tion of the complex Bessel functions. In the CALL statement of the subprogram NEWTON, starting values of μ_+ and μ_- are required. For the first run (data card with $H=0$) they are taken as 0.5 or 1.5, respectively; in the following runs they are equal to $MUEP$ and $MUEM$ computed by the previous runs. According to Newton's method these starting values will be varied (maximum of 50 steps) until the desired accuracy has been obtained.

The so determined results of μ_+, μ_- are printed together with the propagation constants $\gamma_\pm$ and the intensity of the static magnetic field. The output variables are:

H	same as input variable H;
ALP	attenuation constant for the right-handed rotating HE_{11} wave in the ferrite-loaded waveguide;
BGP	phase constant for the right-handed rotating HE_{11} wave in the ferrite-loaded waveguide;
ALM BGM	corresponding to ALP and BGP with left-handed rotating HE_{11} wave;
$MUEP$	complex eigenvalue $\mu_+=\mu_+'-j\mu_+''$ with real part $MUESP$ and imaginary part $MUESSP$;
$MUEM$	complex eigenvalue $\mu_-=\mu_-'-j\mu_-''$ with real part $MUESM$ and imaginary part $MUESSM$.

Then a return instruction follows for reading in a further data card with new input variables H, $DALP$, $DBGM$, $DALM$, $DBGM$, and so on, until an end card (data card with $H=9999$) finishes the calcu-

lation of $\mu_\pm(H_0)$. A further return instruction follows for reading in new parameters F, $D0$, DM, and CEP to start a new calculation of $\mu_\pm(H_0)$. The end card (data card with $F>10.0$) will finish the complete computer run.

By substituting the complex eigenvalues $MUEP$ and $MUEM$ for the input variables $DALP$, $DBGP$, $DALM$, $DBGM$ and by making some simple adaptions, this program can also be applied in the reversed way to calculate the propagation constants of the right- and left-handed rotating HE_{11} waves in the circular cylindrical waveguide containing axial longitudinally magnetized ferrite rods. The subroutines NEWTON and COMBES are programmed in such a way that they are applicable in many other problems.

This program was developed for use on a Telefunken TR440 with a time-sharing system. On this computer the word-storage requirements for the program are 47 K of the core, 54 K of the drum, and 100 K of the plate storage. One computer run for a $\mu_\pm(H_0)$ series with 50 values of the static field H_0 takes a running time of around 450 s.

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Contributors
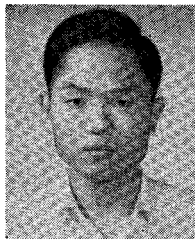
Chi-Pin Chang was born in China on July 23, 1941. He received the B.S.E.E. degree from National Taiwan University, Taipei, in 1965, and the M.S. and Ph.D. degrees from the State University of New York, Stony Brook, in 1968 and 1971, respectively.

He joined ACCO, Bristol Datamaster Division, Glen Cove, N. Y., in 1971. His major interests are microwave acoustics and data processing.

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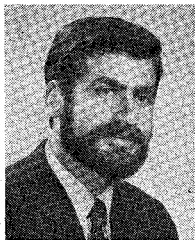
Henry M. Gerard was born in Brooklyn, N. Y., on November 7, 1942. He received the B.S. and M.S. degrees in physics in 1964 as a participant in the Unified Honors Program of the Polytechnic Institute of Brooklyn. As a research assistant at the Microwave Laboratory of Stanford University from 1964 through 1969, he studied piezoelectric surface waves and interdigital transducers leading to conferral of the Ph.D. degree in applied physics in 1970.

Since 1969, he has been a Member of the Technical Staff at Hughes Aircraft Company, Fullerton, Calif., where he has been engaged in the development of broad-band acoustic signal processing devices.

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He has held a number of positions in the microwave industry. From 1964 to 1966 he was Product Line Manager at Microwave Associates, Inc., Burlington, Mass. Currently, he is working as a consultant. He is also a Senior Research Fellow at Heriot Watt University, Edinburgh, Scotland. He is the author of about 25 papers and the book, *Principles of Microwave Ferrite Engineering* (Wiley). In 1968 he was awarded the Insignia Award of the City and Guilds of London Institute.

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From 1952 to 1954 he served in the U. S. Navy as a Training Devices Technician. From 1954 to 1957, while at the University of California, he was employed at the U. S. Naval Ordnance Laboratory, Corona, Calif., as a Microwave Technician. From 1958 to 1960 he was employed at the IBM Watson Laboratory, Yorktown Heights, N. Y., as a member of a microwave computer group investigating the application of microwave techniques to the development of high-speed logical circuits. In 1960 he joined Hughes Aircraft Company, Fullerton, Calif., where he concentrated primarily on the study of electromagnetic surface-wave excitation and diffraction problems. From 1962 to 1966 he returned to full-time academic study at Stanford University with the aid of a Hughes Fellowship. At present he is a Senior Scientist at Hughes Ground Systems Group, where he is involved primarily with research in the areas of electromagnetic and acoustic wave propagation and diffraction problems.

