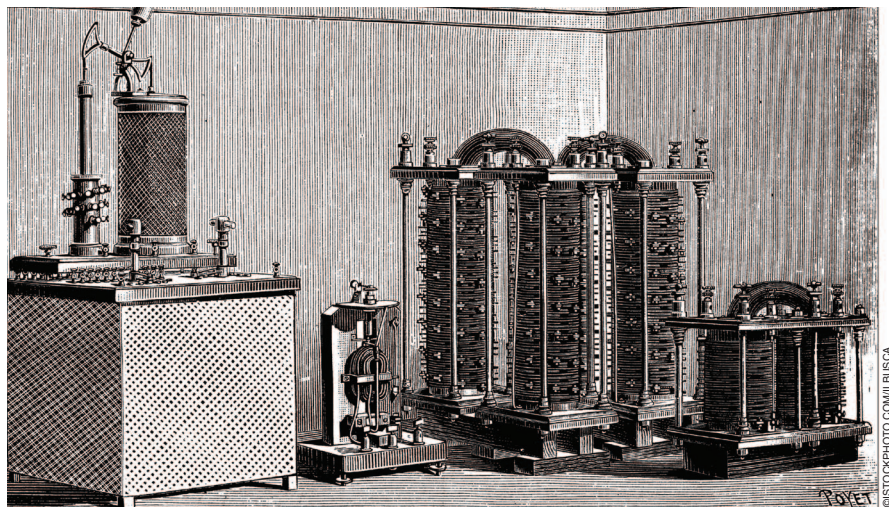


IMS2018 MTT-S Historical Exhibit

Steven N. Stitzer and Robert Caverly

The IEEE Microwave Theory and Techniques Society (MTT-S) Historical Exhibit will be on display during Microwave Week 2018, which includes the IEEE MTT-S International Microwave Symposium (IMS2018), at the Pennsylvania Convention Center in Philadelphia. The display features artifacts and documents highlighting the invention and development of our microwave technologies, dating back to as much as a century ago.

The earliest artifacts in the collection are examples of split anode magnetron oscillator tubes producing microwaves in the 1.6–20-GHz range; these were developed in the early 1930s by G. Ross Kilgore, who was named an IEEE MTT-S Microwave Pioneer in 1998. The most recent artifacts currently in the collections are solid-state devices and traveling wave tubes from the 1990s. The earliest books in the collection are



The Naval Electrician's Text and Handbook and Wireless Telegraphy, both originally published in the 1900s. The most recent documents include the collected papers of several notable Society members, including the personal notebooks of the late Seymour Cohn.

This year marks the 80th anniversary of the U.S. Army's successful demonstration of the SCR-268-T1 radar [1]. Development of the SCR-268 had begun in 1936 and was carried out at the Army's Signal Corps Laboratories in Ft. Monmouth, New Jersey, which is located about 60 mi

(100 km) northeast of Philadelphia. The first version of this early pulse radar operated at 100 MHz and had an aircraft detection range of 40,000 yd (23 mi or 37 km). The transmitter used four type 806 vacuum tube triodes. Later SCR-268-T3 versions, deployed to the field in 1941, operated at 205 MHz to allow the use of smaller antennas.

The transmitter used 16 Eimac 100TL triodes in a ring oscillator to produce 50-kW peak power. The system employed three dipole array antennas on a common rotating mount. One antenna was used for transmitting. The

Steven N. Stitzer (s.stitzer@ieee.org) is with Northrop Grumman Mission Systems, Linthicum, Maryland, United States. Robert Caverly (rcaverly@villanova.edu) is with Villanova University, Villanova, Pennsylvania, United States.

Digital Object Identifier 10.1109/MMM.2018.2801892
Date of publication: 6 April 2018

two receiving antennas each used a lobe-switching technique for enhanced pointing accuracy. One antenna provided azimuth information, while the other was for elevation. Three separate oscilloscopes were used as indicators for range, azimuth, and elevation [2]. Nearly 3,000 sets were produced by early 1944. Signal Corps Laboratories Director William Blair was awarded U.S. Patent 2,803,819 in 1957 for pulse radar based on this system [3].

Planned exhibits at IMS2018 include an SCR-268 type indicator and receiver (Figure 1), examples of the transmitting tubes, and other hardware from this period. The IMS2018 Steering Committee is also working to bring in other artifacts related to the local microwave industry.

The MTT-S Historical Collection is permanently housed at the National Electronics Museum (NEM) in Linthicum, Maryland, located near Baltimore/Washington International Thurgood Marshall Airport. The museum includes many microwave-related exhibits, including components and radar systems from Hughes, Northrop Grumman, Raytheon, RCA, Western Electric, and Westinghouse, as well as communications and countermeasures equipment from a variety of companies. Specific radar exhibits include the SCR-270 (Pearl Harbor radar), SCR-584 gun-directing radar, Nike-Ajax missile-defense equipment, and military aircraft radars from World War II (AN/APS-4) to the present (AWACS F-35).

