CLASS 331, OSCILLATORS

SECTION I - CLASS DEFINITION

This is the generic class for electrical oscillators.

SECTION II - LINES WITH OTHER CLASSES AND WITHIN THIS CLASS

ELECTRICAL OSCILLATORS OR WAVE GENERATORS OR PRODUCERS CLASSIFIED ELSEWHERE

See Classes in References to Other Classes, below.

OSCILLATOR COMBINED WITH OTHER APPARATUS OR SYSTEMS

See References to Other Classes, below.

SECTION III - REFERENCES TO OTHER CLASSES

SEE OR SEARCH CLASS:

84, Music, subclasses 671 through 722 for electric oscillator tone generation systems combined with, or restricted to use with, means to convert the generated tone waves into musical sounds. (Oscillator Combined With Other Apparatus or Systems.)

123, Internal-Combustion Engines, subclass 148 for significant internal combustion engine structure combined with high tension ignition system, which system may utilize an electric oscillator. (Oscillator Combined With Other Apparatus or Systems.)

178, Telegraphy, appropriate subclasses, for telegraph apparatus and systems that may employ electrical oscillators; see particularly subclass 43 for space induction systems, subclasses 66.1+ for alternating, sine or similar wave current telegraph systems. (Oscillator Combined With Other Apparatus or Systems.)

200, Electricity: Circuit Makers and Breakers, subclasses 19.01+ for the structure of circuit makers and breakers designed to be periodically closed and opened; subclass 136.3 for time-controlled or continuously driven thermal switch. (Electrical Oscillators or Wave Generators or Producers.)

204, Chemistry: Electrical and Wave Energy, appropriate subclasses for processes and apparatus for producing chemical changes through the agency of electrical wave energy; see particularly subclasses 155+, 157.15+ and 164+ for the processes, and subclasses 193+ for the corresponding apparatus which may utilize electrical wave energy generators or oscillators. (Oscillator Combined With Other Apparatus or Systems.)

219, Electric Heating, appropriate subclasses, for electrical heating systems or apparatus that may employ electrical oscillators as elements thereof; subclasses 600+ for inductive heating, subclasses 678+ for microwave heating, and subclasses 764+ for capacitive dielectric heating, (Oscillator Combined With Other Apparatus or Systems.)

246, Railway Switches and Signals, appropriate subclasses, for railway switching and signaling systems; see particularly subclasses 7+ for train dispatching telegraphy and telephony systems, and subclass 30 for Hertzian wave controlled automatic block signal systems, which systems may employ electrical oscillators. (Oscillator Combined With Other Apparatus or Systems.)

290, Prime-Mover Dynamo Plants, appropriate subclasses, for prime mover driven dynamo systems, wherein the prime mover is other than an electric motor and wherein the dynamo may be an alternating current generator. (Electrical Oscillators or Wave Generators or Producers Classified Elsewhere, above.)

307, Electrical Transmission or Interconnection Systems, subclasses 106+ for class appropriate waveform or wave shape determinative or pulse producing systems (usually of the delay line type) to produce periodic pulses of predetermined wave shape in the output of the network; subclass 132 provides for free-running electromagnetic circuit maker and breaker-type pulse producers. (Electrical Oscillators or Wave Generators or Producers.)

310, Electrical Generator or Motor Structure, appropriate subclasses, for the structure of alternating current generators for converting mechanical energy into electrical energy; subclasses 300+ provides for nondynamoelectric generators (or motors) while subclasses 10+ provides for dynamoelectric machines, subclasses 40+ provides for rotary machines, indented subclass 159 provides for alternating current generators and indented subclasses 169+, in particular, provides for high frequency inductor generators of the variable reluctance type (e.g., Alexanderson alternator). (Electri-

cal Oscillators or Wave Generators or Producers).

315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses, for oscillator systems similar to those classified in this class (331), but wherein no means for deriving a useful output from the system is claimed. See particularly subclasses 3+ for cathode-ray tube circuits including a cathode-ray tube combined with circuit element structure, indented subclasses 3.5+ provides for traveling wave tubes, and indented subclasses 4+ provides for cathode ray tubes including distributed parameter resonant devices (e.g., cavity resonators); subclasses 39+ provides for discharge devices in general with distributed parameter elements (e.g., wave guides, coaxial lines, which devices usually are resonators); subclasses 227+ provides for gaseous space discharge device systems with capacitor in the supply circuit, many of these systems being self-sustaining oscillators. (Electrical Oscillators or Wave Generators or Producers).

315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses, provides for systems for supplying electrical energy to cathode-ray tubes, electric lamp, diode or gaseous space discharge devices, which systems may be self-oscillatory or wherein the source of supply for the devices may be an electrical oscillator; in particular, subclasses 364+ provides for cathode-ray tube deflecting systems which may utilize an electrical oscillator as a sweep or deflection source, subclass 97 provides for pulsating or A.C. supply for the cathode or heater of plural load device systems and subclass 105 provides for pulsating or A.C. supply for the cathode or heater of a single load device, subclasses 137+ provides for polyphase A.C. supply, subclasses 160+ provides for plural power supplies which may be pulsating or A.C., and subclasses 246+ provides for pulsating or A.C. supply systems in general.

318, Electricity: Motive Power Systems, subclass 130 for reciprocating motor systems wherein the energizing winding circuit of the motor is supplied by an electrical oscillator, and subclass 341 for electric motor control systems wherein the motor armature or primary circuit is supplied by an adjustable frequency or impulse generator or oscillator to control or vary the motor speed. (Oscillator Combined With Other Apparatus Or Systems.)

322, Electricity: Single Generator Systems, appropriate subclasses, for apparatus for converting nonelectric energy directly into electrical energy, which may be alternating current. Except for subclass 2, which provides for non-magnetic type generator systems (e.g., thermoelectric, photoelectric, piezoelectric, electrostatic generators, etc.), and subclass 3, which provides for reciprocating or oscillating type generators, the remaining subclasses comprise mainly patents directed to rotating dynamoelectric machine generator systems. (Electrical Oscillators or Wave Generators or Producers Classified Elsewhere, above.)

323, Electricity: Power Supply or Regulation Systems, particularly subclasses 282 and 351 for intermittently operated final control devices.

324, Electricity: Measuring and Testing, appropriate subclasses, for electrical measuring and testing systems and apparatus which may employ electrical oscillators. For example, subclasses 307+ provides for nuclear induction testing systems utilizing adjustable frequency oscillators to determine nuclear resonance characteristics of material under test. Also, electrical oscillators may be employed in the following testing and measuring subclasses of Class 324; subclass 56 for piezoelectric crystal testing, subclasses 57+ for impedance and admittance measuring systems, subclasses 76.41+ for heterodyne type frequency measuring systems, subclass 85 for phase comparison systems utilizing frequency conversion, and subclass 118 for electricity measuring systems utilizing modulator-demodulator means. (Oscillator Combined With Other Apparatus Or Systems.)

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 291+ for miscellaneous clock or pulse waveform generation which is not free running. (Electrical Oscillators or Wave Generators or Producers Classified Elsewhere, above.)

329, Demodulators, subclasses 302, 306+, 323+, 346, and 358+ for diverse types of demodulator with oscillators. (Oscillator Combined With Other Apparatus or Systems.)

330, Amplifiers, subclass 10 for linear active element amplifiers of the modulator-demodulator type utilizing an oscillator. (Oscillator Combined With Other Apparatus or Systems.)

332, Modulators, appropriate subclasses, for electrical oscillators provided with means for varying some characteristic of the generated wave (e.g.,

amplitude, frequency or phase of a sine wave or pulse repetition rate, position, amplitude, width or slope of a repetitious pulse) in accordance with an intelligence which continually varies in an arbitrary manner. (Oscillator Combined With Other Apparatus or Systems.)

333, Wave Transmission Lines and Networks, subclass 19 for electric wave differentiating or integrating systems of the passive type; subclass 20 for passive type electric wave shaping networks, and subclasses 219+ for resonators, per se, of the distributed parameter type. (Electrical Oscillators or Wave Generators or Producers Classified Elsewhere, above.)

334, Tuners, appropriate subclasses for tuned networks for use in wave energy apparatus and comprising inductance and capacitance elements in circuit arrangement to form a resonant circuit and in which structure is provided for adjusting one or both of these elements for changing the mean resonant frequency of the circuit.

335, Electricity: Magnetically Operated Switches, Magnets, and Electromagnets, subclasses 87+ for the structure of electromagnetically operated switches of the periodic type. (Electrical Oscillators or Wave Generators or Producers Classified Elsewhere, above.)

337, Electricity: Electrothermally or Thermally Actuated Switches, subclasses 51, 92+ and 301+ for particular types of thermally controlled periodically operated switches. (Electrical Oscillators or Wave Generators or Producers Classified Elsewhere, above.)

340, Communications: Electrical, appropriate subclasses for electric signaling systems that may employ electrical oscillators; for example, subclasses 10.4 through 10.42 for interrogation response signal detail which may comprise oscillation clock signals; subclasses 12.1-12.55 for pulse responsive actuation and subclasses 13.2-13.36 for frequency responsive actuation which may comprise oscillators; and subclass 572.5 for tune resonant circuit comprising oscillator. (Oscillator Combined With Other Apparatus or Systems.)

343, Communications: Radio Wave Antennas, appropriate subclasses, for electrical apparatus or systems directed to the generation, control and radiation or reception of wave energy propagated through free space, which apparatus or systems may employ electrical oscillators; for example, subclasses 5+ provides for reflected or returned wave systems (object detection, radar), subclasses 100+ provides for directive systems. (Oscillator Combined With Other Apparatus or Systems.)

348, Television, subclasses 536+ and 735 for television systems that may include electrical oscillators. (Oscillator Combined With Other Apparatus or Systems.)

361, Electricity: Electrical Systems and Devices, subclass 203, for relay systems using an electrical oscillator (Oscillator Combined With Other Apparatus Or Systems.)

361, Electricity: Electrical Systems and Devices, subclasses 268+ for the structure of so-called spark, induction or ignition coils having integral vibratory circuit interrupters, usually in the primary winding circuit and indented subclasses 270+ wherein a capacitor is included. (Electrical Oscillators or Wave Generators or Producers.)

361, Electricity: Electrical Systems and Devices, appropriate subclasses for systems or apparatus that may employ electrical oscillators; particularly, subclass 203 which provides for the combination of an oscillator and electromagnet load and electrical oscillator controlled relay systems. (Oscillator Combined With Other Apparatus Or Systems.)

363, Electric Power Conversion Systems, appropriate subclasses for wave generating or producing systems analogous to those classified in Class 331. Some of the systems for converting direct current to alternating current (e.g., derectifiers, inverters) in Class 363 are indistinguishable from the oscillators in Class 331. The distinction appears to be one of degree, that is, the inverters classified in Class 363 usually are designed to convert direct current power to alternating current power at commercial power frequency (e.g., 25, 50, or 60 cycles per second). See subclasses 1+ for combined conversion systems, subclasses 9+ for phase and frequency conversion, and subclasses 15+ and 34+ for plural current conversion systems (e.g., D.C.-A.C.-D.C., and A.C.-D.C.-A.C.); subclasses 13+ for current conversion systems (rectification, derectification), subclasses 102+ for dynamoelectric machine converters, subclasses 111+ for electronic tube converters, subclasses 123+ for semiconductor-type converters, subclass 140 for impedance-type converters, subclasses 106+ for circuit interrupter-type converters, and subclasses 157+ for frequency converting systems wherein input alternating current of one frequency is converted

into output alternating current without intermediate conversion to direct current. (Electrical Oscillators or Wave Generators or Producers Classified Elsewhere).

363, Electric Power Conversion Systems, subclasses 1+ for cascaded or combined diverse conversion, subclasses 13+ for current conversion systems, subclasses 148+ for phase conversion, and subclasses 157+ for frequency conversion systems. (Oscillator Combined With Other Apparatus or Systems.)

370, Multiplex Communications, appropriate subclasses for oscillators used with multiplexing.

373, Industrial Electric Heating Furnaces, appropriate subclasses, for electric furnaces that may employ an oscillator for supplying or controlling the electric current for the furnaces, see particularly subclasses 138+ for induction furnaces that may utilize an oscillator to supply the furnace charge melting inductor. (Oscillator Combined With Other Apparatus or Systems.)

375, Pulse or Digital Communications, subclasses 354+ for pulse communications synchronization. (Oscillator Combined With Other Apparatus or Systems.)

455, Telecommunications, subclasses 91+ for transmitters using electrical oscillators; subclasses 130+ for receivers using electrical oscillators; subclasses 145+ for local oscillators in panoramic receivers; subclass 196 for local oscillator tuning in radio receivers; subclasses 208+ for local oscillator control in frequency modulation receivers; subclasses 255+ for local oscillator control in radio receiver automatic frequency control; and subclasses 313+ for local oscillators insuperhetrodyne receivers. (Oscillator Combined With Other Apparatus or Systems.)

505, Superconductor Technology: Apparatus, Material, Process, subclasses 150+ for high temperature (T_c 30 K) superconducting devices; and particularly subclass 204 for oscillators or subclass 180 for masers made with high temperature superconducting material. (Electrical Oscillators or Wave Generators or Producers Classified Elsewhere, above.)

