December 11, 1964

Doris J. W. E. Escher, M. D.
Physician-in-Charge
Cardiac Catheterization Unit
Montefiore Hospital and Medical Center
111 East 210th Street
Bronx, New York 10467

Dear Doris:

Thank you for your note of December 7, 1964.

We have been using a transistor radio to detect radio frequency components of our pacemaker impulse since our first work in 1959. This has proven to be a very convenient method of monitoring pacemaker function. The impulse delivered by any of the commercial pacemakers is in the region of two miliseconds in duration. The voltage is varied from two to four volts, depending upon the instrument that you use. The rise time would therefore be very sharp if one is dealing in miliseconds and sufficiently sharp if one is dealing in nanoseconds so that this part of the curve easily falls in to the radio frequency range.

What we usually do is to tune the A.M. portable radio to some spot on the dial where there is no broadcasting station. If you then hold the receiver within a few inches of the pacemaker one can pick-up the sharp click of the pacemaker impulse. We have more recently refined this technique by transferring the click to oscilloscope and if one arranges the sweep on the oscilloscope correctly you may see not only the rise of the square wave but also the fall and therefore can measure the length of the impulse quite accurately. This will change with changes in the impedence of the electrode system and therefore permit one to make some very accurate diagnosis relative to the entire electrode system. According to your letter you ask that I confirm this as of 1961. I am sure that we spoke about this at about that time, if not, a little sooner.

At any rate, I am pleased that you have found this technique useful.

My best wishes for a pleasant holiday season to you, to George and the children.

Sincerely yours,

AK:el

Adrian Kantrowitz, M. D.