

# NASA TECH BRIEF

*Lyndon B. Johnson Space Center*



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## System for Simultaneous, Bidirectional Data Transmission

### The problem:

Simultaneous, bidirectional transmission of data over a single two-conductor line has been accomplished using hybrid transformers. The transformers are relatively large and have limited frequency characteristics. Critical adjustment of balance components is necessary to maintain acceptable isolation between the input and the output signals.

### The solution:

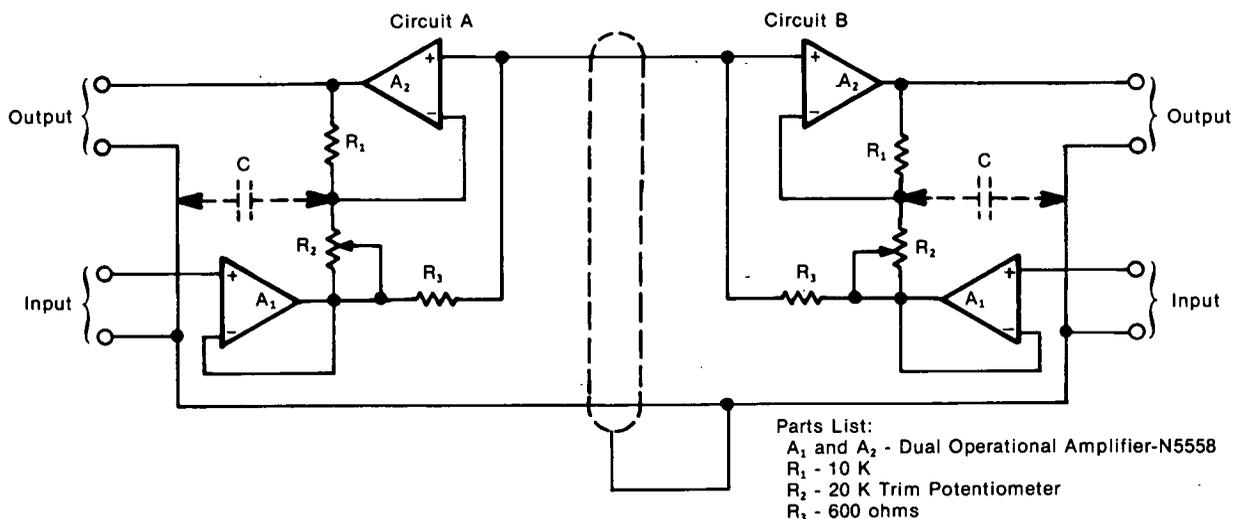
A single inexpensive system has been developed for simultaneous, bidirectional data transmission. System frequency response with presently available amplifiers is from dc to over 70 kHz.

### How it's done:

As shown in the diagram, the system is made up of identical circuits A and B. Resistor  $R_3$ , along with the

elements of the transmission line, determines the major load that is seen by buffer amplifier  $A_1$ . Resistors  $R_1$  and  $R_2$  form a voltage divider which allows the input of  $A_2$  to be balanced so that a signal applied at the input of  $A_1$  is nulled at the output of  $A_2$ . A signal introduced on the transmission line is fed through  $A_2$  to the output. Transmission line reactances can be matched, to a large extent, by the selection of the proper value of capacitor  $C$  in each circuit.

For operation, resistors  $R_2$  in circuits A and B are adjusted so that signals applied at the input terminals of A and B are nulled at their output terminals. The result is that a signal applied at the input of circuit A will appear at the output of circuit B, and a signal applied at the input of circuit B will appear at the output of circuit A.



System Circuit Diagram

(continued overleaf)

**Note:**

No further documentation is available. Specific questions, however, may be directed to:

Technology Utilization Officer  
Johnson Space Center  
Code AT3  
Houston, Texas 77058  
Reference: B75-10171

**Patent status:**

NASA has decided not to apply for a patent.

Source: G. C. Schmidt of  
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