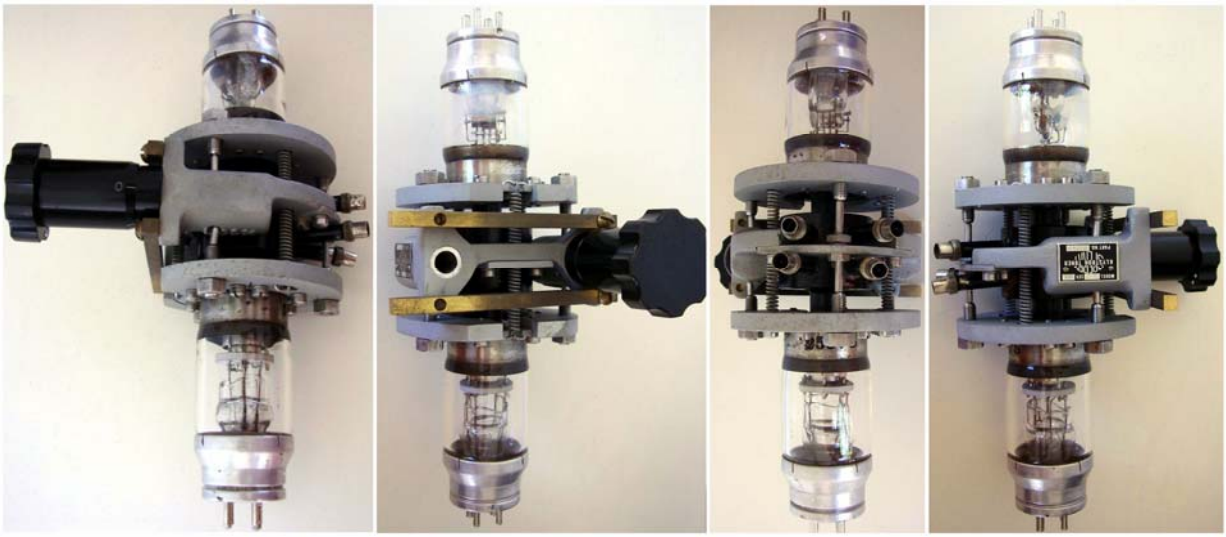
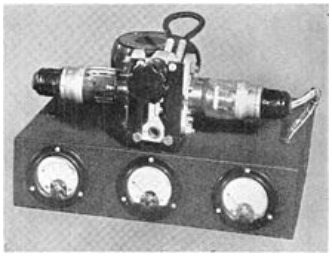
410 Early Klystron Amplifier, about 1940



This tube looks to be one of the very early klystron linear amplifier manufactured by Sperry Gyroscope Company and based upon the work of Varian brothers at the Stanford University. Prototypes in operation at Stanford appears in **Electronics, January 1940**. In **November the cover of Electronics** is dedicated to the high-power variant developed by Westinghouse under Sperry patents. The above sample is complete with a Type 11-C tuner, the feedback coaxial loop and the top and bottom flying connectors, as they appear in the following image. There is a number, 25378, printed on the body.



An article describing what looks to be a didactic gear using the same klystron type to experiment its operation as amplifier or oscillator, was published in Radio News, January 1944. Looking at the references given in Electronics, the above sample could be dated somewhere from January and November 1940.

We find this klystron described by I. E. Mouromtseff from Westinghouse at the International Congress for the 50th anniversary of the discovery of the radio by Marconi, held in Rome in 1947. Unfortunately no date is given in the text. The image shows the tube without the external tuner.