505, Superconductor Technology: Apparatus, Material, Process, subclasses 150+ for high temperature (T_c 30 K) superconducting systems that may contain oscillators; particularly subclass 204 for oscillators, or subclass 180 for masers made with high temperature superconducting material. (Oscillator Combined With Other Apparatus or Systems.)

607, Surgery: Light, Thermal, and Electrical Application, subclasses 72+ for oscillator systems combined with or forming a part of a therapeutic device. (Oscillator Combined With Other Apparatus or Systems.)

SECTION IV - GLOSSARY

ACTIVE ELEMENT

A control device for exerting a control on a source of energy proportional to an applied control signal. A conventional triode, having cathode, control grid on anode, connected as a conventional amplifier, is an example of an active network, a control potential applied to the grid causing a flow of anode current, supplied by the anode biasing source, proportional to the magnitude of the control potential.

AMPLITUDE STABILIZATION

The correction for, prevention of, or compensation for an undesired change in amplitude of the generated waves of the oscillator from a desired value.

AUTOMATIC FREQUENCY STABILIZATION

The restoration of the generated frequency of the oscillator to a desired value by sensing the deviation in frequency, in direction and amount, from the desired value and instituting a corrective action proportional to sensed deviation to adjust the frequency determining element of the oscillator in such direction and amount so as to return the oscillator frequency to the desired value.

BEAM TUBE

An active element comprising a source of charged particles, means for concentrating the particles into a directed beam, means for exerting a control on the beam (e.g., beam accelerating electrode, control grid, deflecting means, slow wave structure, buncher type resonator, reflector electrode, etc.) and means for deriving output energy from the controlled beam.

BEAT FREQUENCY

The resulting difference (or sum) frequency wave, among other waves, produced when two waves of different frequencies are combined in a nonlinear device.

DISTRIBUTED PARAMETER RESONATOR

A resonator of the distributed network type, the capacitance, inductance and resistance of which cannot be isolated into separate lumped capacitors, inductors or resistors and wherein the time factor of propagation of wave energy in the network is appreciable.

ELECTRICAL NOISE OR RANDOM WAVE GENERATOR

A wave generator system wherein the frequency determining element consists of a material medium including electrically charged, chargeable or ionizable particles, the application of electrical energy to the medium by the driving means causing random translatory motion of the charged or ionizable particles resulting in the generation of an infinite number of waves of different frequencies which are fortuitously related, having no definite phase relationship, period, amplitude or shape.

ELECTROMECHANICAL RESONATOR

A resonator comprising an electrically driven material body wherein the mass and compliance parameters of the body determine the mechanical period of vibration of the body and wherein the driving electrical circuit for the body exhibits electrical resonance characteristics which are determined by the mechanical period of vibration of the body.

FREE RUNNING OSCILLATOR

An oscillator wherein the driving system continuously supplies the losses of the frequency determining means so as to produce sustained oscillations.

FREQUENCY ADJUSTING MEANS

Means for setting or controlling the generated frequency of the oscillator by varying a frequency determining element of the oscillator.

FREQUENCY DETERMINING ELEMENT

A passive network or device of the resonant or time constant type, which network or device forms the element of the oscillator which sets or determines the frequency or periodicity of the generated oscillations.

FREQUENCY STABILIZATION

The correction for, prevention of, or compensation for an undesired drift or change in the frequency of the generated waves of the oscillator from a desired value.

GASEOUS SPACE DISCHARGE DEVICE

A space discharge device having at least two electrodes in a gaseous or vapor medium, conduction between the electrodes taking place by ionization of the medium.

HARMONIC OR SINE WAVE OSCILLATOR

A free running oscillator for generating sinusoidal or nearly sinusoidal waves. They usually utilize a resonator of the lumped LC or the distributed parameter type as the frequency determining element.

HETERODYNE FREQUENCY

Beat frequency (which see).

KLYSTRON

A beam tube including at least two apertured cavity resonators, the beam of charged particles passing through the apertures of the resonators in succession, and a collector electrode being provided to intercept the beam after passing through the resonators. The first resonator causes bunching of the particles passing therethrough, the bunched particles then travel in a field-free region where further bunching occurs and then the bunched particles enter the second resonator giving up their energy to excite it into oscillations.

LC RESONATOR

A resonant circuit comprising separate inductance and capacitance elements, i.e., lumped inductor and capacitor elements.

MAGNETICALLY CONTROLLED SPACE DISCHARGE DEVICE

An active element comprising means for producing a space discharge of charged particles and having further means for subjecting the space discharge to the direct control of a magnetic field and an electric field.

MAGNETRON

A magnetically controlled space discharge device comprising a linear cathode, an anode, usually cylindrical, coaxial therewith, the magnetic field being parallel to longitudinal axis of the cathode, while the electric field is transverse thereto.

MOLECULAR OR PARTICLE RESONANT OSCILLATOR

An oscillator wherein the frequency determining element consists of a material medium comprising particles, molecules or atoms, the application of electrical energy by the driving means to the medium setting the particles, molecules or atoms into a state of vibration or oscillation, the vibration or oscillation being that of the particle, molecule or atom itself and not the vibration or oscillation caused by the translational motion of the particle, molecule or atom as a whole.

MOLECULAR RESONATOR

A resonator comprising a material medium and wherein the vibration or oscillation of the molecules of the medium determines the resonant frequency of the resonator. The vibration or oscillation is of the molecule itself and not that due to the translational motion of the molecule as a whole. See, also, above, the definition of a molecular or particle resonant oscillator.

NEGATIVE RESISTANCE OR NEGATIVE TRANSCONDUCTANCE DEVICE

An active element of the two terminal type having a volt-ampere characteristic with negative slope over the range of voltages or currents wherein it is operative, that is, an increase in voltage results in a decrease in current, or vice versa.

OSCILLATOR

A system for initiating and maintaining oscillations whose frequency or period is fixed or determined by the physical parameters of the system. The fundamental elements required by an oscillator system are: (1) a frequency or period determining element, such as a resonator or timing means, (2) a driving system for the frequency or period determining element, and (3) means for deriving a useful output from the oscillator system. This class is restricted to oscillators for generating electrical oscillations or waves and specifically excludes alternating current generators of the mechanically driven dynamo-electric machine type.

RC OR RL FREQUENCY DETERMINING NETWORK

A network of the nonresonant type comprising either resistive and capacitive or resistive and inductive components. The network, by way of example, may be employed: (1) as a frequency determining phase shift network in a sine wave oscillator of the phase shift type, (2) as a frequency determining bridge network in sine wave bridge oscillators, such as the Wien bridge type of the double-T type or (3) as a time constant network in a relaxation oscillator to determine the period of the generated relaxation oscillations.

REFLEX KLYSTRON

A klystron utilizing only a single apertured cavity resonator through which the beam of charged particles passes in one direction, a repeller electrode being provided to repel or redirect the beam after passage through the resonator back through the resonator in the other direction and in proper phase to reinforce the oscillations set up in the resonator.

RELAXATION OSCILLATOR

A free running oscillator for generating decidedly non sinusoidal waves. They usually utilize a time constant network of the RC or RL type as the frequency determining element.

RESONATOR OR RESONANT CIRCUIT

A frequency determining means comprised of substantially pure reactances of opposite signs (i.e., mass and compliance in a mechanical resonator or inductive and capacitive reactance in an electrical resonator) wherein the phenomenon of resonance (i.e., when the positive and negative reactances are equal) is relied upon to determine the frequency of the generated waves.

RETARDING FIELD TUBE

A tube having at least three electrodes, i.e., a source of electrons (cathode), control electrode (grid) and anode or plate electrode, the control electrode being biased positively with respect to the other electrodes. The electrode bias potentials are so chosen that the electrons attracted from the cathode by the positive grid pass through the grid and are slowed down by the repelling effect of the less positive (or negative) anode field and are returned back to or through the grid. This phenomenon is repeated again and again so that a cloud of electrons are caused to sweep back and forth through the grip, giving up energy to the grid at a frequency which is a function of the transit time of the cloud of electrons. The Barkhausen Kurz, Gill-Morrell and the reflex klystron are examples of oscillators utilizing a retarding field tube.

SEMICONDUCTOR ACTIVE ELEMENT

A solid state active element comprised of a solid material having a conductivity intermediate that of a good insulator and a good conductor.

SHOCK EXCITED RESONATOR OSCILLATOR

An oscillator of the nonself-sustaining type wherein the driving system applies an electrical impulse to the frequency determining element (i.e., resonator), which element is then permitted to oscillate freely at its natural frequency.

SOLID STATE ACTIVE ELEMENT

A two-terminal or fourterminal active element of electrically conductive, semi-conductive, ferromagnetic or ferroelectric material in the solid state. Examples are: The Hall effect plate, semi-conductor (transistor), magnetic type and dielectric type amplifiers or negative resistance devices.

SPACE DISCHARGE DEVICE

A device comprising at least two spaced electrodes and wherein conduction by charged particles, e.g., electrons, or ions, takes place between the electrodes.

STABILIZATION

The maintenance of a desired condition or state of the oscillator which condition or state may be subject to change.

TRANSISTOR

A semi-conductive active element having at least three electrodes so arranged that the application of electrical energy to one electrode controls the flow of current between two other electrodes.

TRANSIT TIME OSCILLATOR

An oscillator system wherein the time of flight or transit angle of charged particles between electrodes of a space discharge device is an appreciable part of the cycle of the generated oscillations, the energy derived from the moving particles being continuously supplied to the frequency determining network of the oscillator in proper phase to sustain oscillations. Transit time effects are utilized in magnetron, beam tube and retarding field type oscillators.

TUBE

An active element of the space discharge device type. See: active element; space discharge device.

SUBCLASSES

1 AUTOMATIC FREQUENCY STABILIZATION USING A PHASE OR FREQUENCY SENSING MEANS:
This subclass is indented under the class definition. Subject matter wherein the oscillator has means to adjust its generated frequency and is also provided with a control circuit or loop for controlling the oscillator frequency adjusting means in response to deviation of the generated frequency of the oscillator from a desired frequency or range of frequencies in such direction and amount as to restore the oscillator frequency to the desired frequency or range of frequencies. The control circuit or loop includes: (1) discriminator means for sensing the deviation of the generated frequency of the oscillator in direction and amount and for producing control energy proportional to such deviation, and (2) means responsive to the control energy and coupled to frequency adjusting means of the oscillator to vary the frequency adjusting means in such direction and amount as to restore the generated frequency of the oscillator to the desired frequency or range of frequencies.

(1) Note. The automatic frequency stabilizing systems defined above are to be distinguished from the frequency stabilizing systems classified lower in the schedule (see the search notes below) by the fact that the A.F.S. systems rely on sensing a drift in frequency of the generated oscillations and asserting a corrective control to adjust a frequency determining element of the oscillator in the proper sense to bring it back on frequency, whereas the frequency stabilizing systems classified elsewhere do not sense a drift of frequency and retune the oscillator as a function of such drift, but rely on adding means to the oscillator system to correct or compensate, or to prevent, changes in oscillator circuit parameters that tend to cause an undesired change in oscillator frequency.

Such means may, for example, compensate for the affects of changes in humidity, temperature, current load impedance, tube impedance, electrode bias potential, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

41, for beat frequency oscillators with frequency stabilizing means. See also, (1) Note, above.

88, for magnetron type oscillators with frequency stabilizing means. See, also, (1) Note, above.

175+, for oscillators in general with frequency stabilizing means. See, also (1) Note, above.

SEE OR SEARCH CLASS:

322, Electricity: Single Generator Systems, subclass 32 for dynamoelectric generator systems with frequency responsive devices or networks for automatically maintaining the frequency of the generated wave constant.

329, Demodulators, subclasses 315+ for frequency demodulators and subclasses 345+ for phase demodulators.

332, Modulators, subclasses 123+ for average condition control in frequency modulator distortion prevention and subclasses 155+ and 159+ for average condition control in an amplitude modulator.

334, Tuners, subclass 13 for a tuner having a saturable core element combined with means to automatically center the frequency of the circuit; subclass 16 for a tuner having a reactance tuning means combined with automatic frequency centering means, and subclasses 26+ for tuners having an electromagnetic operator combined with automatic frequency centering means.

348, Television, subclasses 536+ for synchronizing systems which may utilize oscillators of the automatic frequency stabilized type and subclass 735 for television tuners which may utilize oscillators of the automatic frequency stabilized type.

375, Pulse or Digital Communications, subclasses 354+ for synchronizing systems which may use oscillators of the automatic frequency stabilized type.

455, Telecommunications, subclasses 91+ for radio transmitters using oscillators of the automatic frequency stabilized type; and subclasses 130+ for receivers using oscillators of the automatic frequency stabilized type.

2 Plural oscillators controlled:

This subclass is indented under subclass 1. Subject matter wherein the generated frequency of two or more oscillators is automatically stabilized. The oscillators may have A.F.S. loops individual to each oscillator or a single A.F.S. loop may control two or more oscillators, or any combination of A.F.S. loops may be employed, provided the generated frequency of two or more oscillators is automatically stabilized.

SEE OR SEARCH THIS CLASS, SUBCLASS:

46+, for plural oscillator systems in general.

3 Molecular resonance stabilization:

This subclass is indented under subclass 1. Subject matter wherein the frequency discriminator or sensing means is of the molecular or atomic resonance type, comprising a medium, which may be solid, liquid or gaseous, the frequency selective properties of which are due to the vibration or oscillation of the individual molecule or atom itself and are not due to the translational motion of the molecule or atom as a whole.

