

Velocity Modulated Oscillators

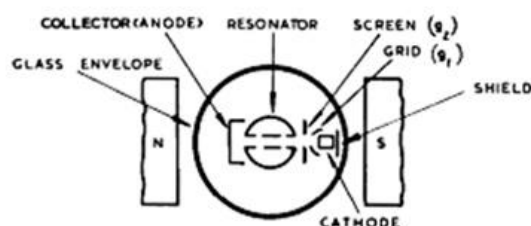
Since 1939, a comprehensive range of single transit coaxial line oscillators (Heil tubes) has been built up covering the frequency range 0.9-6 Gc/s. Types are available having wide mechanical or electronic tuning, wave guide or coaxial mounting, or any combination of these features.

The principle of operation is best explained by reference to the diagram below which shows a cross-section of the tube structure. An electron stream is accelerated from the cathode by the screen and is focused by the grid and magnet into a beam. The beam traverses the two interaction gaps in the resonator and is collected by the anode. The resonator is, effectively, a section of coaxial line with a hollow centre conductor. Interaction occurs between the beam and the field between the centre and outer conductors. The frequency is determined by the cavity to which the structure is coupled and by the potential difference between resonator and cathode. Variation of this potential difference affords a means of frequency modulation.

Application of the screen grid voltage in pulses provides the facility for square wave amplitude modulation. Constant output may be achieved by providing a means of adjusting the screen voltage to keep the cathode current constant.

STC microwave oscillator tubes are designed for long life which is an important requirement in microwave links in which many of these tubes are used.

The letter A immediately in front of the oblique stroke in the Commercial Code indicates a tube designed primarily for wide mechanical tuning range, and similarly the letter C indicates a tube designed for electronic tuning.



Cross-section of tube assembly

Commercial Code	CV Number	Staitable Cavity	Frequency Range Mc/s	Minimum Power Output W	Resonator Voltage Range V	Cathode Current mA	Minimum Electronic Tuning Range Mc/s
V190C/1M	—	495-LVA-202	500-925	0.25	180	40	±1
V218A/1K	—		800-1000	2	180-270	80	±2
V231C/1K	—	—	1700-2000	0.5	200-300	50	—
V233A/1K	2190	495-LVA-252	3060-3180	0.05	180-240	45	±8
V235A/1K	2221	495-LVA-201	2700-4200	0.3	190-380	50-65	±1
V237C/1K	—	495-LVA-226	2700-4000	0.5	190-350	50-65	±1
V238A/1K	5292	495-LVA-251	3560-3820	0.35	225-285	45	±4
V239C/1K	5048		3500-4300	0.55	260-400	50	±1
V241C/1K	5049		3780-4040	0.35	225-285	45	±4
V243A/2FS	5463		4000-4240	0.35	225-285	45	±4
V245C/1K	—		4100-4600	0.75	235-275	65	—
V246A/2K	485		4400-4630	0.2	230-265	50	±8.5
V246C/4K	2422		4580-4860	0.25	200-250	40	±3
V247C/1K	—		4400-4850	0.3	280-360	50	±3
V249C/1K	—		4570-4750	0.2	230-265	50	±8.5
			4760-5000	0.2	240-290	50	±8

* For waveguide output the cavity is type 439-LTA-32A.

The collector voltage is preferably set 10-20 volts above resonator potential. The resonator is usually connected directly to a grounded cavity and the cathode operated at a negative potential. When frequency modulation is required, the resonator may be insulated from the cavity by a mica washer.