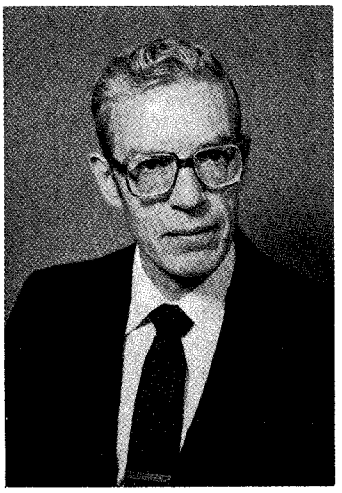

1986
Microwave Applications Award

Clarence Burke Swan

"For pioneering the application of diamond heat sinks useful for high-thermal-power-density semiconductor devices."

The Microwave Applications Award is presented to an individual for outstanding application of microwave theory and techniques. The eligibility requirements are creation of a new device, component or technique, novel use of a device or component or a combination of all of the above. The recipient of the 1986 Microwave Applications Award is C. Burke Swan of AT&T Bell Laboratories at Murray Hill, New Jersey.

Dr. Swan introduced the use of diamond to conduct the heat away from high-power microwave IMPATT oscillator diodes. This was one of a group of effective measures introduced by him for optimizing the output power, the efficiency, and the reliability of microwave IMPATT diodes. Type-IIa diamond is three-to-five times as effective as copper in conducting heat away from small intense heat sources. He showed that small pieces of diamond, only a millimeter on a side and costing only a few dollars each, could allow power dissipation densities of megawatts per square centimeer in very small area semiconductor devices.

The application of the diamond heat sink, the recognition of the importance of optimizing the heat sink design, and the combination of other contributions resulted in Dr. Swan achieving record power levels and efficiencies for IMPATT diodes over the frequency range 6 GHz to 49 GHz. Dr. Swan authored six papers in 1967 and 1968 which established that the power limitations for IMPATTs were primarily thermal not electrical. His pioneering work helped spark the world-wide thrust on IMPATT development which made these diodes the most important solid-state microwave source in communication and radar until the introduction of GaAs FETs in the 1970s.

The diamond heat sink was immediately extended to semiconductor lasers by co-workers. This made possible for the first time the CW operation of GaAs lasers at room temperature. Today, in addition to high-power IMPATTs, many high-reliability high-power semiconductor lasers are mounted on diamond heat sinks.

C. Burke Swan was born in New Brunswick, Canada, on November 9th, 1932. He received the B.Sc. degree in Electrical Engineering from the University of New Brunswick and the M.A.Sc. and the Ph.D. degrees from the University of Toronto.

He joined AT&T Bell Laboratories in 1962. His early work included research on high power harmonic generation with microwave gaseous plasmas, and the first experiments with stacked varactors for higher power and better efficiency.

In 1969 he became supervisor of the Microwave Integrated Circuits group at Allentown, Pennsylvania. Since 1978 has supervised the development of high-bit-rate lightwave transmitters for both terrestial applications and for the TAT-8 undersea system.

He as been granted eight patents and has published more than twenty papers. Dr. Swan is a Senior Member of the IEEE and is a member of the American Optical Society, the Association of Professional Engineers of Ontario, and the American Association for the Advancement of Science.