SEE OR SEARCH THIS CLASS, SUBCLASS:

9, for A.F.S. systems utilizing a distributed parameter type discriminator.

25+, for A.F.S. systems utilizing a signal or phase comparing type discriminator having at least two inputs for the signals (of the controlled oscillator and reference source) to be compared.

32+, for A.F.S. systems having a single input type discriminator.

78, for electrical noise or random wave generators wherein the translatory

motions of charged or excited particles or molecules are utilized to generate oscillations.

94.1, for oscillators of the molecular or particle resonant type (e.g., maser) wherein a molecular or particle resonant solid, liquid or gas comprises the active element of the oscillator.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 251 for devices for producing and propagating a unidirectional stream of neutral molecules or atoms through a vacuum, usually at thermal velocity and including means to excite the molecules or atoms at a resonant frequency.

4 Search sweep of oscillator:

This subclass is indented under subclass 1. Subject matter wherein means are provided, in addition to the A.F.S. loop, for varying the oscillator frequency through a range of frequencies. The systems classified herein are chiefly directed to means for restoring A.F.S. control wherein such control is lost due to the fact that the oscillator frequency for some reason, such as during "warm-up" or some other disturbance, lies outside the "capture" range of the frequency discriminator, the sweep range of frequencies includes the "capture" range of the discriminator and serves to bring the oscillator frequency within the "capture" range and thereby render the A.F.S. effective.

SEE OR SEARCH THIS CLASS, SUBCLASS:

23+, for oscillators wherein low frequency modulation of the generated oscillations is utilized for A.F.S., signals representative of the frequency modulated oscillations being compared with signals of the modulating source.

106, for oscillator systems of the periodic amplitude and frequency varying type.

178, for oscillators in general provided with cyclic frequency sweeping means.

5 Magnetron oscillator:

This subclass is indented under subclass 1. Subject matter wherein the oscillator provided with A.F.S. is of the magnetic and electric field controlled space discharge device type.

SEE OR SEARCH THIS CLASS, SUBCLASS:

86+, for magnetron type oscillators in general, particularly subclass 88, for such oscillators provided with frequency stabilization means of the nonautomatic type.

6 Klystron oscillator:

This subclass is indented under subclass 1. Subject matter wherein the oscillator provided with A.F.S. is of the beam tube type utilizing hollow resonator electron bunching or electron bunching and catching means for determining the generated frequency of the oscillator. Such oscillators are generally designated as klystron oscillators.

SEE OR SEARCH THIS CLASS, SUBCLASS:

83, for multi-cavity type klystron oscillators.

84, for reflex type klystron oscillators.

7 Plural controls:

This subclass is indented under subclass 6. Subject matter wherein the oscillator is provided with two or more oscillator frequency controls as part of the A.F.S. system. For example, the A.F.S. system for a reflex klystron oscillator may (1) control a motor to tune the cavity for coarse tuning and at the same time (2) supply a bias voltage to the reflector electrode for fine tuning of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

10+, for single oscillators provided with two or more A.F.S. controls.

8 Transistorized controls:

This subclass is indented under subclass 1. Subject matter wherein the A.F.S. circuit of the oscillator includes semiconductor means, such as transistors.

SEE OR SEARCH THIS CLASS, SUBCLASS:

107+, for oscillators wherein the active element is of the solid state type and indented subclasses 108+ wherein the active element is of the transistor type.

9 Oscillator with distributed parameter-type discriminator:

This subclass is indented under subclass 1. Subject matter wherein the A.F.S. control circuit of the oscillator is provided with a frequency sensing means of the distributed parameter type (e.g., cavity resonator).

SEE OR SEARCH THIS CLASS, SUBCLASS:

3, for A.F.S. systems utilizing a molecular resonance type discriminator.

25+, for A.F.S. systems wherein the discriminator is of the signal or phase comparing type having at least two inputs for the signals (of the controlled oscillator and reference source) to be compared.

32+, for A.F.S. systems having a single input type discriminator.

10 Plural A.F.S. for a single oscillator:

This subclass is indented under subclass 1. Subject matter wherein oscillator is provided with two or more A.F.S. means, each having a different effect in tuning the oscillator. For example, one A.F.S. means may provide a coarse tuning control and another A.F.S. means may effect a fine tuning control of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

2, for plural oscillators involving plural A.F.S. control loops.

7, for klystron oscillators provided with two or more oscillator frequency controls as part of the A.F.S. systems.

11 Plural comparators or discriminators:

This subclass is indented under subclass 10. Subject matter wherein the oscillator system is provided with two or more comparators or discriminators, each of which may be associated with a separate A.F.S. control. By way of examples (1) one discriminator may have a broad band frequency response characteristic and another discriminator may have a narrow band frequency response characteristic or (2) one discriminator may be of the frequency sensitive type, while another discriminator may be of the phase sensitive type.

12 With phase-shifted inputs:

This subclass is indented under subclass 11. Subject matter wherein at least two comparators are so arranged that the outputs of the controlled oscillator and a reference oscillator are directly compared in one comparator and the output of the controlled oscillator is phase-shifted and then compared with the reference oscillator in a second comparator, the outputs of the comparators then being combined in a control circuit to effect tuning of the controlled oscillator.

13 Motor control of oscillator:

This subclass is indented under subclass 10. Subject matter wherein at least one of the A.F.S. controls includes an electric motor for electromechanically adjusting a tuning reactance of the oscillator. Usually the motor control is utilized for coarse tuning while another A.F.S. control of the electronic type (e.g., including a reactance tube) is utilized for fine tuning of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

24, for oscillators wherein low frequency modulation of the generated oscillations is utilized for A.F.S. and wherein the signal comparator is of the electric motor type.

29, for oscillators wherein an electromechanical signal comparator is utilized in the A.F.S. loop.

35, for A.F.S. oscillators with electromechanically controlled oscillator frequency adjusting means.

14 With intermittent comparison controls:

This subclass is indented under subclass 1. Subject matter wherein means are provided to open and close the A.F.S. loop of the oscillator periodically. By way of example, a periodically actuated switch may connect the input of the comparator in the A.F.S. loop of an oscilla-

tor alternately to the oscillator output and the reference oscillator output.

15 Amplitude compensation:

This subclass is indented under subclass 1. Subject matter wherein the A.F.S. loop circuit of the oscillator is provided with means to limit the amplitude, or to maintain the amplitude constant, or to correct or otherwise compensate for undesired changes in amplitude of a control signal in the loop circuit, or to disable the A.F.S. loop if the amplitude of the control signal (e.g., reference oscillator signal) is below a predetermined level (e.g., the level wherein noise signals may adversely affect the oscillator A.F.S. and thereby cause the generated frequency to be shifted outside its proper range).

SEE OR SEARCH THIS CLASS, SUBCLASS:

40, for beat frequency oscillators provided with amplitude adjustment or control means.

109, for transistor oscillators provided with amplitude stabilization or control means.

182+, for oscillators in general with amplitude control or stabilization.

16 Tuning compensation:

This subclass is indented under subclass 1. Subject matter wherein the A.F.S. controlled oscillator includes means for setting the frequency of the generated oscillations to any selected frequency within a predetermined frequency range, means being provided to interrupt or otherwise deactivate the A.F.S. control loop of the controlled oscillator while changing the generated frequency from one value to another so as to prevent the A.F.S. loop from tending to hold the oscillator frequency to its previously set value, that is, the A.F.S. tends to drag.

SEE OR SEARCH CLASS:

455, Telecommunications, subclasses 255+ for similar A.F.S. systems utilized in radio receivers.

17 Particular error voltage control (e.g., intergrating network):

This subclass is indented under subclass 1. Subject matter wherein the A.F.S. loop of the oscillator is provided with means to modify or control the error voltage so as to compensate or correct for undesired changes in the error voltage brought about by some deficiency in the oscillator system, such as a drift in reference frequency, hunting due to instability around the A.F.S. loop, undesired shift in phase of side band frequencies, and so forth.

18 With reference oscillator or source:

This subclass is indented under subclass 1. Subject matter wherein the A.F.S. circuit of the controlled oscillator includes a source of constant frequency, which source serves as a frequency standard, means being provided for comparing the frequency of the oscillations generated by the controlled oscillator with the standard frequency, the frequency comparison means producing an electrical control or error signal which is a measure of the deviation, in direction and amount, of the controlled oscillator frequency from the standard frequency, the control or error signal being applied to the frequency adjustment means of the controlled oscillator in such a manner as to reduce the frequency difference between the generated oscillations of the controlled oscillator and the oscillations of the constant frequency source to a minimum.

SEE OR SEARCH CLASS:

329, Demodulators, subclasses 323+ for a frequency demodulator using an oscillator and subclass 346 for a phase demodulator using an oscillator.

19 Spectrum reference source:

This subclass is indented under subclass 18. Subject matter wherein the reference source is a spectrum generator producing a plurality of waves of different frequencies, which waves are simultaneously fed to the comparator or discriminator of the A.F.S. circuit of the controlled oscillator means being provided wherein the generated waves of the controlled oscillator may be selectively locked-in to the desired frequency of the spectrum.

(1) Note. This subclass does not include those systems wherein a filter or harmonic selecting network is provided for selecting a single frequency from the range of frequencies of the spectrum source, the selected frequency being fed to the comparator. Such systems are

elsewhere in subclasses 1+, depending on the type of oscillator or type of A.F.S. control.

20 T.V. sync type:
This subclass is indented under subclass 18. Subject matter wherein the oscillator system is of the type peculiarly adapted for use in television systems (e.g., vertical or horizontal sweep generators), the reference source comprising synchronizing pulses (usually of short duration) which pulses are compared with signals representative of the generated waves of the controlled oscillator in a phase comparison means, the resulting control or error signal from the comparison means being utilized to adjust the frequency of the controlled oscillator to restore it to the desired relationship with reference frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:
143+, for relaxation oscillators in general, especially indented subclass 145, for multivibrators with synchronizing, triggering or pulsing circuit, indented subclass 149, for blocking oscillators with synchronizing, triggering or pulsing circuit and indented subclass 153, for relaxation oscillators in general with synchronizing, triggering or pulsing circuit.

SEE OR SEARCH CLASS:
315, Electric Lamp and Discharge Devices: Systems, subclasses 1+ for cathode-ray tube circuits, especially indented subclasses 378, 379+ and 391+ for cathode ray sweep circuits which may utilize sweep generators with A.F.S. control combined with significant cathode ray control means or cathode-ray tube structure, e.g., deflecting plates, deflecting coils, etc.
348, Television, subclasses 536+ for automatic frequency stabilizing systems as an element of a more comprehensive system, e.g., controlled oscillator combined with sync separator.
375, Pulse or Digital Communications, subclasses 354+ for synchronizers in general.

21 Lock to power line:
This subclass is indented under subclass 20. Subject matter wherein means are provided to stabilize or lock the controlled oscillator to the low frequency (e.g., 50, 60 C.P.S.) power current derived from a commercial alternating current supply line.

22 Plural significant heterodyne stages:
This subclass is indented under subclass 18. Subject matter wherein two or more frequency beating or heterodyning means, or stages, are effectively connected in the A.F.S. loop of the controlled oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
31, for oscillators with plural heterodyne stages in the A.F.S. loop, but wherein the discriminator is of the single input type, i.e., no comparison of the oscillator frequency with a reference frequency or source is made at the discriminator.
38+, for beat frequency oscillator systems including plural beating or heterodyning means.

23 Sensing modulation (e.g., frequency modulation controlled oscillator:
This subclass is indented under subclass 18. Subject matter wherein means are provided to frequency modulate the generated oscillations of the controlled oscillator by a low frequency reference source, signals representative of the modulated signal being compared with signals from the low frequency reference source in a signal comparator, the error signal from the output of the comparator being utilized to restore the generated frequency of the oscillator to the desired relationship with the reference frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:
4, for A.F.S. oscillators wherein the frequency of the oscillator is swept over a range of frequencies so as to bring the generated frequency within the “capture” range of the discriminator.

24 With motor comparator:

This subclass is indented under subclass 23. Subject matter wherein the signal comparator comprises a polyphase motor (usually of the two phase or split-phase type) having at least two phase windings, the signal representative of the low frequency modulated oscillations of the controlled oscillator being applied to one phase winding and the signal representative of the low frequency source being applied to another phase winding of the motor, the rotor of the motor is mechanically coupled to the frequency adjusting means of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

13, for a single oscillator with plural A.F.S. means wherein at least one of the A.F.S. means includes an electric motor for adjusting an oscillator frequency control means.

29, for A.F.S. oscillators with electromechanical signal comparator means.

35, for A.F.S. oscillators with electromechanical controlled oscillator frequency adjusting means.

25 Signal or phase comparator:

This subclass is indented under subclass 18. Subject matter wherein a particular or significant signal or phase comparing network is utilized in the A.F.S. loop of the controlled oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

11, for single oscillator with plural A.F.S. means and including plural comparators.

32, for A.F.S. systems wherein the discriminator is of the single input type and wherein no signal comparison is made.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclasses 76.52+ for systems for measuring the frequency of a cyclic current or voltage by phase comparison with a standard cyclic current or voltage, and subclasses 76.77+ for systems for measuring electricity utilizing phase comparison means (e.g., phase comparison between cyclic pulse voltage and sinusoidal current).