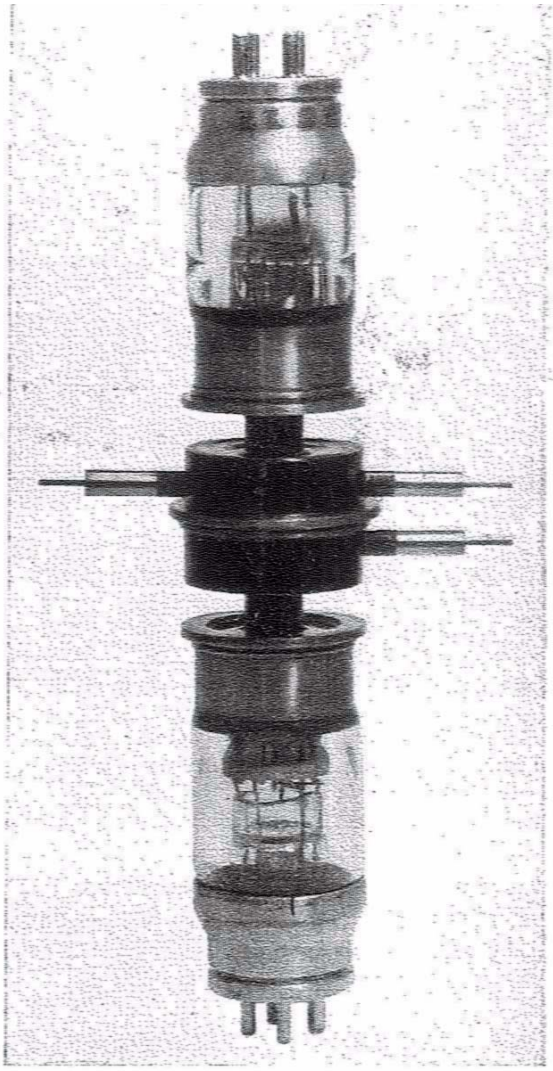


Fig. 10 *b*. – An early 10 cm double cavity Klystron (type 410) with 5 to 10 watt output.

In the next page there is the internal view of this klystron, found at page 6 of Klystron Technical Manual, published by Sperry in 1944. The electron beam travels from the cathode, through the control grid, the focusing electrode and then through the two resonating cavities, the buncher and the catcher. The deflector electrode is biased at the cathode potential, in order to deflect electrons toward the metal top ring terminating the upper cavity. The cavity itself and partially the tuner act as radiator for the heath generated by the electron beam. Each cavity has two coaxial connectors, usable for input and/or output connection and for the feedback loop when needed. Tuning was accomplished by compression applied to the tuning rings, so to vary the grid spacing of the resonators.

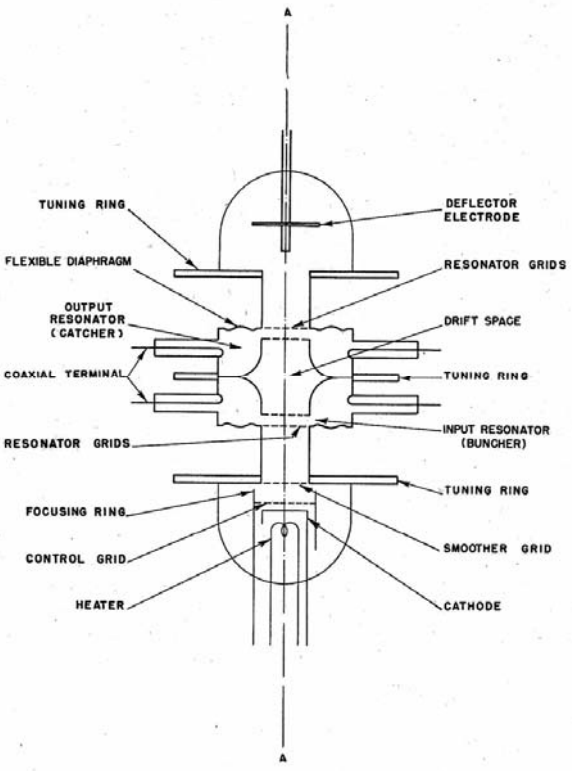
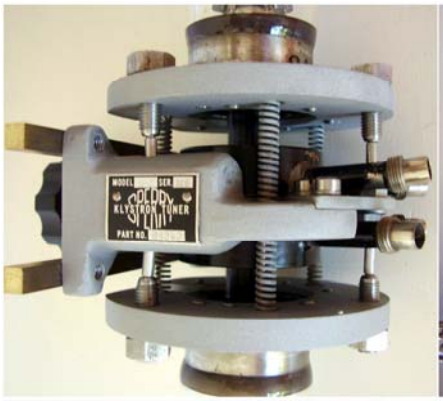
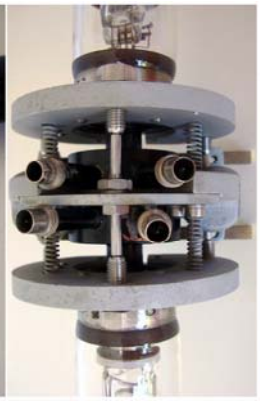


