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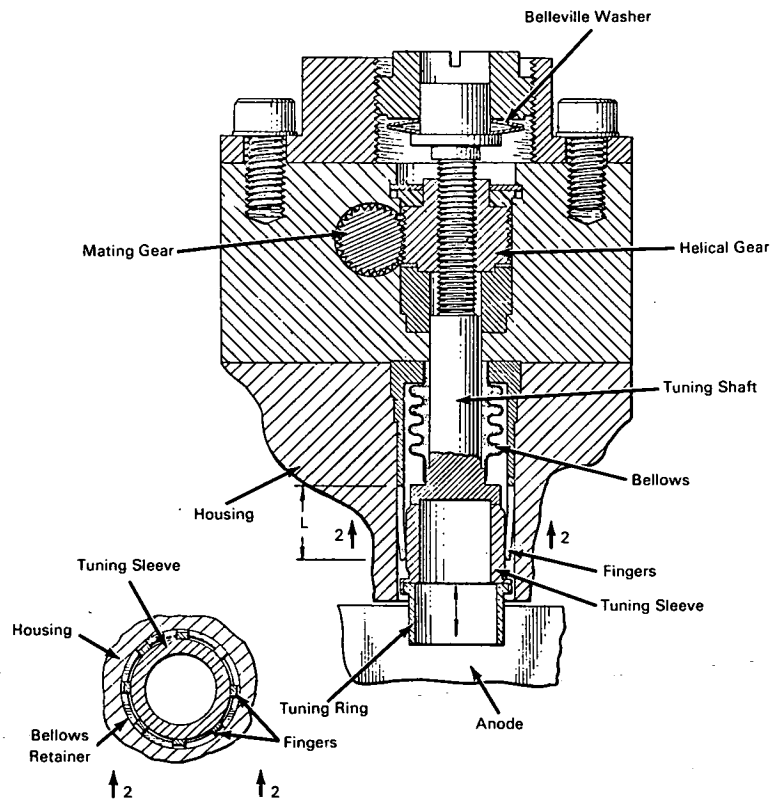
NASA TECH BRIEF

Magnetron Tuner Has Locking Feature



Use of a tuning element to control frequency in an electron discharge device, such as a magnetron, is well known. Tuning is usually achieved by selectively controlling the positions of metallic or dielectric elements within cavities, formed by electrodes. If the frequency is not critical or the magnetron is easily accessible for frequent tuning, a relatively simple arrangement may be used. If, however, a very precise frequency is required and the magnetron is not readily accessible for frequent maintenance, it is necessary to finely tune the elements and insure that they remain so positioned regardless of environmental conditions of vibration, shock, or the range of temperature encountered in a given application. For example, in one application, a dielectric tuning ring has been used to adjust the magnetron frequency at a rate of 18 megacycles per 0.001-inch of ring travel. In this application, it is necessary to move the tuning ring at a very slow travel rate and, when once set at the desired frequency, to maintain the setting in the presence of the anticipated

(continued overleaf)

adverse environmental conditions, to hold the magnetron output frequency to within ±1 megacycle.

Existing tuning arrangements have proven inadequate to meet these requirements. Therefore, a new arrangement has been devised that will satisfy all requirements with a minimum of maintenance.

This new arrangement features a means of moving a tuning ring axially within an anode cavity by a system of reduction gears engaging a threaded tuning shaft or lead screw. The shaft is moved up or down at an extremely slow rate to position the tuning ring within the anode cavity so that the desired magnetron output frequency is achieved. A Belleville washer in the upper assembly exerts a constant biasing pressure on the tuning shaft to prevent backlash during the tuning operation. A bellows within a bellows housing encloses the tuning shaft to permit axial motion of the tuning sleeve without disturbing the pressure balance within the device. The bellows retainer terminates in hardened fingers that produce interfering tolerances on a minimum circumferential surface between the i.d. of the bellows retainer and the o.d. of the tuning sleeve.

Notes:

Documentation is available from:

Clearinghouse for Federal Scientific
and Technical Information
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Price $3.00
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Patent status:

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