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 2+ for miscellaneous phase comparison circuits and subclasses 39+ for miscellaneous frequency comparing circuits.

329, Demodulators, subclasses 315+ for frequency demodulators and subclasses 345+ for phase demodulators.

26 Plural diode type:

This subclass is indented under subclass 25. Subject matter wherein the signal or phase comparator includes two or more unilaterally conducting devices (e.g., diodes) as elements thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

33, for oscillator systems utilizing a single input, nonsignal comparing, discriminator of the plural diode type in the A.F.S. control loop thereof.

27 Plural active element (e.g., triodes):

This subclass is indented under subclass 25. Subject matter wherein the signal of phase comparator includes two or more active elements (e.g., triodes) as elements thereof.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclass 89 for electric current or voltage measuring systems utilizing a phase comparator, a grid-controlled tube means constituting an element or elements thereof.

28 Unilateral element (e.g., diode):

This subclass is indented under subclass 25. Subject matter wherein the signal or phase comparator includes a unilaterally conducting element (e.g., diode, triode) as an element thereof.

SEE OR SEARCH CLASS:

324, Electricity: Measuring and Testing, subclasses 87+ for electric current or voltage measuring systems utilizing phase comparison means with nonlinear device (e.g., rectifier, grid controlled tube, etc.).

29 Electromechanical:
This subclass is indented under subclass 25. Subject matter wherein the signal or phase comparator is of the electromechanical type (e.g., two-phase motor, the reference source being applied to one phase winding and the controlled oscillator output being applied to the other phase winding) or a frequency comparing means of the synchroscope type.

SEE OR SEARCH THIS CLASS, SUBCLASS:
24, for A.F.S. controlled oscillators of the modulated oscillator type (e.g., frequency modulation of controlled oscillator) utilizing an electric motor comparator.

SEE OR SEARCH CLASS:
324, Electricity: Measuring and Testing, subclass 90 for electric current and voltage measuring systems utilizing a phase comparator of the electrodynamometer type, and subclass 91 for phase comparators of the synchroscope type.

30 With stable heterodyne oscillator or source:
This subclass is indented under subclass 1. Subject matter wherein the A.F.S. loop of the controlled oscillator comprises (1) means for beating or heterodyning the generated oscillations of the controlled oscillator with the oscillations of the reference oscillator or source and (2) a single input discriminator means responsive to the resulting heterodyned oscillations, which discriminator produces an output error or control signal proportional to the frequency deviation of the controlled oscillator from that of the reference source, the error signal being utilized to restore the generated frequency of the controlled oscillator to the desired relationship with the reference frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:
37+, for beat frequency oscillators, per se.

31 Plural significant heterodyne stages:
This subclass is indented under subclass 30. Subject matter wherein two or more beating or heterodyning means are utilized in the A.F.S. loop of the controlled oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
22, for oscillators having plural heterodyne stages in the A.F.S. loop, but wherein heterodyned oscillations of the controlled oscillator and the reference source signal are compared in a signal or phase comparator.
38, for beat frequency oscillator systems including plural beating or heterodyning means.

32 With particular discriminator (e.g., LPF and HPF):
This subclass is indented under subclass 30. Subject matter wherein a significant or particular single-input frequency deviation detecting network or discriminator is utilized in the A.F.S. loop of the controlled oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
3, for A.F.S. systems utilizing a molecular resonance type discriminator.
9, for A.F.S. systems utilizing a distributed parameter type discriminator.
25+, for A.F.S. systems wherein the discriminator is of the signal or phase comparing type, having at least two inputs for the signals (of the controlled oscillator and reference source) to be compared.

33 Plural diode type:
This subclass is indented under subclass 32. Subject matter wherein the frequency deviation detecting network or discriminator includes two or more unilaterally conducting devices (e.g., diodes) as elements thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
26, for oscillator systems utilizing plural input signal or phase comparators of the plural diode type in the A.F.S. control loop thereof.

34 Particular frequency control means:
This subclass is indented under subclass 1. Subject matter wherein the controlled oscillator includes a significant or particular means for controlling, adjusting or varying its generated frequency as a function of the error signal from

the discriminator in the A.F.S. loop of the controlled oscillator. The particular means may be (1) the adjustable tuning element of the controlled oscillator (e.g., a passive reactance or a reactance tube comprising an element of the oscillator tank circuit), or (2) the means for adjusting the tuning element of (1), (such as an electric motor drive therefor), or (3) the combination of (1) and (2).

SEE OR SEARCH THIS CLASS, SUBCLASS:

177+, for oscillators in general with particular frequency adjustment means.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, subclasses 219+ for resonators of the distributed parameter type which may be provided with frequency adjusting means.

334, Tuners, appropriate subclasses for tuners, per se. See the reference to Class 334 under subclass 1 above.

35 Electromechanical (e.g., motor):

This subclass is indented under subclass 34. Subject matter wherein the frequency control means includes an electromechanical drive for the tuning or frequency adjusting element of the controlled oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

13, for a single oscillator with plural A.F.S. means and wherein electric motor means controls or adjusts the oscillator frequency determining means.

24, for A.F.S. controlled oscillators of the modulated oscillator type (e.g., frequency modulation of the controlled oscillator) utilizing an electric motor comparator.

29, for A.F.S. controlled oscillators having a signal or phase comparator of electromechanical type.

36 Reactance device (e.g., variable capacitors, saturable inductors, reactance tubes, etc.):

This subclass is indented under subclass 34. Subject matter wherein the particular frequency control means comprises an adjustable or variable reactance element or elements of the frequency determining network of the controlled oscillator. Examples of such elements are: reactance tubes, saturable core inductors, adjustable capacitors or inductors, etc.

37 BEAT FREQUENCY:

This subclass is indented under the class definition. Subject matter comprising a signal producing system including a signal combining device (e.g., mixer, modulator) having signal input circuit means and a signal output circuit, at least two oscillators or a single oscillator simultaneously generating plural frequencies being connected to the input circuit means, the arrangement being such that the sum and/or difference frequencies (usually the difference frequency) of the oscillations generated by the respective oscillators or of the plural frequency oscillator appears in the output circuit of the signal combining means.

(1) Note. In addition to beat frequency oscillators the beat frequency principle is made use of in other systems. In general, beat frequency oscillators classified herein comprise means for beating two nonarbitrary sources of slightly different frequencies and of substantially equal amplitudes, the proximate purpose of the system being to produce a stable, high level, low frequency output wave (by selecting the lower side band). Modulators classified in Class 332 are directed to means for beating a source of carrier frequency of high amplitude with a signal wave of low amplitude, which signal wave varies arbitrarily in a continuous manner in accordance with some intelligence (e.g., sound). Radio receiver mixers or converters classified in Class 455, Telecommunications, are similar to the modulators of Class 332 except that the modulating signal wave contains, in addition to an arbitrary signal wave a large predictable component (the incoming carrier wave).

SEE OR SEARCH THIS CLASS, SUBCLASS:

19, for automatic frequency stabilized oscillators with a spectrum frequency reference source involving beat frequency generation in the stabilizing circuit.

22, for automatic frequency stabilized oscillators with signal comparator and having plural heterodyne stages in the stabilizing circuit.

30+, for automatic frequency stabilized oscillators with a stable heterodyne oscillator or source.

51, for frequency divider systems comprising plural oscillators in cascade.

53, for frequency multiplier systems comprising plural oscillators in cascade.

76, for oscillators combined with an output coupling network, with space discharge device or unilaterally conductive device therein, for harmonic producing or selecting.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclass 424 for nonoptical parametric amplifier frequency converters, per se.

332, Modulators, see (1) Note above. Consult also the notes and search notes appended to the class and subclass definitions of Class 332 as to other fields of search for beat frequency systems.

359, Optical: Systems and Elements, subclasses 326+ for optical frequency translators.

455, Telecommunications, subclasses 130+ for radio receivers using the beat frequency principle (in the form of autodyne, homodyne, superheterodyne and other types of beat reception), subclasses 313+ for radio receiver mixers or converters. See (1) Note above.

38 Plural beating:

This subclass is indented under subclass 37. Subject matter wherein the system includes at least two signal combining means (i.e., mixers or modulators).

SEE OR SEARCH THIS CLASS, SUBCLASS:

22, for automatic frequency stabilized oscillators with reference oscillator or source and including plural heterodyne stages in the frequency control circuit.

31, for automatic frequency stabilized oscillators with plural heterodyne stages in the frequency control circuit.

SEE OR SEARCH CLASS:

455, Telecommunications, subclasses 314+ for radio receivers that may have plural heterodyning stages.

39 Single channel:

This subclass is indented under subclass 38. Subject matter wherein the plural mixers or modulators are connected in concatenation or cascade in a single channel, that is, the output of one mixer is connected to the input of a succeeding mixer, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

51, for frequency divider systems comprising plural oscillators connected in cascade.

53, for frequency multiplier systems comprising plural oscillators connected in cascade.

40 Frequency or amplitude adjustment or control:

This subclass is indented under subclass 37. Subject matter wherein (1) means are provided for changing the generated frequency of at least one of the beating oscillators from one frequency to another, usually over a range of frequencies, the change may be by discrete steps or continuous over the range, or (2) means are provided for changing the amplitude of the generated oscillations of at least one of the beating oscillators or for effecting a change in amplitude at some other point in the system, e.g., in the mixer circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1+, for oscillators which are automatically maintained on frequency by retuning means when the frequency drifts from the desired frequency, indented subclass 4 for search sweep of the oscillator, indented subclass 15 for amplitude compensated oscillator.

47, for plural oscillator systems wherein one oscillator varies the amplitude or frequency of another oscillator.

48, for plural oscillator systems wherein at least one oscillator has frequency adjusting means.
90, for magnetron type oscillators with frequency adjusting means.
109, for transistor oscillators with amplitude control.
177+, for oscillators in general with frequency adjusting means.
182+, for oscillators in general with amplitude adjusting means.

41 Frequency stabilization:

This subclass is indented under subclass 37. Subject matter wherein means are provided to prevent or compensate for an undesired drift in output frequency of the system. Such drift in frequency may be caused by (1) a change in a circuit parameter (due to ambient temperature variations or to the heating affects of currents in the circuit), (2) changes in active element characteristics, (3) changes in active element electrode potentials, (4) variations in load impedance, (5) undesired pull-in of one oscillator with respect to another oscillator of the system, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1+, for oscillators of the automatic frequency stabilized type.
88, for magnetron type oscillators with means to stabilize the frequency.
175+, for oscillators in general provided with frequency stabilizing means.

42 With particular signal combining means (e.g., cavity mixer):

This subclass is indented under subclass 37. Subject matter wherein the signal combining means is of a particular type, such as the high frequency type (e.g., cavity mixer) or a tuned circuit between oscillator and mixer which circuit may include frequency dividers or multipliers.

43 With filter in mixer output circuit:

This subclass is indented under subclass 42. Subject matter wherein a wave filter is included in the mixer output circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

77, for oscillators with a wave filter connected in the output circuit.

44 WITH FREQUENCY CALIBRATION OR TESTING:

This subclass is indented under the class definition. Subject matter (1) wherein means are provided to adjust the frequency setting means of the oscillator to make its frequency of oscillation correspond to the frequency (or fundamental, harmonic or sub-harmonic) of a source of standard frequencies or (2) means are provided wherein the frequency of the oscillations generated by the oscillator is compared with the frequency of the oscillations of a source of standard frequencies and the tuning position indicator or dial of the oscillator is graduated or marked in accordance with the results of the comparison with the known frequency setting or settings of the source of standard frequencies or (3) wherein means are provided to determine a performance characteristic, or characteristics, of the oscillator under prescribed conditions of operation (e.g., test under particular duty cycle, test under various load conditions, test purity of generated wave form, etc.).

SEE OR SEARCH THIS CLASS, SUBCLASS:

64, for oscillators with indicator, signal, or alarm in general and wherein frequency calibration of the oscillator with respect to a source of standard frequency or test of some other characteristic of the oscillator are not involved.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 250 for radio or microwave absorption wavemeters for determining the frequency or wavelength of a radio or microwave.
324, Electricity: Measuring and Testing, subclasses 20+ for systems for testing lamps and space discharge devices in general, particularly subclasses 24+ for testing the discharge characteristics of space discharge devices (e.g., such as triodes and pentodes), sub-

classes 57+ for measuring or testing electrical apparatus wherein no details of the apparatus are claimed, subclasses 76.12+ for systems to analyze complex electrical waves, and subclasses 76.39+ for systems for measuring the frequency of cyclic current or voltage.

45 POLYPHASE OUTPUT:

This subclass is indented under the class definition. Subject matter wherein the oscillator system is provided with at least two output circuit, each output producing a separate wave of the same frequency, the waves being displaced in phase by a fixed angle (other than phase coincidence or phase opposition) so as to produce a multiphase or polyphase set of currents or voltages.

SEE OR SEARCH THIS CLASS, SUBCLASS:

50+, for plural oscillators connected in cascade wherein separate outputs may be taken from successive oscillators.

57, for ring oscillators comprising three or more switching tubes in closed ring connection.

60, for single oscillator systems provided with plural separate outputs.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclasses 13+ for polyphase systems in general.

