 will tend to cancel. As a result, the output voltage will remain essentially unaffected by temperature within a prescribed range.

Notes:

1. In tests employing a 2N780 transistor (Q_1) for the first stage and a 2N869 transistor (Q_2) for the second stage, the maximum output voltage variation was 30 mv, with an average variation of approximately 25 mv, over the temperature range of -20°F. to +200°F. No attempt was made to match the characteristics of the transistors used in the tests.
2. For further information about this innovation inquiries may be directed to:
   Technology Utilization Officer
   Manned Spacecraft Center
   P.O. Box 1537
   Houston, Texas 77001
   Reference: B63-10493

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

Source: McDonnell Aircraft Corporation under contract to Manned Spacecraft Center (MSC-20)