

# IMS2019 MTT-S Historical Exhibit

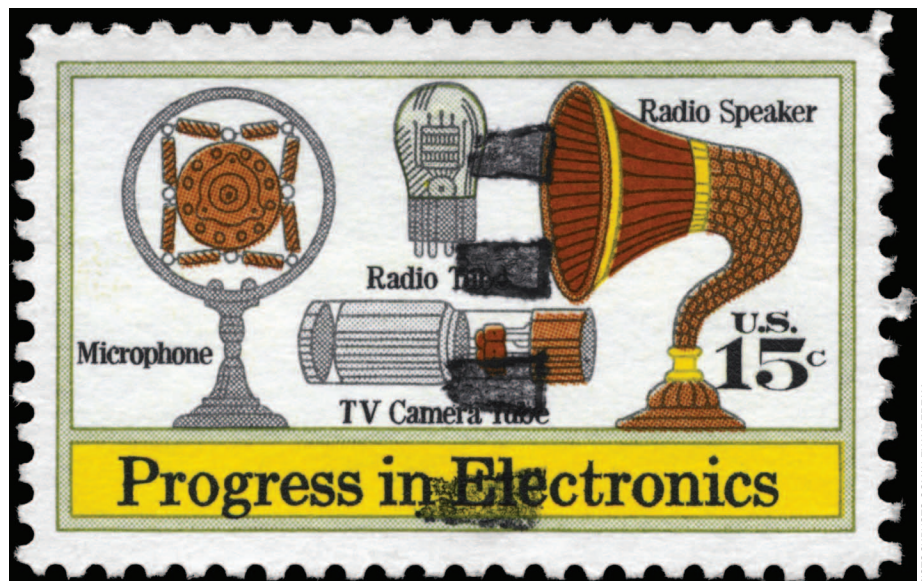
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The IEEE Microwave Theory and Techniques Society (MTT-S) Historical Exhibit will be on display during International Microwave Week 2019, which includes the IEEE MTT-S International Microwave Symposium (IMS2019), at the Boston Convention and Exhibition Center (Figure 1). 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 that produced microwaves in the 1.6–20-GHz range. These tubes 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.

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The earliest books in the collection are *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.

2018 marked 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. 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 36.6 km). The final transmitter design used 16 Eimac 100TL triodes in a ring oscillator to produce 50-kW peak power. One example of this transmitter was restored at the



**Figure 1.** The MTT-S Historic Exhibit will be on display at IMS2019.

InfoAge Museum [2] and first shown at IMS last year. This exhibit has been updated, and we plan to bring this interesting and important piece of history to Boston this year.

The Boston area is the home of numerous companies that focus on RF and microwave products. One example is General Radio (GR), which was founded in 1915 to manufacture measuring equipment for use at radio frequencies. Edwin H. Armstrong used some of GR's early standard capacitors in the experimental radio equipment he built. After World War I, the new radiobroadcasting phenomenon drove much of the company's product line. For a short time, the company produced components for use in radio equipment, but their main effort eventually went back to producing radio test equipment. GR was first

located in Cambridge, Massachusetts, at Massachusetts Avenue and Windsor Street, and its operations moved to Concord, Massachusetts, in 1958. Microwave test equipment included signal generators, impedance measuring equipment, and the GR series of sexless coaxial connectors [3].

The National Electronics Museum (NEM) permanently houses the MTT-S Historical Collection in Linthicum, Maryland, close to the Baltimore/Washington Thurgood Marshall International 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 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 newest exhibit is a World War II vintage SU shipborne X-band radar built by Raytheon in the 1950s for the Canadian Navy. NEM houses several local IEEE Society functions and receives generous support from the MTT-S annually. It provides numerous educational and hands-on programs throughout the year; in 2018, it reached more than 5,000 students at on-site and off-site events. A new exhibit, Satellites Transform Our Lives, is funded by the Society of Satellite Professionals International. NEM is open to the public Monday–Friday, 10:00 a.m.–4 p.m., and on Saturdays, 10 a.m.–2 p.m. It is located at 1745 W. Nursery Rd., Linthicum, Maryland [4].