363, Electric Power Conversion Systems, subclasses 1+ for cascaded or combined diverse conversion which may include conversion from one number of phases to another number of phases, and subclasses 148+ for phase conversion systems, per se.

46 PLURAL OSCILLATORS:

This subclass is indented under the class definition. Subject matter comprising an electrical system including at least two significant oscillators.

(1) Note. If only one oscillator is significantly claimed and the other oscillator or oscillators are merely recited by name only without any oscillator circuit detail being claimed, classification is elsewhere in this class in accordance with the nature of system or of the significant oscillator claimed.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1+, for oscillator systems with automatic frequency stabilization which may involve plural oscillators. See especially subclasses: 2, wherein plural oscillators are stabilized, 18+, wherein a reference oscillator or source is utilized, 30+, for such systems combined with a stable heterodyne oscillator. 37+, for plural oscillators utilized to produce a beat frequency. 45, for polyphase output systems that may utilize plural oscillators. 71, for oscillator systems wherein raw A.C. is utilized as a source of power or bias.

87, for magnetically controlled space discharge device oscillator (e.g., magnetron) with particular pulsing means.

106, for oscillators with periodic amplitude or frequency varying means (e.g., tremolo, vibrato).

145, for multivibrator oscillators with synchronizing, triggering or pulsing means.

149, for blocking oscillators with synchronizing, triggering or pulsing means.

153, for relaxation oscillators in general with synchronizing, triggering and pulsing means.

172+, for oscillators in general with synchronizing, triggering or pulsing means.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, particularly subclasses 18+ for plural sources of electrical energy in general associated with plural output circuits and subclasses 43+ for plural sources of electrical energy associated with a common output or load.

47 Oscillator used to vary amplitude or frequency of another oscillator:

This subclass is indented under subclass 46. Subject matter wherein means are provided to enable energy from one oscillator to modify or

vary the amplitude or frequency of the oscillations generated by another oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

4, for automatic frequency stabilized oscillators wherein one oscillator sweeps the generated frequency of a frequency stabilized oscillator through a range of frequencies.

106, for oscillators with periodic or repetitious amplitude or amplitude and frequency varying means.

178, for oscillators with cyclic frequency sweeping means.

48 Adjustable frequency:

This subclass is indented under subclass 46. Subject matter wherein at least one of a plurality of oscillators is provided with means to change the generated frequency from one value to another.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1+, for plural oscillators with automatic frequency stabilization, and subclass 34+ for oscillators with automatic frequency stabilization having particular frequency control means.

40, for beat frequency oscillators with frequency adjusting means.

90, for magnetron type oscillators with frequency adjustment means.

106, for oscillators with periodic or repetitious frequency varying means.

177+, for oscillators in general provided with frequency adjusting means.

49 Selectively connected to common output or oscillator substitution:

This subclass is indented under subclass 46. Subject matter wherein means are provided for connecting one or more of two or more oscillators at will to a common output circuit or wherein means are provided for disconnecting one oscillator from a load circuit and connecting another oscillator to the load circuit, i.e., oscillator substitution.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclass 23 for systems for substituting a source in a plural source-plural load circuit system, subclass 29 for systems for selectively connecting plural sources to plural load circuits, subclasses 64+ for systems for substituting a source in a plural source-single load system, and subclass 80 for systems for selectively connecting a source or sources in a plural source-single load system.

50 Cascade or tandem connected:

This subclass is indented under subclass 46. Subject matter wherein two or more oscillators are effectively connected in concatenation, that is, the output circuit of one oscillator is connected to the input circuit of a second oscillator so that the first oscillator drives the second oscillator. The second oscillator may drive a third oscillator, the third oscillator a fourth oscillator, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

38+, for beat frequency oscillator systems wherein plural beating stages are cascaded.

45+, for polyphase output oscillators which may utilize cascaded oscillators.

55, for plural oscillators wherein a periodic source, recited broadly, synchronizes, triggers or pulses at least one of the plural oscillators.

51 Frequency dividers:

This subclass is indented under subclass 50. Cascaded oscillators wherein at least one succeeding oscillator generates oscillations of a frequency that is subharmonically related to the frequency of the oscillations generated by a preceding oscillator of the cascade.

SEE OR SEARCH CLASS:

363, Electric Power Conversion Systems, subclasses 157+ for frequency conversion systems in general, wherein an input alternating current of one frequency is converted directly into an output alternating current of a different frequency. The output frequency may be either less or greater than this input frequency.

52 Semiconductor (e.g., transistor):
This subclass is indented under subclass 50. Subject matter wherein the cascaded oscillators are of the semiconductor active element type (e.g., transistor).

SEE OR SEARCH THIS CLASS, SUBCLASS:
94.1, for molecular or particle resonant type oscillators which may utilize a semiconductor element.
107+, for oscillators of the solid state active element type.

53 Frequency multiplier:
This subclass is indented under subclass 50. Cascaded oscillators wherein at least one succeeding oscillator generates oscillations of a frequency that is harmonically related to the frequency of the oscillations generated by a preceding oscillator of the cascade.

SEE OR SEARCH THIS CLASS, SUBCLASS:
76, for a single oscillator combined with an harmonic producing or selecting network, which network includes a space discharge or unilaterally conductive device.

SEE OR SEARCH CLASS:
363, Electric Power Conversion Systems, subclasses 157+ for frequency conversion systems in general, wherein an input alternating current of one frequency is converted directly into an alternating current of another frequency. The output frequency may be either greater or less than the input frequency.

54 Diverse-type oscillators:
This subclass is indented under subclass 50. Subject matter wherein at least two of the cascaded oscillators are of different types, such as: Hartley and Colpitts oscillators, relaxation and sine wave oscillators, multivibrator and blocking oscillators, by way of examples.

SEE OR SEARCH THIS CLASS, SUBCLASS:
59, wherein a single oscillator system is provided with means to convert it from one type of oscillator to a diverse type.

55 Synchronized, triggered or pulsed:
This subclass is indented under subclass 46. Subject matter wherein at least one of a plurality of oscillators is provided with means for coupling the oscillator, or oscillators, to a periodic source of synchronizing or triggering potential to drive to lock the period of the oscillator, or oscillators, to the period of the source or to some multiple or submultiple thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
18+, for oscillators of the automatic frequency stabilized type synchronized with respect to a standard or reference frequency source.
41, for beat frequency oscillators that are locked to synchronize with a standard or reference frequency.
50+, for cascade or tandem connected oscillators.
87, for magnetron type oscillators with means to pulse the oscillator.
145, for multivibrators with synchronizing, triggering or pulsing circuit.
149, for blocking oscillators with synchronizing, triggering or pulsing circuits.
153, for relaxation oscillators in general with synchronizing, triggering or pulsing means.
172+, for oscillators in general with synchronizing, triggering or pulsing means.

56 Parallel connected:
This subclass is indented under subclass 46. Subject matter wherein the output circuits of at least two oscillators are effectively connected in parallel.

57 RING OSCILLATORS:
This subclass is indented under the class definition. Subject matter wherein the oscillator comprises three or more active elements connected or cascade, the output of one active element being connected to the input of another active element to form a closed chain or loop, the active elements being so connected and biased that they are caused to switch from a conducting to a nonconducting state in succes-

sion, cyclically, thereby generating self-sustained oscillations.

SEE OR SEARCH THIS CLASS, SUBCLASS:

45, for polyphase output oscillators which may be of the closed-ring type.

50+, for plural oscillators connected in cascade.

113, for transistor oscillators of the multivibrator type wherein two transistors are alternately switched.

135+, for phase shift oscillators which may comprise plural tubes in cascade in a closed loop, but wherein a switching action of the tubes does not take place.

144+, for multivibrator oscillators in general wherein two tubes are alternately switched.

58 PLURAL FUNCTIONS SIMULTANEOUSLY:

This subclass is indented under the class definition. Subject matter wherein the oscillator circuit is provided with means for performing at least one other function in addition to the generation of oscillations, which other function is independent of and is intended to be performed concurrently with the production of oscillations by the oscillator. An example of the type of plural function system falling within the foregoing definition is that of a vacuum tube circuit that simultaneously acts as an amplifier of extraneous waves of one frequency and as an oscillator with respect to waves of a different frequency, there being no mutual interaction between the two waves.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37+, for beat frequency oscillators wherein a single electron tube oscillator may act as a frequency converter, the oscillations generated by the oscillator being combined or mixed within the tube with externally supplied oscillations to produce in the output of the tube a beat frequency which is the algebraic sum or difference of the generated and supplied oscillations.

59, for oscillator systems that may be selectively converted from an oscillator to another type of electrical system, such as an amplifier, or detector, or to another oscillator of a different type.

60+, for oscillators with plural output circuits, especially indented subclass 61 wherein the plural outputs are of diverse wave forms.

SEE OR SEARCH CLASS:

330, Amplifiers, subclasses 1, 82, 93, 101, 104, and 112 for subject matter including plural function amplifiers which also operate as oscillators simultaneously.

332, Modulators, appropriate subclasses, wherein a single electron tube circuit may perform the dual function of carrier frequency generation and modulation.

455, Telecommunications, subclasses 321+ for heterodyne receiving systems utilizing a frequency converter system wherein a single electron tube circuit may perform the dual function of local oscillation generation and signal frequency mixing.

59 CONVERTIBLE (E.G., OSCILLATOR TO AMPLIFIER, ETC.):

This subclass is indented under the class definition. Subject matter wherein means are provided for effecting a change in oscillator circuit connections or for adding or substituting circuit element thereto so that the system resulting from such change or substitution is substantially different from the original oscillator circuit.

(1) Note. Typical systems classifiable herein are oscillators convertible to (1) amplifiers, (2) detectors, (3) wave meters, (4) triggered multivibrator, or oscillators convertible to another type of oscillator, for example, (5) sine wave generator to square wave generator, (6) Colpitts oscillator to Hartley oscillator, (7) Colpitts oscillator to tuned feedback oscillator, and (8) fixed frequency crystal oscillator to tunable LC oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

58, for oscillator systems wherein the system simultaneously performs some

function in addition to generating oscillations (e.g., amplifies an external signal or detects an external signal).

161, for crystal oscillators wherein means are provided for substituting one crystal for another in the oscillator circuit.

179, for oscillators in general wherein the frequency of oscillation is adjustable in discrete steps, e.g., by switching in or substituting inductors and/or capacitors having different fixed values of reactance.

SEE OR SEARCH CLASS:

330, Amplifiers, subclasses 1, 82, 93, 101, 104, and 112 for subject matter including amplifiers convertible to oscillators.

60 SINGLE OSCILLATOR WITH PLURAL OUTPUT CIRCUITS:

This subclass is indented under the class definition. Subject matter wherein the oscillator network includes at least two separate and distinct output circuits.

(1) Note. Push-pull output type oscillators for supplying a balance push-pull load are classified with the particular oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

45, for oscillators of the polyphase output type wherein the separate output voltages or currents are of the polyphase type, i.e., the separate output voltages or currents are of the same period and differ by a constant phase angle (other than phase coincidence or phase opposition).

46+, for plural oscillator systems which may have plural separate outputs.

74+, for oscillators combined with a particular output coupling network which network may include plural separate output circuits.

61 Plural outputs of diverse wave form:

This subclass is indented under subclass 60. Subject matter wherein the electric waves derivable from at least two separate output circuits are of different wave shapes. Examples are: sine wave and triangular wave, saw-tooth and square wave, sine wave and square wave, etc.

SEE OR SEARCH THIS CLASS, SUBCLASS:

75, for oscillators with space discharge device or unilaterally conductive device in the output circuit (e.g., for producing distorted waves).

111+, for transistor-type relaxation oscillators.

129+, for gas-tube type relaxation oscillators.

143+, for relaxation oscillators in general.

62 WITH OSCILLATOR CIRCUIT PROTECTIVE MEANS:

This subclass is indented under the class definition. Subject matter wherein the oscillator is provided with means to protect the oscillator circuit or elements thereof from damage due to some condition or malfunction of the oscillator circuit or power supply therefor.

SEE OR SEARCH THIS CLASS, SUBCLASS:

63, for oscillators provided with means to protect operating personnel or others who may come into contact with exposed portions of the oscillator from electrical shock.

67, for oscillators provided with electromagnetic or electrostatic shield means to prevent undesirable couplings between elements of the oscillator caused by fields generated within the oscillator circuit or to prevent external fields from influencing the oscillator.

68+, for oscillators having outer casings or housings to protect the oscillator from damage due to external mechanical forces.

70, for oscillators provided with means to modify the temperature of the oscillator or elements thereof, wherein the means may be for the purpose of cooling the oscillator or elements thereof to prevent damage thereto that would result if the oscillator or elements thereof were permitted to overheat.

182+, for oscillators having means for controlling or maintaining the amplitude level of the generated oscillations and

wherein the invention is not primarily for protecting the oscillator from overload.

186, for oscillators having a regulated source of power or bias and wherein the invention is not primarily for protecting the oscillator from damage due to excessive bias potential.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclasses 326+ for electrical systems in general having self-protective, safety or limit control features.

361, Electricity: Electrical Systems and Devices, subclasses 1+ for safety and protection systems for electrical devices and equipment in general. See the search notes, and under "SEARCH CLASS" of subclasses 92+ of Class 307 and subclasses 1+ of Class 361 as to further fields of search for protective systems for specific electrical devices and systems.

