Hamiltonian Treatment of the 3-dimensional Motion in a Low Energy Linear Accelerator, J.I.M. BOTMAN, R.W. de LEEUW, <u>H.L. HAGEDOORN</u>, Cyclotron Laboratory, Eindhoven Univ. of Technology - A relativistic Hamiltonian is taken as a starting point for analytical calculations of the particle motion in a low energy linear accelerator. In this Hamiltonian the electromagnetic space waves are represented as vector potentials. Also a longitudinal focusing magnetic field is incorporated by means of its vector potential. For an adequate representation of the latter one has to use cartesian coordinates. After a few canonical transformations a final Hamiltonian is obtained that gives insight in several physical phenomena related to the particle motion. By the use of cartesian coordinates the apparent increase of the transverse emittance due to the longitudinal magnetic field is demonstrated. The results are correct up to second order in the amplitudes of the waves and are in agreement with other results in literature.