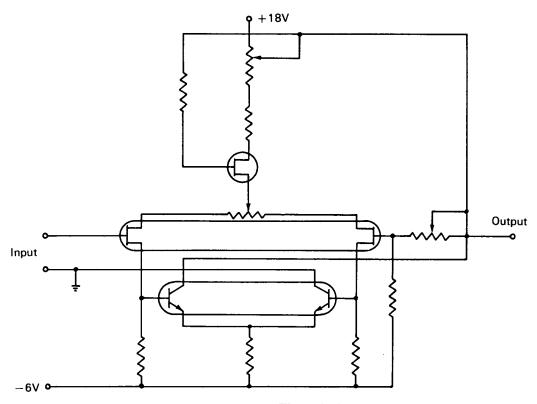
October 1967 Brief 67-10334

# NASA TECH BRIEF



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## Field Effect Transistors Improve Buffer Amplifier



#### The problem:

To achieve a buffer amplifier with an input current of 0.1 microamp maximum at  $-20^{\circ}$ C, it is necessary to use a Darlington connection at the input differential stage to the amplifier. Such an arrangement causes collector current to be so low that serious degradation in the gain-bandwidth product of the transistors results in poor performance of the buffer amplifier. Therefore, a basic tradeoff must be made between input current and bandwidth for any stable dc amplifier using bipolar transistors.

#### The solution:

A unity gain buffer amplifier with a field effect transistor (FET) differential input stage that responds much faster than bipolar transistors when operated at low current levels. The circuit illustrated uses a dual FET in a unity gain buffer amplifier having extremely high input impedence, low bias current requirements, and wide bandwidth. Input bias current is less than  $10^{-8}$  amps maximum and bandwidth exceeds 2 mc while measured offset stability is -4mv at -20°C and +5mv at 85°C.

(continued overleaf)

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### Notes:

- 1. Adequate gain stability will be realized with this circuit only through use of a very stable constant current source.
- 2. Inquiries concerning this innovation may be directed to:

Technology Utilization Officer Marshall Space Flight Center Huntsville, Alabama 35812 Reference: B67-10334

#### Patent status:

No patent action is contemplated by NASA.

Source: Dynatronics, Inc.
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