63 PROTECTIVE OF SAFETY DEVICES FOR PERSONNEL:

This subclass is indented under the class definition. Subject matter wherein the oscillator is provided with means for protecting persons contacting the oscillator or an exposed portion thereof or persons controlling the oscillator from the danger of bodily injury or electrical shock because of the high potentials associated with the oscillator (e.g., the potential of the power source or the generated oscillations).

SEE OR SEARCH THIS CLASS, SUBCLASS:

62, for oscillators having means to prevent damage to the oscillator circuit or elements thereof due to some condition or malfunction of the oscillator circuit or the power supply therefor.

68+, for oscillators with protective casings or housings.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclass 5 for electric shock hazard protective devices in general. See also the search notes to this subclass as to other fields of search for devices to protect personnel against electrical shock.

64 WITH INDICATOR, SIGNAL, OR ALARM:

This subclass is indented under the class definition. Subject matter wherein the oscillator is provided with an indicator, signal or alarm means to indicate or signal some state or condition of the oscillator.

(1) Note. Examples of indicating, signaling or alarm means included herein are (1) calibrated scales and cooperating indicators or pointers to indicate the frequency setting of a tunable tank circuit of the oscillator or to indicate the amplitude setting of an output attenuator of the oscillator, (2) electric meters, signals or alarms to indicate or respond to any current or potential of the oscillator, such as output load current or power, overload current, bias potential level, frequency of the generated oscillations, standing wave ratio of oscillator resonator, etc., (3) indicating or signaling means responsive to any other condition of the oscillator such as temperature or humidity, by way of example.

(2) Note. Systems wherein the oscillator is an element of a more comprehensive indicating or signaling system, for example, a system for performing an external (to the oscillator) chemical, physical or electrical measurement or test are not classified herein but in the class providing for such systems.

SEE OR SEARCH THIS CLASS, SUBCLASS:

44, for methods of or systems for calibrating the oscillation frequency setting means or tuning scale of an oscillator or for testing the oscillation frequency characteristics of the oscillator.

SEE OR SEARCH CLASS:

73, Measuring and Testing, appropriate subclasses for physical measuring and testing systems or devices in general not elsewhere provided for.

116, Signals and Indicators, appropriate subclasses for indicators, signals and

alarms of the mechanical type and not elsewhere classifiable.

250, Radiant Energy, subclass 250 for radio and microwave absorption meters for determining the wavelength or frequency of a radio or microwave.

324, Electricity: Measuring and Testing, appropriate subclasses for electrical measuring and testing systems in general, particularly subclasses 76.39+ for cyclic current or voltage frequency measuring or testing devices.

332, Modulators, subclass 118 for frequency modulators and subclass 150 for amplitude modulators with indicating means, observing means and/or signal, respectively.

340, Communications: Electrical, appropriate subclasses for electrical signals and alarms, especially subclasses 870.01+ for continuous variable indication devices and systems (e.g., telemetry) and subclass 653 for oscillator condition responsive signals and alarms.

65 WITH DEVICE RESPONSIVE TO EXTERNAL PHYSICAL CONDITION:

This subclass is indented under the class definition. Subject matter wherein the oscillator is combined with means distinct from the oscillator system or wherein the means is a modified element of the oscillator, which means is responsive to a nonelectrical condition external to the oscillator, a current characteristic of the oscillator, (e.g., amplitude or frequency) being varied in accordance with changes in the sensed condition.

(1) Note. The condition sensing means may, for example, comprise means responsive to (1) presence or absence of a material body, (2) moisture or humidity, (3) temperature, (4) light, (5) pressure, (6) liquid level, and so forth.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1+, for oscillators with automatic frequency stabilization wherein means are employed to sense a drift in oscillator frequency and to effect a tuning of the oscillator in the proper direction to maintain the oscillator frequency constant.

62, for oscillators having means to sense an undesirable condition in the oscillator and responsive thereto to correct the condition or so control the oscillator to prevent damage to the oscillator.

69, and 70, for oscillators having means to modify the temperature of the oscillator or a part thereof in response to temperature changes in the oscillator or the relative temperature change of the oscillator and its ambient medium.

176, for oscillators whose frequency is stabilized by a temperature or current responsive means in the oscillator circuit.

SEE OR SEARCH CLASS:

73, Measuring and Testing, appropriate subclasses, for measuring and testing apparatus involving sensing means for making physical measurements or tests not provided for in other classes. See also, the Notes to the class definitions and under "SEARCH CLASS" as to condition sensing means classified in other classes. See particularly under (3) Note, section C, of the class definition of Class 73 as to various electrical devices and electrical systems classes which utilize condition responsive controls.

332, Modulators, appropriate subclasses for modulated oscillators combined with specific intelligence source (e.g., electro-acoustic transducer).

369, Dynamic Information Storage or Retrieval, subclass 129 for a phonograph circuit with an information modulated oscillator.

66 Temperature or light responsive:

This subclass is indented under subclass 65. Subject matter wherein the condition responsive means is responsive to temperature or radiant energy in the form of light.

SEE OR SEARCH THIS CLASS, SUBCLASS:

176, for frequency stabilized oscillators with temperature or current responsive stabilizing means in circuit.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclasses 200+ for visible light responsive photocell electric circuits or photocell apparatus in general.

332, Modulators, appropriate subclasses for modulated oscillators combined with a specific intelligence source of the photoelectric transducer type.

340, Communications: Electrical, subclasses 584+ and 600 for electrical signal systems or alarms responsive to temperature, radiant and energy respectively.

356, Optics: Measuring and Testing, subclasses 43+ for optical pyrometers, subclasses 402+ for shade or color testing, and subclasses 213+ for photometers.

374, Thermal Measuring and Testing, subclasses 121+ for a thermal radiation responsive thermometer, and subclasses 170+ for an electrical thermometer with a digital signal controlling an indicator.

67 WITH ELECTROMAGNETIC OR ELECTROSTATIC SHIELD:

This subclass is indented under the class definition. Subject matter wherein the oscillator system is provided (1) with means for shielding at least part of the oscillator system from external electric or magnetic fields, (2) with means to shield one or more parts of the oscillator system from electric or magnetic fields generated in one or more other parts of the oscillator system, (3) with shielding or screening means to prevent radiation of undesired electric or magnetic fields generated within the oscillator system.

(1) Note. The electric or magnetic shield or screen to be classified herein must be in addition to and separate from oscillator circuit element structure. For example, if the electron tube of the oscillator contains a screen grid orshielding electrode as a perfecting feature of the tube this is considered tube structure and not shielding or screening for this subclass. Subclasses 72+ for instance, is directed to electron coupled oscillators utilizing tetrode or pentode tubes wherein the screen electrode shields or screens the oscillator circuit section of the tube from the output or anode circuit thereof. Another example of excluded subject matter is that of an oscillator wherein the resonator of the oscillator encloses and forms a screen for the active element of the oscillator (see subclasses 97+, for example, for a tube enclosed by a distributed parameter type resonator).

(2) Note. The shield or screen must be claimed as a magnetic, electric or electromagnetic shield or screen, or such limitations must be recited to clearly restrict the shield or screen to that use, to cause classification in this subclass. Merely reciting the combination of an oscillator with an outer casing or housing, or as a metallic outer casing or housing, for example, would not be sufficient for classification herein, such combination being classified in subclasses 68+ below.

SEE OR SEARCH THIS CLASS, SUBCLASS:

68+, for oscillators combined with outer casing or housing. See (2) Note above.

72+, for electron coupled oscillators utilizing screen grid tubes. See (1) Note above.

79+, for beam tube oscillators wherein part of the tube structure may include electric or magnetic shielding means.

86+, for magnetically controlled space discharge device oscillators wherein part of the discharge device may include electric or magnetic shielding means.

97+, for oscillators wherein the oscillator tube is enclosed by a distributed parameter resonator of the oscillator. (See (1) Note above).

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclasses 32 through 397 for miscellaneous anti-inductive structures, particularly subclasses 350-397 for miscellaneous electrical shields and screen structures not elsewhere classifiable. The search notes to subclasses 32-397, indicate further fields

of search for anti-inductive and shielding structure.

68 WITH OUTER CASING OR HOUSING:
This subclass is indented under the class definition. Oscillators provided with a casing or housing to enclose the oscillator.

(1) Note. The function of the casing or housing surrounding the oscillator in the patents in this subclass is to provide primarily for the mechanical protection or for the control of the physical environment of the enclosed oscillator.

(2) Note. The casing or housing includes at least the oscillator system and may or may not include the power supply or biasing sources for the oscillator.

(3) Note. If the casing or housing is claimed as an electric, magnetic, or electro-magnetic shield or screen the patent is excluded.

(4) Note. The casing or housing in this subclass must be independent of the oscillator. For example, if the oscillator is enclosed by one of its own components (such as its resonator) classification is with the particular oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

67, for oscillators with electromagnetic or electrostatic shield. See (3) Note above.

79+, for beam tube oscillators wherein the frequency determining structure (i.e., resonator or slow wave structure) is enclosed by the tube envelop.

86+, for magnetically controlled space discharge device oscillators (e.g., magnetron) wherein the frequency determining network of the oscillator is enclosed by the tube envelope.

97+, for oscillators wherein the active element is enclosed by a distributed parameter resonator. See (4) Note above.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, for miscellaneous casings and housings for electrical devices and including the combination of the casing or housing with the electrical device recited by name only, particularly subclasses 8+ for such devices intended to be used with a fluid or vacuum and subclasses 50+ for such devices of general utility. See the search notes to the class definition of Class 174 and to subclasses 8 and 50 and under “SEARCH CLASS” thereunder as to other fields of search for particular electrical devices with housings.

69 With temperature modifier:
This subclass is indented under subclass 68. Subject matter wherein means are associated with the housed oscillator for controlling or modifying the temperature of the oscillator or elements thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

66, for oscillators combined with temperature sensing means external to the oscillator for controlling a characteristic of the oscillator (e.g., frequency or amplitude) as a function of an externally sensed temperature.

70, for oscillators having means for controlling or modifying the temperature of the oscillator or elements thereof and wherein the oscillator is not combined with an enclosing housing or casing.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclasses 15.1+ for combined electrical device (recited by name only) casing or housing therefor and means for feeding, circulating or distributing a fluid or with means to cool either the electrical device or the fluid.

70 WITH TEMPERATURE MODIFIER:

This subclass is indented under the class definition. Subject matter wherein means are provided for modifying or controlling the temperature of the oscillator or elements thereof.

(1) Note. For example, included in this subclass are oscillators provided with (1) crystal ovens for controlling or maintaining the oscillator crystal temperature constant, (2) means for forcing a cooling fluid through a cavity resonator of the oscillator, (3) means for circulating a fluid through a hollow conductor comprising the inductor of the LC frequency determining element of the oscillator, (4) an oscillator tube wherein the anode or cathode structure of the tube is provided with passages through which a cooling fluid is passed or wherein the external terminal of the anode electrode may include cooling fins.

SEE OR SEARCH THIS CLASS, SUBCLASS:

66, for oscillators combined with an external temperature responsive means for controlling a characteristic (e.g., frequency or amplitude) of the oscillator.

69, for oscillators including temperature modifying means, combined with an outer casing or housing.

176, for oscillators in general including temperature or current responsive means in the oscillator circuit for stabilizing the oscillator frequency.

SEE OR SEARCH CLASS:

174, Electricity: Conductors and Insulators, subclasses 15.1+ for means for cooling electrical apparatus wherein no details of the apparatus are claimed. See the search notes to subclass 15.1 and the class definition search notes of Class 174 for other fields of search with respect to modifying the temperature of particular electrical apparatus.

71 RAW A.C. USED AS SOURCE OF POWER OR BIAS:

This subclass is indented under the class definition. Subject matter wherein the source of power or bias for the output and control electrodes or the output electrode of the active element of the oscillator comprises raw alternating current, which current is applied directly to the electrodes.

(1) Note. Where the raw alternating current is merely applied to the control electrode of the active element of the oscillator classification is not in this subclass, but elsewhere in this class in accordance with the particular type of oscillator systems or the nature of the control. See the search notes below for oscillator systems which may have alternating current applied to the control grid of the active element thereof may be found, wherein one oscillator is used to vary the amplitude of the oscillation generated by another oscillator; for cascaded or series connected oscillators; for a subclass wherein plural oscillators may be synchronized from an external source or where one oscillator synchronizes another; for oscillators with periodic or repetitious amplitude and/or frequency varying means (e.g., tremolo, vibrato); for and oscillators with synchronizing triggering or pulsing means involving grid bias control; for blocking oscillators, for relaxation oscillators in general and for oscillators in general.

SEE OR SEARCH THIS CLASS, SUBCLASS:

47, for oscillator systems which may have alternating current applied to the control grid of the active element thereof, wherein one oscillator is used to vary the amplitude of the oscillation generated by another oscillator.

50+, for cascaded or series connected oscillators.

55, wherein plural oscillators may be synchronized from an external source or where one oscillator synchronizes another

106, for oscillators with periodic or repetitious amplitude and/or frequency

varying means (e.g., tremolo, vibrato).

145, oscillators with synchronizing triggering or pulsing means involving grid bias control may be found in this subclass (145) for multivibrators

149, for blocking oscillators.

153, for relaxation oscillators in general

172+, for oscillators in general..