## References

- [1] R. B. Colton, "Radar in the United States Army," *Proc. IRE*, 1945, pp. 740–753.
- [2] InfoAge Science & History Center. [Online]. Available: infoage.org
- [3] S. N. Stitzer, "Early general radio microwave equipment at the National Electronics Museum," *IEEE Microw. Mag.*, vol. 10, no. 4, pp. 136–137, 2009.
- [4] National Electronics Museum. [Online]. Available: www.nationalelectronicmuseum.org



## Our Third IMS Three Minute Thesis Competition *(continued from page 50)*

- [3] YouTube, "IMS2018 3MT Philadelphia." [Online]. Available: <https://www.youtube.com/playlist?list=PLVXVjvkEq8EXJ3aaLLUV2KJRiW326nZQ5>
- [4] The University of Queensland, Australia, "Three Minute Thesis." [Online]. Available: <https://threeminutethesis.uq.edu.au/home>
- [5] International Microwave Symposium, "Three Minute Thesis (3MT®) competition." [Online]. Available: <https://ims-ieee.org/authors-organizers/competitions/3mt>
- [6] The University of Queensland, Australia, "Watch 3MT presentations from around the world." [Online]. Available: <https://threeminutethesis.uq.edu.au/watch-3mt>
- [7] YouTube, "McMaster Electrical & Computer Engineering 3MT 2018." [Online]. Available: [https://www.youtube.com/playlist?list=PLsf\\_1-s90Gw4HXyKieLz3KOHFsAcRuusu](https://www.youtube.com/playlist?list=PLsf_1-s90Gw4HXyKieLz3KOHFsAcRuusu)
- [8] J. W. Bandler and E. M. Kiley, "Brevity, clarity, engagement: The IMS2017 Three Minute Thesis competition," *IEEE Microw. Mag.*, vol. 18, no. 3, pp. 85–87, 2017.
- [9] J. W. Bandler and E. M. Kiley, "In the first few blinks of an eye: The basics of engaging presentations," *IEEE Microw. Mag.*, vol. 18, no. 2, pp. 112–114, 2017.
- [10] YouTube, "John Bandler—You, your slides and your posters: Allies or foes." [Online]. Available: <https://www.youtube.com/watch?v=CtSTppBxBpPg>
- [11] International Microwave Symposium, "What is 3MT®, Why is it Beneficial, How is it Judged, and How to Prepare." [Online]. Available: <https://ims-ieee.org/authors-organizers/competitions/3mt/3mt-add>
- [12] International Microwave Symposium, "IMS Three Minute Thesis (3MT®) competition rules." [Online]. Available: <https://ims-ieee.org/authors-organizers/technical-program-competitions/3mt/rules>
- [13] International Microwave Symposium, "The Three Minute Thesis judging criteria." [Online]. Available: <https://threeminutethesis.uq.edu.au/resources/judging-criteria>
- [14] YouTube, "John Bandler and Ana Kovacevic—Clear, brief, engaging: Your thesis in three minutes." [Online]. Available: [https://www.youtube.com/watch?v=R\\_Vv5XKHHlg](https://www.youtube.com/watch?v=R_Vv5XKHHlg)
- [15] J. W. Bandler, E. M. Kiley, and A. Kovacevic, "The art of effectively communicating complex, highly technical work in three minutes," IEEE MTT-S Webinar, 2017.
- [16] YouTube, J. W. Bandler, M. Ogrodnik, and D. Tajik—Clear, brief, engaging: Your thesis in three minutes." [Online]. Available: <https://www.youtube.com/watch?v=0hhNHXINLVE>
- [17] J. W. Bandler, E. M. Kiley, and D. Tajik, "Communicating your highly technical work to non-specialists in three short minutes," IEEE MTT-S Webinar, 2018.

