

# NASA TECH BRIEF

## Goddard Space Flight Center



NASA Tech Briefs announce new technology derived from the U.S. space program. They are issued to encourage commercial application. Tech Briefs are available on a subscription basis from the National Technical Information Service, Springfield, Virginia 22151. Requests for individual copies or questions relating to the Tech Brief program may be directed to the Technology Utilization Office, NASA, Code KT, Washington, D.C. 20546.

### Programed Asynchronous Serial Data Interrogation in a Two-Computer System

A new technique permits redundant computers, with one unit in a CONTROL mode and the other in a MONITOR mode, to interrogate the same serial data source. Its use for program-controlled serial data transfer results in extremely simple hardware and software mechanization. The technique will be particularly useful in applications of redundant minicomputers.

Principal features of the technique are as follows:

- It resolves asynchronous addressing conflicts of the same serial data source.
- It eliminates the need to mechanize specialized input/output logic unique to each data source.
- It allows simple and uniform data output buffering in any type of serial data source.

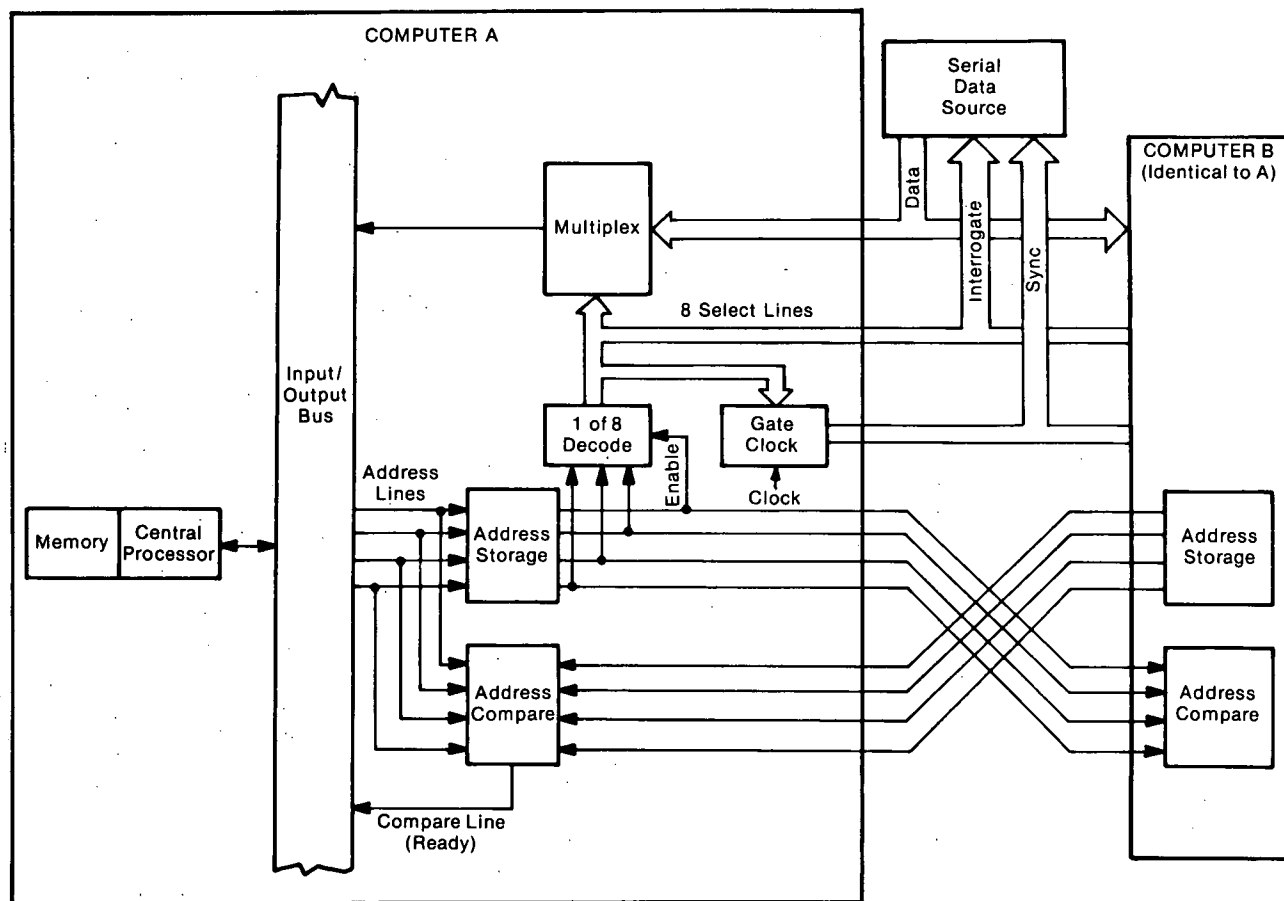


Figure 1. Functional Diagram

(continued overleaf)

