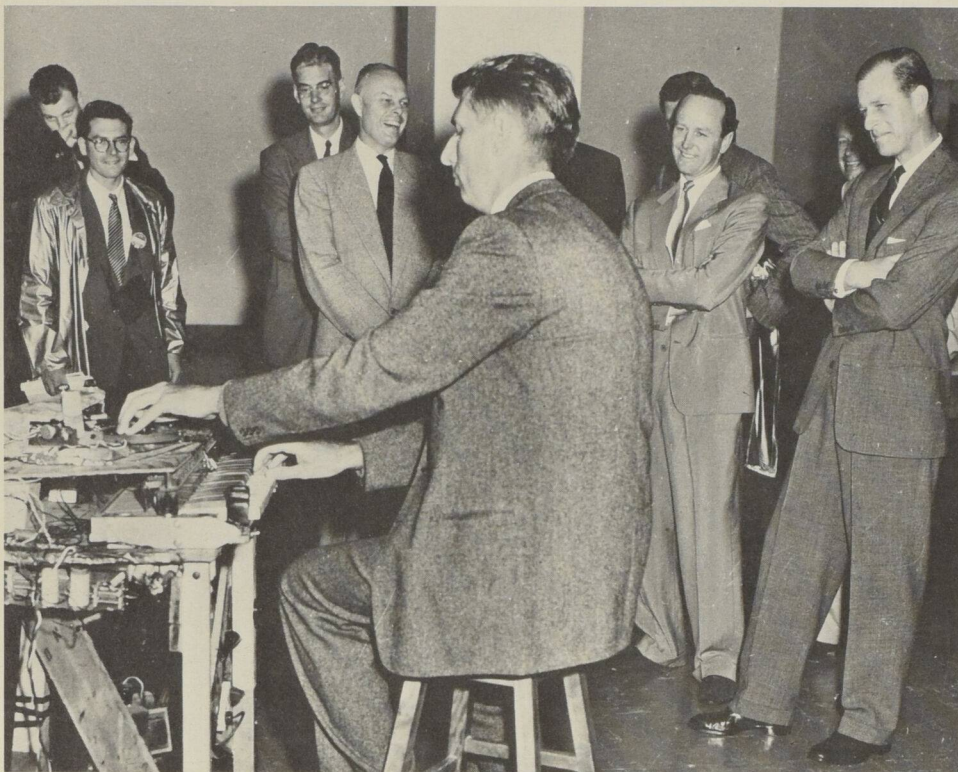# Hugh LeCaine, B.Sc., M.Sc., Ph.D. (1914-1977) —
# Portrait of a scientist/musician



Electrical Engineering Division/Division de génie électrique

*"He is remembered as a man with a vision" — István Anhalt, Head, Department of Music, Queen's University.*

Father of electronic music in Canada; scientist, composer, inventor, painter; add to this teacher, lecturer, consultant, photographer, horticulturist and, last but not least, humanist — and a portrait of the late shy and private Hugh LeCaine emerges.

"He epitomized what research is all about," says Horace Aubrey of the National Research Council's Division of Electrical Engineering, where Dr. LeCaine spent his entire working life. Joining the Council in 1940, just when radar work for the war effort was getting under way, he started work on the first of his many inventions. "With the use of tin cans and a couple of potentiometers — the most hairy-looking thing you ever saw," says Aubrey, "LeCaine designed the first automatic pattern recorder, an instrument used to measure the directions in which an antenna propagates a radio signal." For years, the Council had the only one of its kind in the world. At war's end, Canadian National used receiving equipment designed by LeCaine to plan radio links across the country. In the field of nuclear physics, he collaborated in building the forerunner of what is today the Van de Graaff nuclear accelerator used to generate a

**Dr. Hugh LeCaine combines electronic theory with a "command performance" for His Royal Highness the Duke of Edinburgh on his visit to NRC in 1954.**

**Le Dr Hugh LeCaine présente la théorie sur la musique électronique lors d'une représentation de commande tenue en l'honneur de Son Altesse Royale le duc d'Edimbourg à l'occasion de sa visite au CNRC en 1954.**

stream of high-speed sub-atomic particles. Such accelerators are used in the fields of medicine, chemistry and atomic energy as "super" microscopes or probes.

Vascillating between music and physics, the former became the all-consuming interest of his life. With the invention of the electronic Sackbut in 1945, Hugh LeCaine opened the era of electronic music (the more widely-accepted advent of this music occurred three years later when the French engineer/composer Pierre Schaeffer recorded street sounds in Paris, combining them in various ways to form his "musique concrète"). The original Sackbut was the earliest form of the slide trumpet derived from the Roman buccina, which afterwards developed into the trombone. Although LeCaine's work on the instrument began at home, NRC entered the picture in 1954, supporting it as a form of communication between scientists and artists. "My primary concern," Hugh once said, "was making an electronic instrument

that was musically expressive." The problem, he felt, lay in the cold, mechanical sounds of available electronic instruments. LeCaine's answer was the construction of an extremely sensitive instrument which, unlike other keyboard instruments, could slur and slide from note to note, producing continuously variable sounds with an additional capacity for making constant tone, color and pitch adjustments. Musicians who have played it maintain that its best feature is the way a note can be made louder by pressing a key harder or made to waiver with a sideward movement of the finger; and it is adaptable to every kind of music. The Sackbut has been featured at Canadian and international exhibitions and used for the musical scores of several films.

"Each new invention sparked ideas for more," explains another colleague, Dave Rocheleau. "There really was no end to the number of areas Hugh wanted to explore." Once, as his team completed preparation of the Sackbut for showing at an exhibition in Toronto, they were suddenly told the Sackbut wouldn't be going. Why? Because another LeCaine idea had come to fruition much sooner than expected — the multitrack tape recorder — which would eventually be shown instead. The recorder is a device primarily for replaying and retaping sounds. With it, 16 tapes can be played at the same time, and by mixing them or combining together certain sections, musical compositions can be created. "There are other tape devices," says Dave, "but none has the flexibility of this one."

"Hugh and I discussed the kinds of heads to be used in tape drives," continues Horace Aubrey. "At that time, no one knew much about these drives and unlike other tape recorders with one head, the multitrack had six! The head had to be strong enough to hold the tapes as they went through, but not of sufficient load to slow them down. For months, I worked on it and at last came up with something I thought was absolutely superb. I attached it to the multitrack, and left for the day. Well, you should have seen it next morning; Hugh had been in during the night (he preferred to work during these quiet hours) and taken a hacksaw to it! I was almost in tears — and then I saw the note: 'as soon as I looked at it, I realized you could improve it Horace, if you did this, and this, and this!' "Most