185+, for oscillators with particular source of power or bias voltage.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 137+ for gaseous space discharge device or vacuum diode systems supplied with a polyphase alternating current, and subclasses 246+ for similar systems supplied with pulsating or alternating current supply (see the search notes appended to subclasses 246+ for further fields of search for similar subject matter).

330, Amplifiers, subclasses 114+ for linear amplifiers wherein an unrectified alternating current is applied to an electrode of an active element or elements, thereof.

72 ELECTRON-COUPLED TYPE:

This subclass is indented under the class definition. Subject matter wherein the active element of the oscillator includes a cathode, two or more grids and an output electrode (e.g., conventional tetrode or pentode) and wherein the cathode and at least two grids are connected in circuit to form a triode oscillator, one of the grids acting as an anode electrode, and wherein the output electrode is coupled to the oscillator solely through the electron stream, so that the output circuit is substantially isolated from the oscillator circuit. In effect, the resulting circuit comprises an oscillator and power amplifier combined in one tube.

SEE OR SEARCH THIS CLASS, SUBCLASS:

75+, for the combination of oscillator and output amplifier, wherein the oscillator and amplifier each comprise separate and distinct active elements.

79+, for beam tube type oscillators wherein the output circuit may be electron coupled to a directed electron beam.

134, for negative resistance oscillators of the transition type wherein a plural grid active element is utilized.

147, for blocking oscillators utilizing a plural grid tube.

152, for relaxation oscillators having a multi-grid discharge device in the charged capacitor circuit.

73 Piezoelectric crystal resonator:

This subclass is indented under subclass 72. Subject matter, wherein a piezoelectric crystal comprises a frequency determining element of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

116, for transistor oscillators using a piezoelectric crystal.

139, for bridge oscillator with piezoelectric crystal in the bridge network.

155, for oscillator with a crystal driven electromechanical resonator.

158+, for crystal oscillators in general.

74 COMBINED WITH PARTICULAR OUTPUT COUPLING NETWORK:

This subclass is indented under the class definition. Subject matter wherein the oscillator has coupled or connected to its output circuit an additional network, which network may be passive or active, the driven load being coupled or connected to the output of the additional network.

(1) Note. To be classified in this and indented subclasses the additional output coupling network must be significantly claimed. If it is claimed nominally, for example, as a transformer coupled output or a directly connected output, or the like, classification will be with the particular oscillator and not herein.

(2) Note. Where the oscillator is claimed in broad terms, such as a wave generator, pulse generator harmonic generator, oscillator, or the like, so as to provide no basis for classification in this class and the oscillator is claimed in combination with a specific output coupling network,

classification, in general, will be with the particular coupling network and not herein.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37+, for beat frequency oscillators wherein at least two sources of oscillation are connected or coupled to a modulator or mixer network to produce an output which is the difference or the sum of the two frequencies.

45, for oscillators including a network for producing a polyphase output.

46+, for plural oscillators wherein one oscillator may be in the output circuit of another oscillator.

72, for electron coupled oscillators wherein a single multi-grid electron tube (e.g., tetrode or pentode) is so connected that one section of the tube acts as an oscillator and the output electrode (usually the anode) is coupled to the oscillator solely through the electron stream and acts effectively as a stage of amplification.

SEE OR SEARCH CLASS:

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, appropriate subclasses and search notes for a field of search for coupling networks of the active element type; also see appropriate subclasses for miscellaneous systems with particular output circuits. See the (2) Note above.

333, Wave Transmission Lines and Networks, provides for passive type wave transmission coupling networks (e.g., impedance matching networks, equalizing networks, delay lines, wave filters); see the class definitions and search notes; also see subclasses 24+ for passive coupling networks, per se, and see the Search Class notes thereunder. See also (2) Note above.

75 Space discharge or unilaterally conductive device in output network:

This subclass is indented under subclass 74. Subject matter wherein the output coupling network includes a device having at least two spaced electrodes between which an electric current may be caused to flow. Included, by way of example, are spark gaps, electron tubes (diodes, triodes, etc.) of the vacuum type or gas-filled type and solid state equivalents thereof, such as semi-conductor barrier layer devices (e.g., rectifier, transistors).

SEE OR SEARCH THIS CLASS, SUBCLASS:

46+, for plural oscillator systems wherein one oscillator may be in the output circuit of another oscillator.

72, for electron coupled oscillators wherein a single multi-grid electron tube (e.g., tetrode or pentode) is so connected that one section of the tube acts as an oscillator and the output electrode (usually the anode) is coupled to the oscillator solely through the electron stream and acts effectively as a stage of amplification.

150, for relaxation oscillators with output circuit connected to another discharge device circuit.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclasses 401+ for miscellaneous systems utilizing nonlinear reactor devices and not elsewhere classifiable and subclasses 106+ for class appropriate waveform or wave shape determinative or pulse producing systems.

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, appropriate subclasses for miscellaneous transistor and electron tube nonlinear circuits.

330, Amplifiers, appropriate subclasses for the various types of linear amplifiers, per se.

76 Harmonic producing or selecting network:

This subclass is indented under subclass 75. Subject matter wherein (1) the active element is operated on a nonlinear portion of its characteristic so as to produce harmonics of the fundamental frequency of the oscillator, further filter means usually being provided to select a particular harmonic or harmonics of the harmonics generated, or (2) a wave filter selective to the desired harmonic or harmonics of the

harmonics generated by the oscillator is included in the output coupling network.

SEE OR SEARCH THIS CLASS, SUBCLASS:

51, for frequency dividing plural oscillator systems, wherein the oscillators are connected in cascade or series.

53, for frequency multiplying plural oscillator systems, wherein the oscillators are connected in cascade or series.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclass 105 for miscellaneous systems employing harmonic filtering or neutralizing devices and not elsewhere classifiable.

333, Wave Transmission Lines and Networks, subclasses 167+ for passive wave filters, especially subclasses 175+ for resonant discrete frequency selective type filters.

363, Electric Power Conversion Systems, subclasses 157+ for frequency conversion systems, for directly converting a current into a current of a higher or lower frequency, especially subclasses 166+ for electronic tube frequency converting systems.

77 Wave filter:

This subclass is indented under subclass 74. Subject matter wherein the output coupling network is of the passive type and is so designed as to pass waves of a desired frequency or band of frequencies with little attenuation while highly attenuating waves of other or undesired frequency or band of frequencies.

SEE OR SEARCH THIS CLASS, SUBCLASS:

32+, for oscillators having automatic frequency stabilization utilizing a stable heterodyne oscillator and wherein the frequency discriminator may be of the passive-filter type.

43, for beat frequency oscillators having a filter in the mixer output.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, subclasses 167+ for passive type wave filters, per se.

78 ELECTRICAL NOISE OR RANDOM WAVE GENERATOR:

This subclass is indented under the class definition. Subject matter wherein the oscillator comprises means for utilizing the random translatory motions of charged particles for generating a substantially infinite number of waves of different frequencies which are fortuitously related, having no definite phase relationship, period, amplitude or shape. The means may be (1) a solid conductor, the random waves being generated by the thermal agitation of the free electrons, or (2) a thermionic space discharge device, wherein the random waves are caused by random emission of electrons (such as the shot effect in a temperature limited thermionic diode), or (3) a gaseous space discharge device wherein the thermal agitation or electrical excitation of the molecules, ions and electrons of the gas produces the random waves.

SEE OR SEARCH THIS CLASS, SUBCLASS:

94.1, for molecular or particle resonant type oscillators wherein the generated oscillations are caused by the vibration of the particle, molecule or atom itself and is not due to translational motion of the particle, molecule or atoms as a whole.

79 BEAM TUBE:

This subclass is indented under the class definition. Subject matter wherein (1) the active element of the oscillator comprises a space discharge device consisting of a source of charged particles, means for concentrating the particles into a directed beam, means for exerting a control on the beam (e.g., beam accelerating electrode, control grid, deflecting means, slow wave structure, buncher type resonator, reflector electrode, etc.) and means for deriving output oscillatory energy from the controlled beam.

(1) Note. The active elements in this and indented subclasses are of the transit

time or velocity variation or velocity modulation type, and while space charge effects influence the beam somewhat they are secondary, the primary effect of control of the beam being that of velocity variation. This action is to be contrasted with that of the space-charge control tubes (e.g., conventional triode) wherein the electron density is varied and the slight change in electron velocity during such variation is secondary.

SEE OR SEARCH THIS CLASS, SUBCLASS:

6+, for klystron oscillators provided with automatic frequency stabilization.

86+, for magnetically controlled space discharge device type oscillators (e.g., magnetron) wherein the space discharge device is not of the beam type, but which device may utilize transit time effects to produce oscillations.

92+, for retarding field tube type oscillators wherein the tube is not of the beam type.

104+, for transit time oscillators in general and wherein the active element is not of the beam type.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, subclasses 364+ for cathode-ray tube structure and subclass 299 for beam tube structure.

315, Electric Lamp and Discharge Devices: Systems, subclasses 1+ for cathode-ray tube systems in general, especially subclasses 3+ for systems utilizing cathode-ray tubes combined with circuit element structure.

330, Amplifiers, subclasses 43 and 44+ for linear amplifiers which include an active element of the electron beam type.

332, Modulators, appropriate subclasses for modulators utilizing electron beam discharge devices.

80 With beam sweeping or deflecting means:

This subclass is indented under subclass 79. Subject matter wherein the beam control means of the space discharge device includes means (e.g., beam deflecting electrodes or coils) for causing the beam to depart from its directed path.

(1) Note. Included in this subclass are systems wherein the beam sweeping deflecting device acts as driven switching device to shock excite a resonant circuit into oscillation, the switching device being driven by an external oscillator. For other shock-excited resonant circuit systems see the search notes below. The driving oscillator in this subclass is claimed in broad terms only, if the driving oscillator is significantly claimed classification is in some preceding subclass, such as the subclasses for the combination of specific oscillator with particular output coupling networks, especially subclasses wherein the output coupling network may include a space discharge device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

74+, for the combination of specific oscillator with particular output coupling networks

75+, wherein the output coupling network may include a space discharge device.

84, for beam tube oscillators of the reflex type wherein the beam is reflected so as to travel in a direction opposite to its initial direction.

128, wherein the switching element is of the gaseous space discharge type. The driving oscillator in this subclass is claimed in broad terms only, if the driving oscillator is significantly claimed classification is in some preceding subclass,

166, wherein the switching element is of the active element type and which system is not provided for in any preceding subclass. The driving oscillator in this subclass is claimed in broad terms only, if the driving oscillator is significantly claimed classification is in some preceding subclass.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, subclasses 421+ for cathode-ray tube structures provided with ray deflection means.

315, Electric Lamp and Discharge Devices: Systems, subclasses 5.18+ for cathode-ray tube devices including a hollow distributed parameter type resonator wherein the ray passes through the resonator and the tube is provided with repeller means to return the ray to the resonator, subclasses 5.24+ for cathode-ray tube devices including a hollow resonator through the ray passes and having means to deflect or reflect the ray, and subclasses 364+ for cathode-ray tube circuits in general having means for deflecting the cathode-ray.

330, Amplifiers, subclass 46 for linear amplifiers utilizing beam deflection tubes.

81 With electron bunching or velocity variation means:

This subclass is indented under subclass 79. Subject matter wherein the means for controlling the beam comprises a resonator or a slow wave structure (delay line) effectively in energy-coupling relation to the moving beam of particles, the energy interchange between the particles and resonator or slow wave structure due to relative movement therebetween resulting in a change in velocity of given particles along the path of the beam, such differences in velocity of given particles causing the particles to form in groups or bunches.

SEE OR SEARCH THIS CLASS, SUBCLASS:

6, for oscillators utilizing velocity variation type active elements (e.g., Klystron) and having means for automatically stabilizing the oscillator frequency.

86+, for magnetically controlled space discharge device oscillators of the magnetron type wherein the electrons in the interaction space between the cathode and anode resonator may be subjected to velocity modulation and bunching to generate oscillations.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 3+ for cathode-ray tubes combined with circuit element structure, especially indented subclasses 3.5+ for traveling wave tubes with delay transmission line and indented subclasses 4+ for cathode-ray tube combined with inductor or distributed parameter type inductive structure, and subclass 39.3 for traveling wave tube with delay line and wherein the active electrons are not in the form of a beam or ray.

330, Amplifiers, subclass 45 for velocity variation electron-beam tube linear amplifiers.

332, Modulators, subclasses 133, 147+ or 165+, for electron bunching type tubes (e.g., klystron) utilized in a frequency, phase or amplitude modulator, respectively.

82 Traveling wave type:

This subclass is indented under subclass 81. Subject matter wherein the means controlling the beam comprises a transmission line of the slow wave type placed in energy exchanging relation to the beam of particles, the axes of the transmission line and the beam being in the same general direction, the transmission line being so constructed that the phase velocity of a component of a traveling electromagnetic wave propagated therealong approximates the velocity of the beam of particles being such that the wave gains in energy while the particles lose energy, the slowing down of the particles causing groups or bunches to form.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 3.5+ for cathode-ray tube circuits wherein the tube is of the traveling wave type combined with a delay type transmission line, and subclass 39.3 for a discharge device of the traveling wave type with delay type transmission line.

330, Amplifiers, subclass 43 for linear amplifier systems of the traveling wave type.