The NEM is used for several local IEEE Society functions and annually receives generous support from the MTT-S. The museum provides numerous educational and hands-on programs through-

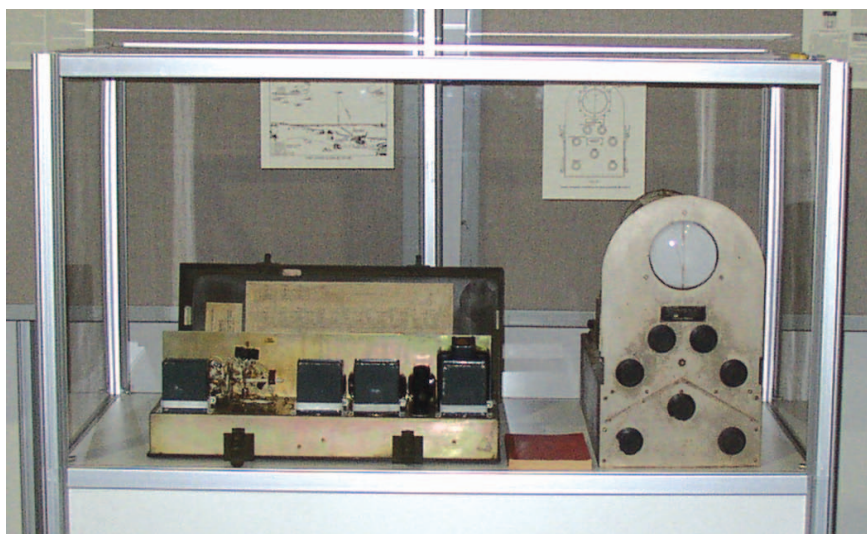


Figure 1. An SCR-268 radar receiver and indicator scope.

out the year and in 2017 reached more than 5,000 students at both on- and off-site events. A new exhibit funded by the Society of Satellite Professionals International is called “Satellites Transform Our Lives.” The NEM is open to the public Monday–Friday from 10:00 a.m. to 4:00 p.m. and Saturdays from 10:00 a.m. to 2:00 p.m. The address is 1745 W. Nursery Road, Linthicum, Maryland [4].

As a nod to local microwave history, a limited exhibit of items from the Sarnoff Collection will be on display at IMS2018. The Sarnoff Collection was originally established by RCA in 1967 as the David Sarnoff Library. The collection, which includes more than 6,000 artifacts related to major developments in communication during the 20th century, was donated to The College of New Jersey, Ewing, in 2010. The Sarnoff Collection includes artifacts concerning David Sarnoff’s life; RCA, NBC, the Victor Talk-

ing Machine Company, and the Marconi Wireless Telegraph Company of America; and the history of radio and television broadcasting, audio and video recording and reproduction, electron microscopy, radar, vacuum tubes, transistors, solid-state physics, semiconductors, lasers, liquid-crystal displays, integrated circuits, microprocessors, computers, communications satellites, and other technologies that RCA played an important role in inventing and developing. J. Allen and M. Pezalla-Granlund have been working with the IMS to make this exhibit happen.

References

- [1] R. B. Colton, “Radar in the United States Army,” *Proc. IRE*, pp. 740–753, Nov. 1945.
- [2] S. N. Stitzer, “Signal progress,” *IEEE Microwave Mag.*, vol. 18, no. 4, pp. 97–107, June 2017.
- [3] [Online]. Available: <http://cecomhistorian.armylive.dodlive.mil/2012/04/04/radar-pioneer-william-blair/> retrieved 2017/12/9
- [4] [Online]. Available: www.nationalelectronics-museum.org



2018 IEEE International Microwave Biomedical Conference *(continued from page 70)*

noncoronary interventions at Thomas Jefferson University, will present the talk, “Renal Denervation for Uncontrolled Hypertension: Complexity After Simplicity.” Next, Prof. Chung-Kang Peng, director of the Center for Dynamical Biomarkers at Beth Israel Deaconess Medical

Center and the Harvard Medical School who also leads the Dynamical Biomarkers Group made up of physicians, scientists, and engineers for the Qualcomm Tricorder XPRIZE project, will deliver the presentation “Is There a Fundamental Law of Health and Disease?”

IMBioC 2018 welcomes engineers and biomedical experts to participate in a multidisciplinary conversation to accelerate technologies that advance health care. Conference information is available at <https://imbic-ieee.org/>.