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He was appointed Instructor of Electrophysics at the Polytechnic Institute of Brooklyn in 1967 and Assistant Professor in 1968. His research interests have been in the areas of microwave networks, symmetry effects on wave propagation in periodic structures, and lately in microwave acoustics, particularly in the study of waveguides for acoustic surface waves. In addition, he also serves as a Consultant to Kaiser Aluminum and Chemical Corp. in the area of microwave heating.

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John McStay was born in Lisburn, Northern Ireland, on February 21, 1939. He received the B.Sc. degree in physics and the M.Sc. degree in electrical engineering from Queen's University, Belfast, Northern Ireland, in 1960 and 1962, respectively.

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Motoharu Ohtomo was born in Osaka, Japan, on February 11, 1938. He received a B.E. degree in 1960 from the University of Tokyo, Tokyo, Japan, where his major was applied physics.

In 1960 he joined the Tokyo Shibaura Electric Company, Limited, Kawasaki, Japan, where he was engaged in research and development of a ruby maser. Since 1966 he has been working on Gunn effect devices and later on avalanche oscillators, amplifiers, and noise measurement of these oscillators.

Mr. Ohtomo is a member of the Institute of Electronics and Communication Engineers of Japan and the Physical Society of Japan.

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Thomas M. Reeder (S'59–M'69) was born in Elmhurst, Ill., on April 17, 1938. He received the B.S.E.E. degree from the University of Illinois, Urbana, in 1960, and the M.S.E.E. and Ph.D. degrees from Stanford University, Stanford, Calif., in 1961 and 1965, respectively.

Between 1962 and 1965 he was a Research Assistant at the Stanford Microwave Laboratory, and did research on megawatt-level traveling-wave tubes. In 1965 he joined the Standard Telecommunications Laboratories in Harlow, England, as a Research Engineer. There he set up facilities for microwave acousto-electric transducer fabrication and diagnostic study. Upon returning to the United States in 1967, he was employed by Microwave Electronics Corporation, Palo Alto, Calif., where he was responsible for research and development of broad-band transducer coupling networks. Between 1968 and 1971 he was a Research Associate at Hansen Microwave Laboratory, and did research on surface acoustic-wave transducers and amplifiers. In the fall of 1971 he joined United Aircraft Research Laboratories, East Hartford, Conn., as a Senior Research Scientist. His present research concerns the application of surface acoustic waves to high data-rate signal processing and acoustooptic interactions.

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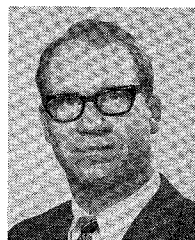
W. Richard Smith was born in Salem, N. J., on July 2, 1942. He received the A.B. degree in physics from Princeton University, Princeton, N. J., in 1964, and the M.S. and Ph.D. degrees in applied physics from Stanford University, Stanford, Calif., in 1966 and 1970, respectively.

In 1969 he served as a Technical Consultant to North American Rockwell Corporation, Autonetics Division, in the area of microwave acoustic surface waves. Since 1970 he has been on the technical staff at Hughes Aircraft Company, where he has been engaged in research on acoustic surface waves, especially as applied to filter and delay line design.

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William R. Sperry was born in Santa Monica, Calif., on September 21, 1945. He received the Associate of Arts and Sciences degree from Santa Monica City College, Santa Monica, Calif., in 1966, and the B.S. degree in physics from San Diego State College, San Diego, Calif., in 1968.

He joined Teledyne MEC, Palo Alto, Calif., in 1968 where he worked on the development of broad-band matching networks for thin-film microwave acoustic transducers. Presently, he is a Project Engineer in the Acoustic Delay Line Production Group at Teledyne MEC and is responsible for production of delay lines in the UHF to 18-GHz range.

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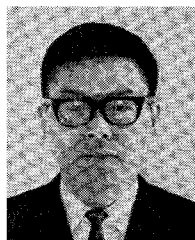
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He was a postdoctoral research fellow at Harvard from January to June 1965; in September of the same year he joined the Faculty of Electrical Sciences, State University of New York, Stony Brook, where he is now an Associate Professor. From 1971 to 1972, he is a Visiting Professor in the Department of Electrical Engineering, National Taiwan University, Taipei. He has been involved in research and teaching in electromagnetic theory, wave propagation in anisotropic media, and antenna theory. Presently, he is mainly interested in microwave acoustics.

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Kuo-Hsiung Yen was born in Tainan, Taiwan, on September 8, 1941. He received the B.S. degree in electrical engineering from the National Taiwan University, Taipei, in 1964, and the M.S. degree in electronics engineering from the Institute of Electronics, National Chiao-Tung University, Hsinchu, Taiwan, in 1967.

Since 1968 he has been at the Polytechnic Institute of Brooklyn, Farmingdale, N. Y., where he is currently working toward the Ph.D. degree in electrophysics.