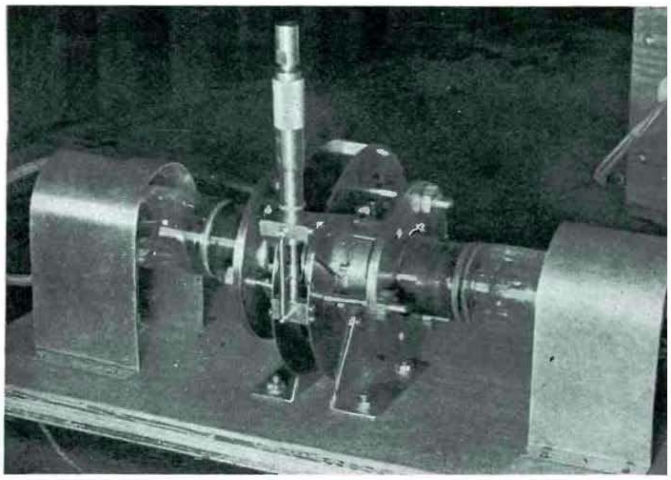
Figure 1—Schematic View of a Klystron Amplifier



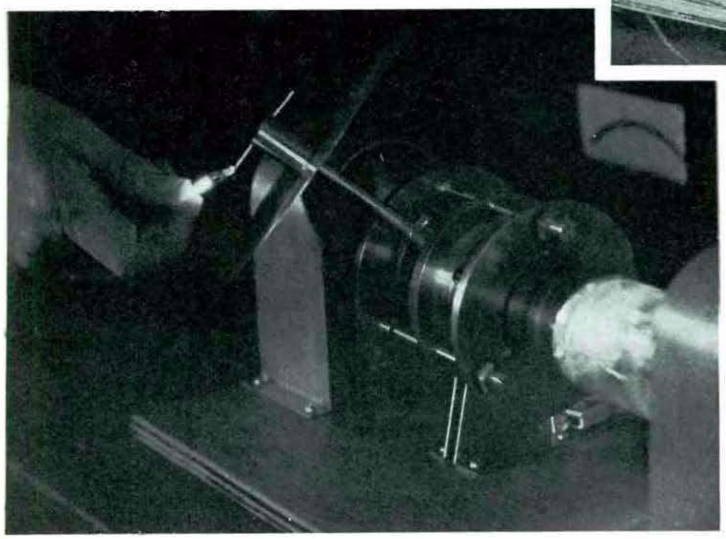


KLYSTRONS

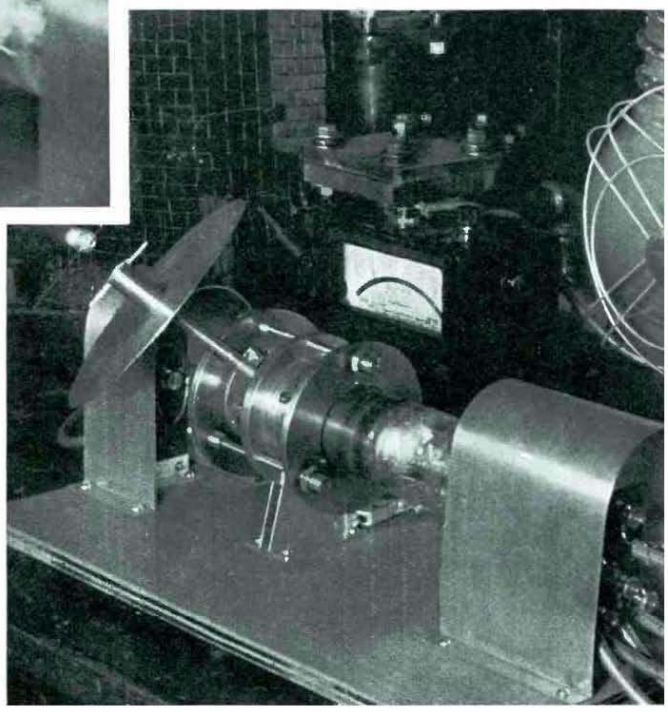
In operation at Stanford University. These tubes generate sizeable amounts of radio frequency power at a wave length of ten centimeters (3000 Me). They show great promise for the future of very high frequencies



Receiver tube. Tuning (the ranqe is about 9 to II em) is accomplished by compressing the thin walls of the reeonatinq chambers with the micrometer adjuster until lhe qreatest sensitivity is obtained

