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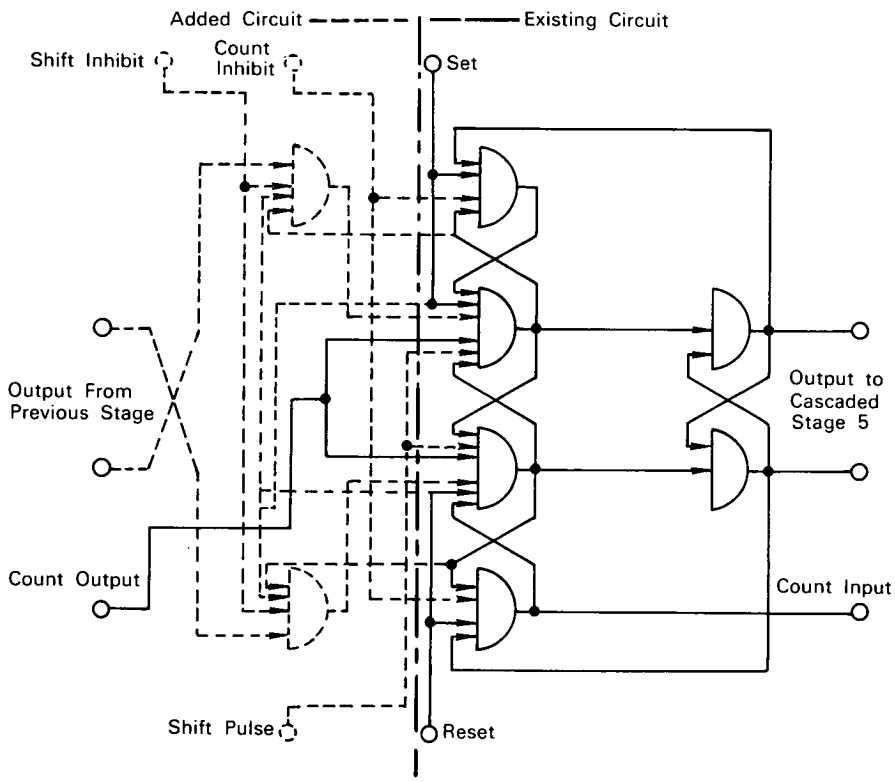
NASA TECH BRIEF

Computer Circuit Will Fit on Single Silicon Chip



The problem: Simplifying the counting and shifting circuitry of computer logic circuits. Advantages sought include a simpler layout for micromodular integrated circuit construction, elimination of capacitors presently required in logic circuits, and reduction of space requirements.

The solution: A micromodule digital logic circuit consisting of two NAND/NOR gates and three additional inputs to accomplish the count and shift function. When added to an existing 6-gate logic circuit, this direct-coupled transistor logic can be utilized to eliminate diodes and simplifies construction and interconnection. The entire shift-register/counter combination may be mounted on a single silicon chip.

How it's done: As shown in the illustration, a previous circuit was modified by the addition of two NAND/NOR gates and the following functions: count inhibit, shift inhibit, and shift pulse input. The circuit has capacity for parallel read-in, counting, serial shiftout, complement input, and set and

(continued overleaf)

reset. Only a single phase-shift pulse is required for shifting in the shift mode. Sampling of the previous circuit is done on the leading edge of the shift pulse, and the read-in of the shifted information is fixed with the trailing edge of the shift pulse. The function of the circuit is initiated by applying an input pulse at the point labeled *Count Input*. If the circuit is in the count mode the input pulses will be counted and stored in the register. When the shift mode is initiated the stored count is shifted out serially and appears at the output of the cascaded stages below the added circuit. The control voltages, count inhibit, shift inhibit, shift pulse, set and reset are applied to the cascaded stages from associated equipment.

Note:

1. For further information about this innovation inquiries may be directed to:
   Technology Utilization Officer
   Jet Propulsion Laboratory
   4800 Oak Grove Drive
   Pasadena, California 91103
   Reference: B63-10514

Patent status: NASA encourages the immediate commercial use of this invention. It is owned by NASA and inquiries about obtaining royalty-free rights for its commercial use may be made to NASA Headquarters, Washington, D.C. 20546.

Source: Christian Smith
(JPL-513)