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Attended the College of Electronics at the Royal Radar Establishment, Malvern, England and qualified as a graduate member of the Institution of Electrical Engineers in 1956. Joined IBM's British Laboratory in 1958 after two years in the Royal Air Force and was assigned to the development of core logic circuit design. Has since been associated with the development of IBM's read-only-storage products and is currently responsible for Advanced Storage Circuit Development in the Components Division at Poughkeepsie.

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Sc.B. in Engineering, 1948, Brown University; M.S. in Electrical Engineering, 1950, University of Illinois; Professional Degree in Electrical Engineering, 1957, Columbia University. Joined the IBM Engineering Laboratories in Poughkeepsie in 1950. Has been manager of various projects at the Research Center, including an investigation of high performance thin film memory techniques and the ADRA system. Currently spending the academic year 1967-1968 studying at the Computer Science Department, Stanford University, under the IBM Residence Study Program. Member, IEEE, Sigma Xi and Eta Kappa Nu.

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B.S. in Engineering Science Physics, 1937, Carnegie Institute of Technology. Graduate work at University of Rochester, 1937 and 1938. Worked with Bausch and Lomb Optical Company, 1937-1951. Experience there included management of both production and development activities; he was also a Research Assistant Fellow from the company to the Mellon Institute. Joined IBM in 1951 at Vestal, N. Y. and since 1960 has been at San Jose, engaged in the development of photo-optics technology for information storage and retrieval systems. Received an Outstanding Invention Award in 1965. Member, Society of Photographic Scientists and Engineers and National Microfilm Society.

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B.S. in Electrical Engineering, 1950, London University and M.S. in Electrical Engineering, 1958, University of Michigan. Employed at A. V. Roe, Canada Limited, 1954-1956. Joined IBM in Poughkeepsie in 1959 engaged in the field of programming, 8106 project. Most recent areas of work include the Automatic Dynamic Response Analyzer and applications programming. Is now at the laboratory in Poughkeepsie doing work on the analysis of operating systems. Member, ACM, IEEE.

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B.A. in Industrial Economics, 1952, University of California, Berkeley; M.B.A., 1965, University of Santa Clara. Supply Officer, United States Navy, 1952-1954. From 1954-1959 was engaged in development, design and marketing of equipment for processing, grading, and packaging food products. President of firm, Mulvany Automatic Equipment, Inc., 1958-1959. Joined IBM Advanced Systems Development Division in 1959 at San Jose to work on system design and development of mechanical components for a prototype computer voice output system. Later, was involved in image systems development in ASDD, and recently participated in development of the IBM 1360 Photo Digital Mass Memory System in the SDD laboratory. Currently, an Advisory Engineer in the advanced storage products area. Received an IBM Outstanding Invention Award in 1966 for high-pressure ammonia "wash" development method. Member, Society of Photographic Scientists and Engineers.

H. Daniel Schnurmann

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S.B. in Electrical Engineering, 1961, MIT; M.E.E., 1964, Polytechnic Institute of Brooklyn. Participated in the design and development of a digital system for error detection and correction at the Western Union Telegraph Company, 1961-1963. Joined IBM in 1963 at the Components Division in

Poughkeepsie for work in exploratory device technology. Has since worked in LSI, particularly in its application to small experimental machines. Transferred to the Research Division in Yorktown Heights in 1965 where he participated in the development and evaluation of the ADRA system. Currently engaged in the study of highly reliable computers. Member, IEEE.

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A.B., 1948, Valparaiso University; B.S.E.E., 1947 and M.S.E.E., 1948, Purdue University. Employed by Indiana Steel and Wire Co., Muncie, Indiana, 1948-50 and Westinghouse Electronics Division, Baltimore, 1950-56. Joined IBM in 1956 for work in magnetic core logic and subsequent research in tunnel diode and magnetic memory elements. Currently engaged in development of automatic test equipment at the Research Center.

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Contents of previous two issues

March 1968

Vol. 12, No. 2

• Papers:

- Method for Estimation and Optimization of
Printer Speed Based on Character Usage Statistics
by *E. B. Eichelberger, W. C. Rodgers*
and *E. W. Stacy* 130
- Polymer Dielectric Films
by *L. V. Gregor* 140
- Computer Algorithm for Spectral Factorization
of Rational Matrices
by *W. G. Tuel, Jr.* 163
- Automatic Focus Control of
Charged-Particle Beams
by *M. H. Dost* 171
- Application of Finite Geometry
in File Organization for
Records with Multiple-Valued Attributes
by *S. P. Ghosh and C. T. Abraham* 180

• Communication:

- The Study of Laser-induced Absorption
of a Secondary Light Beam
in Molecular Liquids and Solutions*
by *M. W. Dowley and W. L. Peticolas* 188
- Letter to the Editor:
- Reflectivity Thickness Corrections for
Silicon Dioxide Films on Silicon for VAMFO
by *W. A. Pliskin and R. A. Wesson* 192

* *Erratum:* In the Communication by Dowley and Peticolas the sentence starting on line 13 of the first paragraph should read "This type of measurement is very important because it allows, for the first time, the observation of singlet molecular orbitals are symmetric (the so-called *g* states)."

● *Papers:*

- Computation of Molecular Properties
and Structure
by *A. D. McLean and M. Yoshimine* 206
- Redundant Alphabets with Desirable
Frequency Spectrum Properties
by *E. Gorog* 234
- A Two-dimensional Mathematical Analysis
of the Diffused Semiconductor Resistor
by *D. P. Kennedy and P. C. Murley* 242
- High-resolution Positive Resists for
Electron-beam Exposure
by *I. Haller, M. Hatzakis and R. Srinivasan* 251
- Effects of Lasers on the Human Eye
by *W. L. Makous and J. D. Gould* 257

● *Communication:*

- Room Temperature Delay Times in Diffused
Junction GaAs Injection Lasers
by *J. C. Marinace and K. L. Konnerth* 272



The IBM Journal of Research and Development is regularly indexed and abstracted by Science Abstracts (I.E.E.-Britain), Chemical Abstracts, The Engineering Index, Physikalische Berichte, ASM Review of Metal Literature, Mathematical Reviews, Computing Reviews, Computer Abstracts (Technical Information Co. Ltd.-Britain), Bulletin Signaletique (C.N.R.S.-France), Solid State Abstracts, Instrument Abstracts (British Scientific Instrument Research Association), Psychological Abstracts, Computer Abstracts on Cards, Automatic Subject Citation Alert, and American Documentation Institute. Reproductions of the magazine by years are available on positive microfilm from University Microfilms, 313 N. First Street, Ann Arbor, Michigan.