NASA TECH BRIEF

Marshall Space Flight Center

Central Control Element Expands Computer Capability

The problem:

Conventional computers do not have the flexibility of alternating between redundant processing and multiprocessing modes. Either one or the other mode is obtained, but the two are not available from one computer.

The solution:

Both modes can be obtained from one computer by using a new logic configuration. This configuration serves as a central control element (CCE) which can automatically alternate between a high-capacity multiprocessing mode and a high-reliability redundant mode using dynamic mode switching in real time.

How it's done:

The new CCE module is to be used in an automatically-reconfigurable modular system (ARMS) computer. The ARMS computer controlled by the CCE consists of multiple memories and central processing elements (CPE's), one or more input/output processors (IOP's), and a maintenance/status panel. These modules are standard computer building blocks. Each module contains internal fault detection logic, utilizing redundancy and error detecting and correcting codes.

The CCE distributes power and clock signals to ARMS modules, and it coordinates ARMS reconfiguration, either due to new assignments from the maintenance/status panel or in response to fault interrupts from other ARMS modules. The CCE consists of the following:

a. Individual status controllers for each ARMS module to be controlled,

b. Fault correlation logic,

c. An overall program initiator and reconfiguration controller,

d. Switching logic for power supplied to other modules,

e. A crystal-controlled central clock source, and

f. External interrupt routing logic.

The CCE has no internal-processing or main memory bus access capabilities. However, it is capable of utilizing CPE software or hardware to enhance its own hard-wired capabilities by means of interrupts.

At this time, the CCE is developed with T²L, small-scale integrated-circuit logic. Improved reliability will become available by using CMOS (complementary metal-oxide semiconductor), large-scale integration (LSI) technology. As proposed for ARMS, the CCE contains 1,174 gates which can be easily implemented in two or three LSI's.

Note:

Requests for further information may be directed to:

Technology Utilization Officer
Marshall Space Flight Center
Code AT01
Marshall Space Flight Center, Alabama 35812
Reference: B75-10103

Patent status:

Inquiries concerning rights for the commercial use of this invention should be addressed to:

Patent Counsel
Marshall Space Flight Center
Code CC01
Marshall Space Flight Center, Alabama 35812

Source: R. A. Easton of
Hughes Aircraft Co.
under contract to
Marshall Space Flight Center
(MFS-23216)

Category: 02 (Electronics Systems)