Exclusive-NOR gates perform comparisons

(transmitted) signal and the A register with the delayed (return) signal (**Fig 7**). Initially, you clock these two registers together so that the time delay between the signals appears as a displacement in the signals' relative register positions. When both registers are loaded, you monitor the output of one correlator while A-register clocking continues. This action loads progressively later return-signal bits into register A while shifting the delayed pattern across the undelayed signal stored in register B. The number of bit shifts required to produce acceptable correlation then represents the total time delay between the two signals.

This measurement method requires a code long enough to avoid triggering on false correlations. Additionally, the code should not repeat itself too frequently if you wish to avoid measurement ambiguities. Under ideal conditions, when the only objective is to measure the distance to a target, the transmitted code need contain only a simple isolated pulse—a single

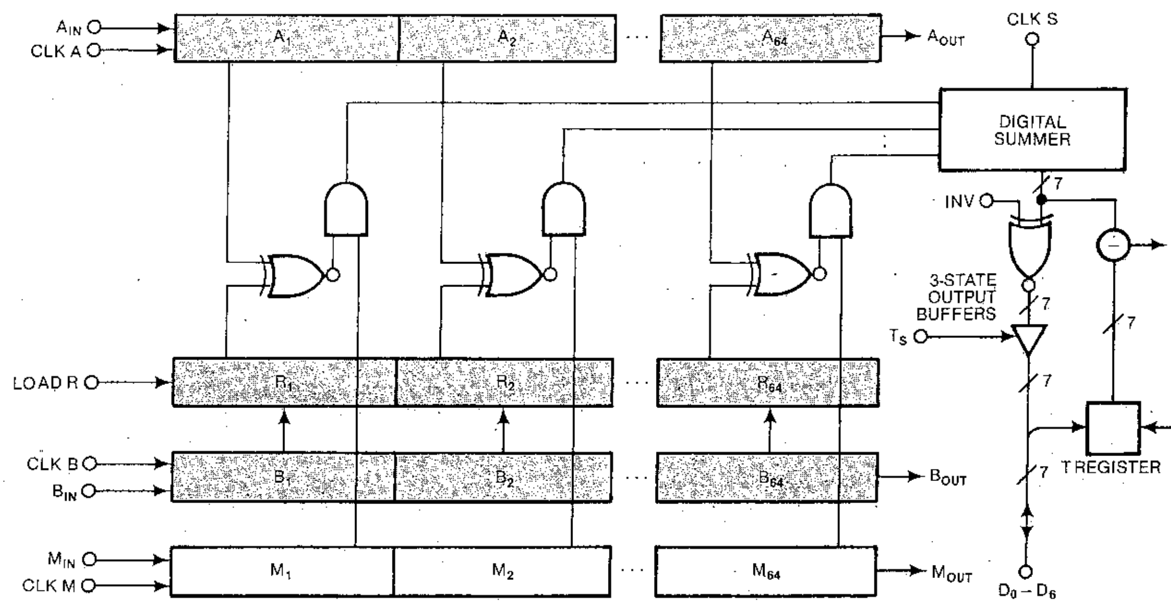

Fig 4—Three independently clocked 64-bit shift registers *and one 64-bit latch store and shift data in the TDC1023J all-digital correlator. Sixty-four exclusive-NOR gates, whose outputs drive 64 AND gates that accept inputs from the M (mask) register, make the bit-by-bit comparisons. The digital summer combines the 64 AND-gate outputs and produces a 7-bit code representing the number of bits in agreement.*

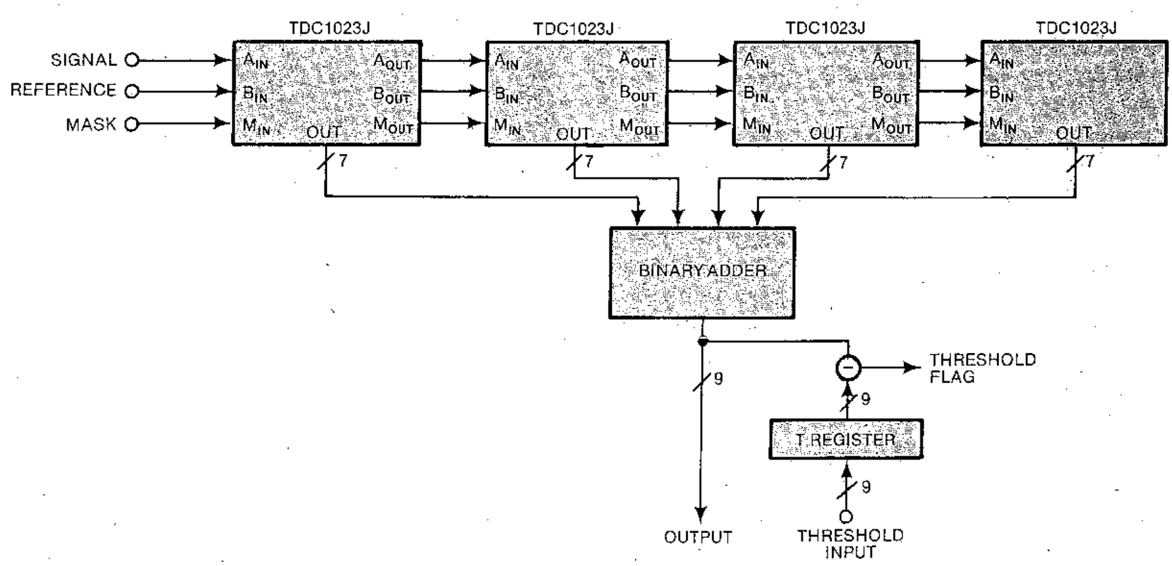

Fig 5—Extending correlation codes *by cascading multiple TDC1023Js requires the use of each device's A, B and M output lines and a binary adder to sum the devices' 7-bit outputs. This arrangement also requires an external threshold register if your design calls for that function.*