# Characterization of P-static for Antenna and Receiver Design Standards

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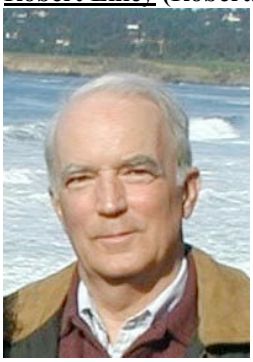

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## SYNOPSIS

Throughout the Loran-C and more recent *eLoran* programs, concern has been voiced over *precipitation static* or *p-static* noise effects on system availability and navigational accuracy. P-static is the term used to describe electrical noise which can be generated by the transport of electrical charge from the airframe to the surrounding atmosphere. Flight in clouds, precipitation or dust can result in an electrically charged airframe, and discharges trailing edges, antenna tips and other devices.

The most recent FAA guidance on p-static effects is Advisory Circular (AC) 20-121A [2], released in 1988 and still "active". E-field antennas were standard practice then, and the agency included installation and maintenance advice to minimize navigational outages due to precipitation static.

Since the February, 2008 decision in the U.S. to continue Loran services and deploy *eLoran*, emphasis has increased on development of standards for eLoran antennas and receivers for aviation. Recent high-voltage measurements conducted at the FAA Technical Center reveal detail about the discharge mechanisms, offer suggestions for minimization of p-static noise at the antenna, describe the residual noise voltage which may appear at the receiver terminals, and point the way to affordable standard test configurations for proponent antennas.

P-static is not “just more noise.” The results to date confirm the *pulsed* nature of corona discharge and the “tunable” repetition rate, which can occur at the Loran carrier or envelope intervals. Results are also presented on the E-field and H-field strengths at the corona point and the extent of interference with the Loran receiver.