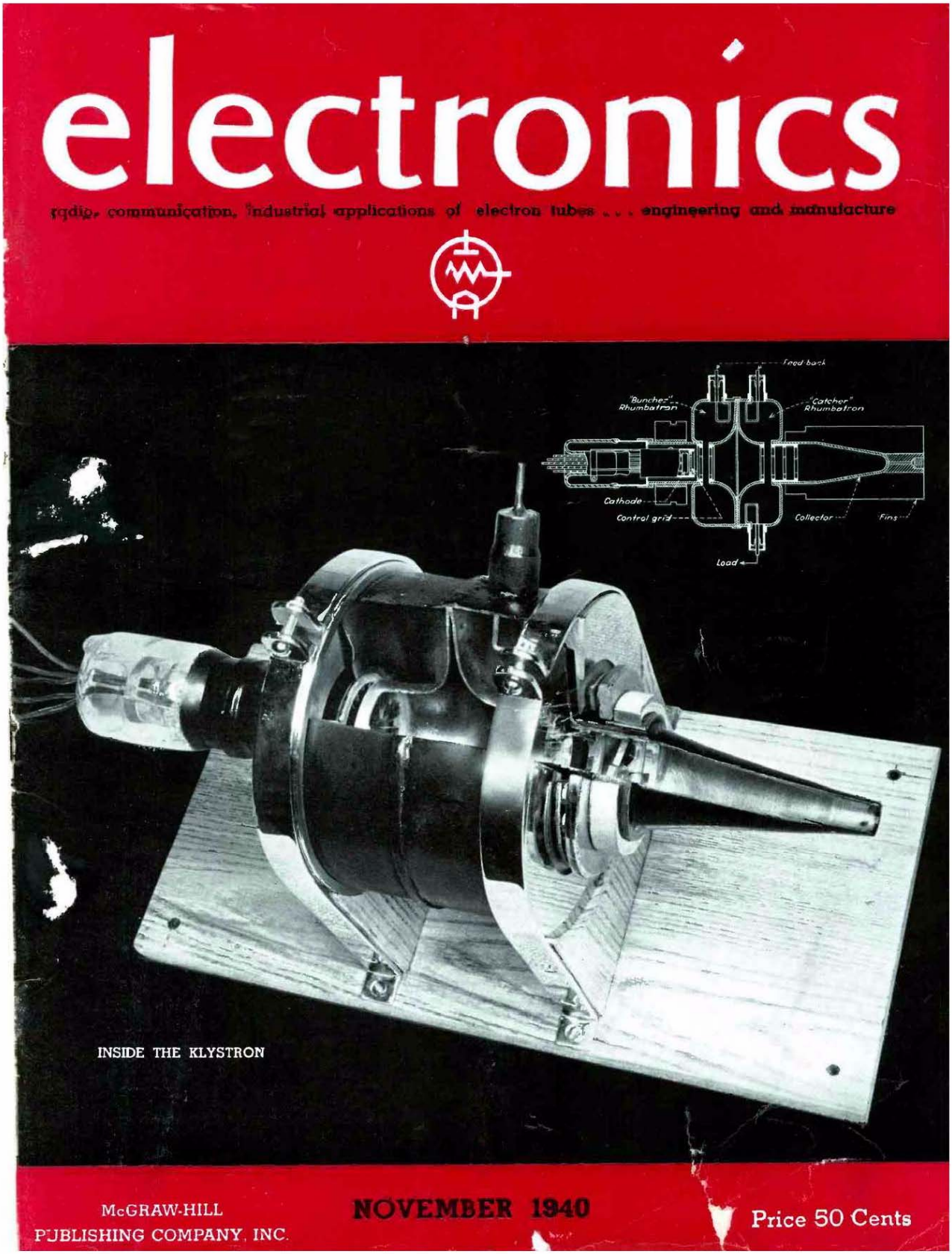


A neon lamp in contact with the radiatinq antenna of the transmitlinq tube q)ows not with the usual neon red. but with a weird reddish purple which seems to be a characteristic color of such ultra-hiqh.frequency ionization



Transmitting tube. The antenna (projecting wires above disc) is a half-wave dipole coupled to the "catcher" rhumbatron (resonating chamber where the electron groups deliver their energy)

The page from Electronics, January 1940, showing the 3 GHz klystron prototype working continuously pumped on the bench at Stanford.



In November 1940 the cover of Electronics is dedicated to another Stanford klystron prototype capable of generating 150 W at 3 GHz. We could assume that our 10 W sample could be dated somewhere between January and November 1940