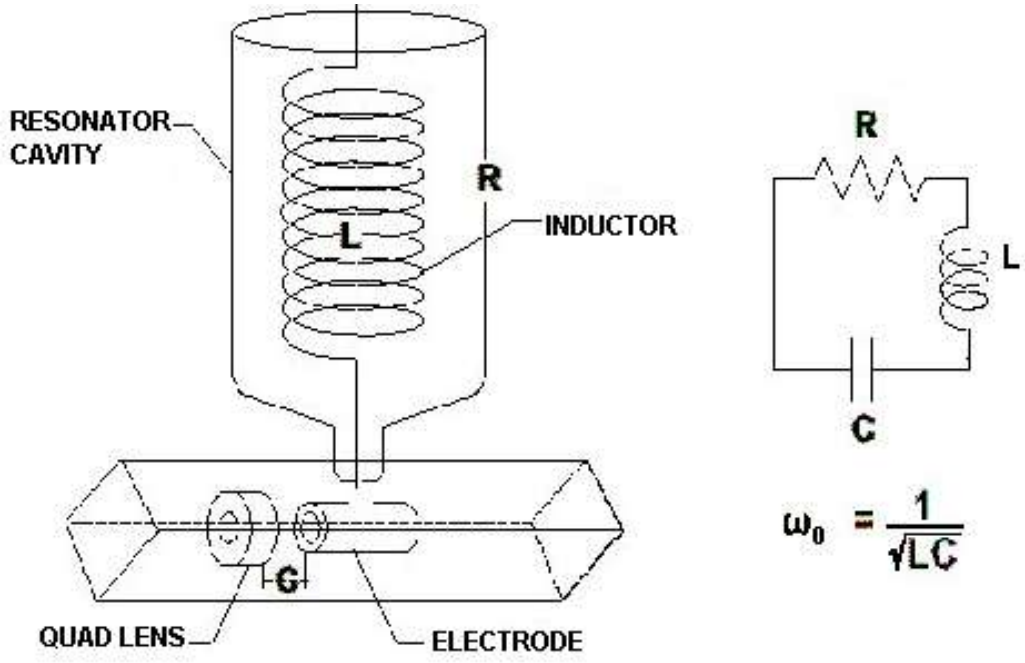
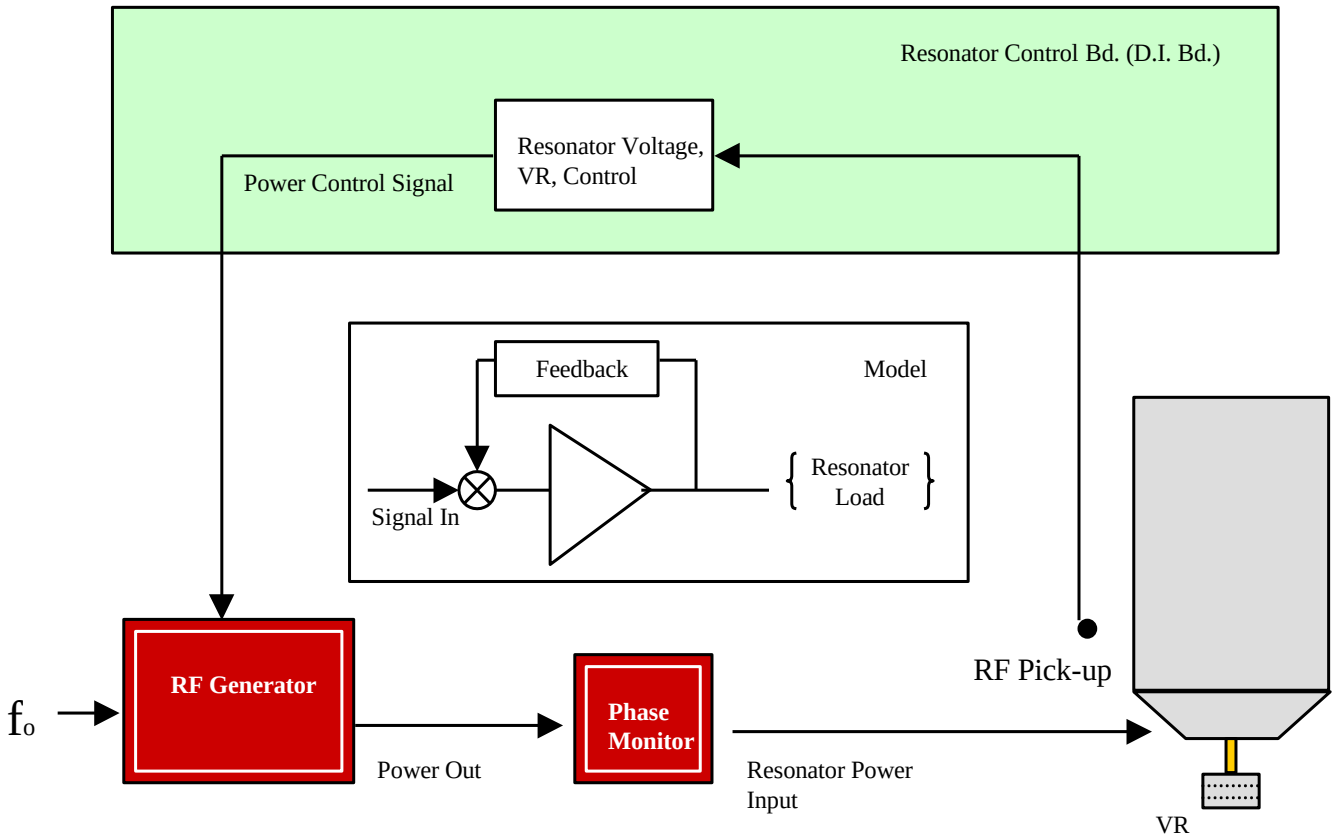
Overview of RF amplifier system:

In order to accelerate an ion, an acceleration system must be used. The LINAC uses several resonators to accomplish this. Each resonator is made up of an inductive and capacitive (LC) circuit which has a natural resonating frequency ($2\pi f = \omega$) that is determined by the inductance and capacitance, which is then adjusted to 13.56 MHz. The energy transfers between the magnetic field in the inductor and the electric field in the capacitor. The resistive term accounts for energy losses within the circuit (such as heat and friction losses) and can not be avoided.



When the resonator is initially turned on, the amplifier shows 100 Watts of forward power. This power level is deemed low enough such that if the resonator is completely mis-tuned and all of the injected power is reflected, the amplifier is robust enough to handle it. When the reflected power falls below 4 Watts, the user or control system sets a voltage through the Operator Interface (O/I) for the electrode voltage. The control system checks the pick-up probe voltage, compares it with internal circuitry on the DI board, the resonator DI board requests a power adjustment of the RF amplifier and the amplifier then supplies power to the resonator. Adjustments are made until the pick-up probe voltage corresponds to what the control circuitry is looking for. Typically, a 9V AC signal corresponds to 80 kV AC at the electrode. The following diagram illustrates this.



There is approximately a 1% window on the sense circuitry, which is referred to the "Set-point Status Signal" as periodically seen on the alarm window of the O/I.