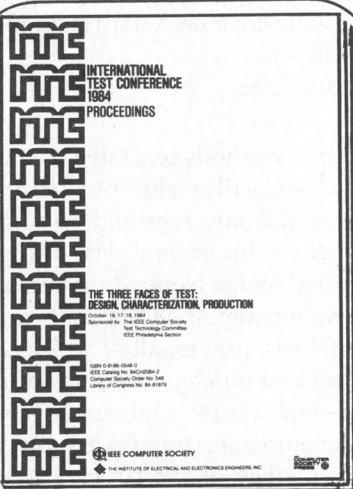


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can be used only for regular structures arranged in a well-partitioned data flow. It does not address the problem of testing the irregular types of logic found in the control sections of computers. Also, it does not offer a push-button solution to test problems, as do conventional automatic test pattern generation, fan-out cutting, or pseudo-exhaustive test. Instead it requires extensive investigations by a skilled engineer, using the "rules of thumb" described earlier. Design automation "purists" might also argue that anything done manually is unreliable and so should not be used.

On a more detailed level it is obvious that this methodology places strict constraints on the placement of registers within the data flow, possibly imposing overhead on the chip size. However, this problem is not nearly as serious as it might appear. Investigations have shown that registers can be shared and that test pattern sequences can be routed through the data flow. This is currently the subject of on-going research. □

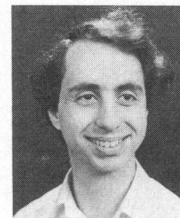
### Acknowledgments

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### References

1. L. H. Goldstein and E. L. Thigpen, "SCOAP: Sandia Controllability/Observability Analysis Program," *Proc. 17th Design Automation Conf.*, Minneapolis, Minn., June 1980, pp. 190-196.
2. R. G. Bennetts, C. M. Maunder, and G. D. Robinson, "Camelot: A Computer Aided Measure for Logic Testability," *Proc. Int'l Conf. Circuits and Computers*, Port Chester, N.Y., Oct. 1-3, 1980, pp. 1162-1165.
3. Vishwani D. Agrawal and Melvin Ray Mercer, "Testability Measures—What Do They Tell Us?," *Proc. 1982 IEEE Test Conf.*, pp. 391-396.

4. J. Savir, "Good Controllability and Observability Do Not Guarantee Good Testability," research report RC9432, IBM Thomas J. Watson Research Center, Yorktown Heights, N.Y., 1982.
5. J. Savir, Gary S. Ditlow, and Paul H. Bardell, "Random Pattern Testability," *IEEE Trans. Computers*, Vol. C-33, No. 1, Jan. 1984, pp. 79-90.
6. Oscar H. Ibarra and Sartay K. Sahni, "Polynomial Complete Fault Detection Problems," *IEEE Trans. Computers*, Vol. C-24, No. 3, Mar. 1975, pp. 242-249.
7. Silvano Gai, Marco Mezzalama, and Paolo Prinetti, "A Review of Fault Models for LSI/VLSI Devices," *Software and Microsystems*, Vol. 2, No. 2, Apr. 1983, pp. 44-53.
8. E. B. Eichelberger and E. Lindbloom, "Random Pattern Coverage Enhancement and Diagnosis for LSSD Logic Self Test," *IBM J. Research and Development*, Vol. 27, No. 3, May 1983, pp. 265-272.
9. E. J. McCluskey and S. Bozorgui-Nesbet, "Design for Autonomous Test," *IEEE Trans. Computers*, Vol. C-30, No. 11, Nov. 1981, pp. 866-875.
10. Oren Pratashnik, "Circuit Segmentation for Pseudo-Exhaustive Testing," Stanford CRC technical report no. 83-14, (CSL TN no. 83-233), Oct. 1983.



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