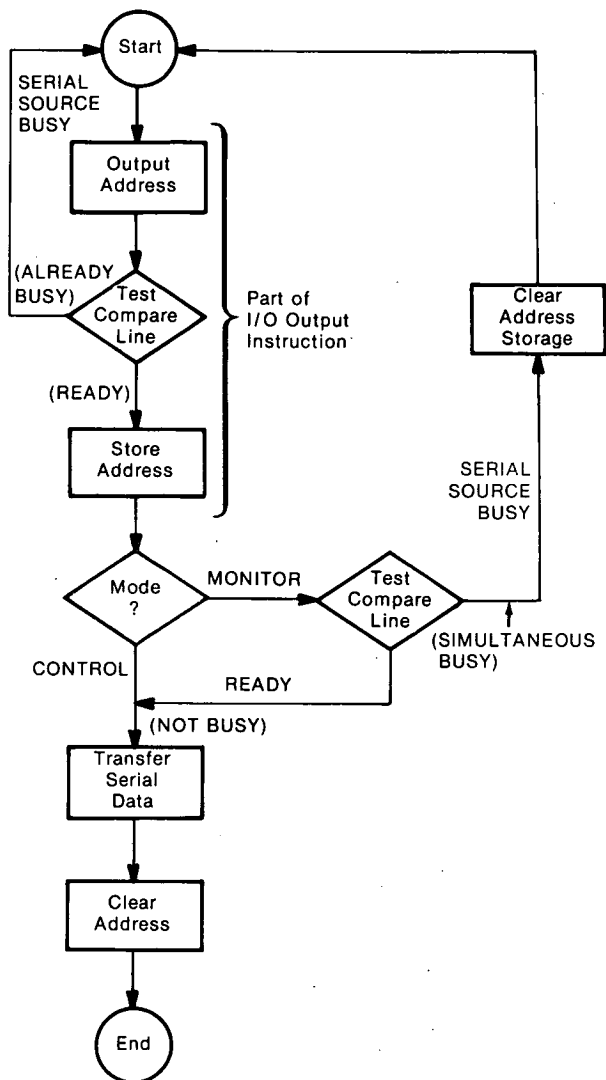


Figure 2. Program Flow Chart

A program flow chart is shown in Figure 2. The data addresses are first compared by the requesting computer. If the requested address is busy, the computer may loop and wait or proceed with other programmed functions.

If the data source is not being interrogated, the address comparator in the computer requesting the data source will respond with a READY signal; and the address bits will be stored and decoded, giving the respective INTERROGATE signal output.

If the data source is busy, the comparator of the requesting computer will indicate a busy condition, and the address bits will not be stored for decoding.

If the comparators of both computers indicate READY, both computers will store and decode the address. However, the computer designated MONITOR is programmed to execute an additional READY test with the same address. At that time, the response will be the same as the already busy case, and the MONITOR computer will output the "dummy-channel" address or request a different data source than that being interrogated by the CONTROL computer. At the end of the program-controlled serial data transmission, the computer will output a "dummy-channel" address canceling the INTERROGATE signal and presenting a false input to the comparator of the other computer.

**Note:**

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

Technology Utilization Officer  
 Goddard Space Flight Center  
 Code 704.1  
 Greenbelt, Maryland 20771  
 Reference: B75-10184

**Patent status:**

NASA has decided not to apply for a patent.

Source: N. A. Schneberger of  
 Honeywell, Inc.  
 (GSC-11778)

- d. Available CONTROL/MONITOR status information is used for programmed logic.
- e. Standard input/output instructions are used.
- f. It provides simple comparator logic for address cross-checking between the two computers.

A functional diagram of the interconnection of the two computers with the data source is shown in Figure 1. As shown, the data addresses requested by each computer are stored and are available for comparison. If no conflict is found, an INTERROGATE signal is sent to the data source to freeze or update its data. Sync pulses are generated to shift data by executing an output command instruction. The MONITOR computer always gives priority to the CONTROL computer in case of simultaneous addressing by both computers. If one computer is already interrogating the serial data source, the other computer cannot address the source.