83 Multicavity type (e.g., Klystron):

This subclass is indented under subclass 81. Subject matter wherein the means controlling the beam includes at least two distributed parameter devices of the cavity resonator type, the resonators being provided with apertures,

the beam of particles being directed through the apertures of the resonators in succession, exciting the resonators into oscillation. The first resonator causes bunching of the particles passing therethrough, the bunched particles then travel in a field-free region where further bunching occurs and then the bunched particles enter the second resonator giving up their energy to excite it into oscillation, a positive feedback loop from the second resonator to the first resonator causes sustained oscillations to be generated.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclass 5.16 for combined cathode-ray tube with plural hollow devices where in plural rays pass through or in the hollow devices, subclass 5.27 for similar devices utilizing a single ray and with ray deflection means.

330, Amplifiers, subclass 45 for linear electron beam type amplifier systems having plural resonant cavities.

84 Reflex type (i.e., with repeller electrode):

This subclass is indented under subclass 81. Subject matter wherein the means controlling the beam of particles comprises a buncher resonator effectively placed in the path of the beam and interacting therewith to cause the particles to be velocity modulated or bunched, a repeller electrode is provided in the path of the bunched particles and is so biased as to reflect the bunched particles and cause them to return to the buncher resonator in proper phase to interact therewith to give additional energy to the resonator and produce sustained oscillations.

SEE OR SEARCH THIS CLASS, SUBCLASS:

80, for beam tube oscillators of the beam sweeping or deflecting type.

92+, for retarding field type (e.g., Barkhausen-Kurz) oscillators wherein the active element is not of the beam type and wherein a cloud of electrons is caused to oscillate about a positively biased grid.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 5.18+ for combined cathode-ray tube and hollow resonator structure wherein the ray is reflected and returns to and enters the resonator, and subclasses 5.24+ for similar devices wherein the ray returns to but does not enter the resonator.

332, Modulators, appropriate subclasses for retarding field electronic tube type (e.g., Barkhausen-Kurz) modulators.

86 WITH MAGNETICALLY CONTROLLED SPACE DISCHARGE DEVICE (E.G., MAGNETRON):

This subclass is indented under the class definition. Subject matter wherein the active element of the oscillator consists of a space discharge device having means for producing a space discharge comprising charged particles, such as electrons or ions, and wherein further means are provided for subjecting the space discharge to the direct control of a magnetic field and an electric field.

(1) Note. This subclass includes magnetrons, a specific form of magnetically controlled space discharge device. The magnetron is essentially a diode comprising a linear cathode, an anode, usually cylindrical, coaxial therewith and wherein the magnetic field is parallel to the longitudinal axis of the cathode while the electric field is transverse thereto. In the multicavity magnetron the frequency determining element is structurally a part of the anode.

SEE OR SEARCH THIS CLASS, SUBCLASS:

5, for magnetic field controlled space discharge device oscillators of the automatic frequency stabilized type.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, subclass 433 for cathode-ray tube structure provided with electrostatic and electromagnetic, beam deflecting means and subclasses 153+ for space discharge device structure provided

with a magnetic device, especially indented subclasses 156+ for space discharge devices where the magnetic field is transverse to the discharge.

315, Electric Lamp and Discharge Devices: Systems, subclass 5.13 for cathode ray device with a hollow resonator combined with a magnetron, subclasses 399+ for cathode-ray tube systems utilizing electromagnetic beam deflection, and subclasses 39.51+ for distributed parameter type resonator magnetron space discharge devices in general wherein the resonator is a structural part of the space discharge device.

329, Demodulators, subclass 322 for a magnetron type frequency demodulator and subclass 354 for a magnetron type amplitude demodulator.

330, Amplifiers, subclasses 47+ for linear amplifiers utilizing a magnetic field controlled space discharge tube as the active element thereof.

332, Modulators, particularly subclasses 132 and 166 for modulators utilizing magnetic field type electronic tubes (e.g., magnetron).

87 **With particular pulsing means:**

This subclass is indented under subclass 86. Subject matter wherein an electrical network including switching or keying means is provided for producing high voltage pulses of large energy content, which pulses are applied between electrodes (cathode and anode) of the active element of the oscillator to cause the oscillator to generate oscillations in accordance with the duration of the pulses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

55+, for synchronizing, triggering or pulsing systems involving plural oscillators.

145, for multivibrators with synchronizing, triggering or pulsing circuit.

149, for blocking oscillators with synchronizing, triggering or pulsing circuit.

153, for relaxation oscillators in general with synchronizing, triggering or pulsing circuit.

172+, for oscillators in general with synchronizing, triggering or pulsing circuit.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclasses 106+ for waveform or wave shape determinative or pulse producing systems which are class appropriate and especially subclass 108 for such systems utilizing capacitors.

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 291+ for miscellaneous clock or pulse waveform generation.

332, Modulators, particularly subclasses 132 and 166 for modulators of the magnetic field electronic tube type and subclasses 106+ for pulse modulation systems in general respectively.

333, Wave Transmission Lines and Networks, subclass 20 for passive type wave shaping network, and subclasses 138+ for passive type delay networks, per se.

88 **With frequency stabilization:**

This subclass is indented under subclass 86. Subject matter wherein means are provided in the oscillator circuit to prevent or compensate for undesirable drift or change in oscillator frequency caused by changes in (1) space discharge device characteristics or (2) circuit parameters or (3) supply or bias voltages, or any combination or (1), (2) or (3).

(1) Note. This subclass does not provide for oscillators with automatic frequency stabilization wherein means are provided for sensing or detecting an undesired change in oscillator frequency, developing a control or error voltage proportional to such change and applying the control or error voltage to means for varying or adjusting a frequency determining means of the oscillator in such a sense as to bring the oscillator back on frequency. For such subject matter search subclasses 1+ above, particularly subclass 5 for magnetron type oscillators.

SEE OR SEARCH THIS CLASS, SUBCLASS:

5, for oscillators utilizing magnetically controlled space discharge devices and having means to automatically stabilize the frequency. See, also, (1) Note above.

41+, for beat frequency systems with frequency stabilization means.

69, for oscillators with outer casing, housing or shield and wherein a temperature modifier is provided which may aid in stabilizing the oscillator frequency.

175+, for frequency stabilized oscillators in general and not provided for in any preceding subclass.

89 With secondary emissive electrode:

This subclass is indented under subclass 86. Subject matter wherein the magnetically controlled space discharge device includes a secondary electron emissive electrode.

(1) Note. The secondary electron emission electrode, for example, may be (1) an auxiliary electrode, or (2) the cathode electrode, which cathode may be designed to produce electrons by thermionic and secondary emission or by secondary emission alone (cold cathode), or (3) the anode or collector electrode.

SEE OR SEARCH THIS CLASS, SUBCLASS:

79, for beam tube oscillators of the negative resistance type wherein the negative resistance effect may be produced by secondary electron emission means.

133, for negative resistance or negative transconductance type oscillators in general utilizing the phenomenon of secondary electron emission (e.g., dynatron oscillators).

184, for oscillators utilizing a secondary electron emission discharge device of particular construction.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, subclasses 103+ for the structure of space discharge devices including secondary electron emissive electrodes. See the search notes to subclasses 103+ of Class 313 as to the further fields of search for secondary electron emissive devices or systems utilizing such devices.

315, Electric Lamp and Discharge Devices: Systems, subclass 39.63 for magnetically controlled space discharge device structures (e.g., magnetrons) having secondary electron emitter means.

333, Wave Transmission Lines and Networks, subclasses 213+ for negative resistance networks which networks may include a negative resistance device having a secondary emissive electrode.

90 With frequency adjustment:

This subclass is indented under subclass 86. Subject matter wherein the oscillator includes means to vary or change the frequency of the oscillations generated by the oscillator.

(1) Note. The frequency adjustment of the oscillator may be effected in many ways, (1) by moving a tuning element such as a variable capacitor or variable inductor of a resonant circuit or the short-circuiting element of a resonant line, (2) by electronic control such as an auxiliary cathode in a resonator cavity of a multicavity magnetron, (3) by adjusting the strength of the magnetic field in the electron interaction space of a magnetron.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1+, for oscillators having means for automatically stabilizing the oscillator frequency, especially indented subclass 5 wherein the oscillator is of the magnetron type.

40, for beat frequency adjustment or control.

47, for plural oscillators where one oscillator sweeps the frequency of another.

48, for plural oscillators having means to adjust the frequency of one or more oscillators.

177+, for oscillators in general having frequency adjusting means.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 39.55+ for distributed parameter resonator magnetron type space discharge device having variable tuning means.

332, Modulators, subclass 5 for modulator systems of magnetic field electronic tube type (e.g., magnetic) wherein the modulating signal may vary the tuning of the system.

91 With undesired mode suppression or selection means:

This subclass is indented under subclass 86. Subject matter wherein the circuit constants of the oscillator are such that the oscillator may have several possible modes of operation and wherein means are provided to prevent or suppress the generation of modes other than the desired mode.

(1) Note. Undesired mode generation is most common in magnetrons of the multicavity anode type and may be prevented or suppressed in various ways, for example, by strapping (conductively connecting) alternate segments of the resonant cavities, by changing the resonant cavity structure so that alternate cavities are resonant at different frequencies or by some external means such as a resonant break-down device or wave filter device in the output coupling line of the magnetron.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclass 39.65 for magnetron devices wherein the anode structure is of the plural diverse resonator type, and subclass 39.69 for magnetron devices wherein the plural resonators of the anode structure are strapped.

92 RETARDING FIELD TUBE-TYPE OSCILLATORS (E.G., BARKHAUSEN KURZ):

This subclass is indented under the class definition. Subject matter wherein the oscillator comprises an electron tube having at least three electrodes, i.e., a source of electrons (cathode), control electrode (grid) and an anode or plate electrode, the control electrode being biased positively with respect to the other electrodes. The bias potentials of the electrodes are so chosen that the electrons attracted from the cathode by the positive grid pass through the grid and are slowed down by the repelling effect of the negative anode field and are returned back to, or through the grid. This phenomenon is repeated again and again so that a cloud of electrons is caused to sweep back and forth through the grid, giving up energy to the grid at a frequency which is a function of the transit time of the electrons. Usually a frequency determining network is associated with the electron tube so that the frequency of the generated oscillation is a function of both the electron transit time and the network parameters.

SEE OR SEARCH THIS CLASS, SUBCLASS:

84, for beam tube oscillators of the reflex type wherein an electron beam is projected through a beam permeable electrode cavity toward a repelling electrode which electrode reflects the beam, causing it to pass back through the permeable electrode or cavity.

104, for transit time oscillators in general not classified in any preceding subclass.

SEE OR SEARCH CLASS:

329, Demodulators, subclass 322 for microwave frequency structure in a frequency demodulator and subclass 354 for microwave structure in an amplitude demodulator.

93 With distributed parameter resonator:

This subclass is indented under subclass 92. Subject matter wherein a distributed parameter frequency determining network is associated with the electron tube.

SEE OR SEARCH THIS CLASS, SUBCLASS:

96+, for oscillators in general wherein the frequency determining network is of the distributed parameter type.

94.1 MOLECULAR OR PARTICLE RESONANT TYPE (E.G., MASER):

This subclass is indented under the class definition. Subject matter wherein the oscillator consists of (a) a medium which may be solid, liquid, or gaseous, comprising particles, molecules, or atoms; (b) means including a source of energy for setting the particles, molecules, or atoms into a state of vibration or oscillation; and (c) means to abstract electromagnetic wave energy produced by the vibration or oscillation of the particles, molecules, or atoms. The vibration or oscillation is that of the particle, molecule, or atom itself and is not due to the translational motion of the particle, molecule, or atom as a whole.

SEE OR SEARCH THIS CLASS, SUBCLASS:

2, for automatic frequency stabilized oscillators utilizing a frequency discriminator of the molecular resonant type.

78, for electrical noise or random wave generators wherein the translatory motions of charged particles or molecules are utilized to generate oscillations.

SEE OR SEARCH CLASS:

250, Radiant Energy, subclass 552 for devices for producing and propagating a unidirectional stream of neutral molecules or atoms through vacuum, usually at thermal velocity and including means to excite the molecules or atoms at a resonant frequency.

332, Modulators, appropriate subclasses for maser type modulators.

372, Coherent Light Generators, appropriate subclasses for optical (e.g., laser) oscillators.

95 BUTTERFLY RESONATOR:

This subclass is indented under the class definition. Subject matter wherein the frequency determining element of the oscillator comprises a variable split stator capacitor, the stator plates being in general circular discs having a symmetrical opening therein of butterfly wing configuration, the rotor plates having a corresponding butterfly shape and being in interleaving or meshing relation to the stator plates and being rotatable about an axis normal to and passing through the center of symmetry of the surface of the rotor plates. The arrangement is such that both the capacitance and inductance of the device vary at a function of the rotor position.

SEE OR SEARCH THIS CLASS, SUBCLASS:

96+, for oscillators with distributed parameter resonator.

167+, for oscillators of the lumped parameter LC type.

96 WITH DISTRIBUTED PARAMETER RESONATOR:

This subclass is indented under the class definition. Subject matter wherein the frequency determining means or resonator of the oscillator is of the distributed network type, the capacitance, inductance and resistance of which cannot be isolated into separate lumped capacitors, inductors or resistors and wherein the time factor of propagation of wave energy in the network is appreciable. Examples of such a network are an open-circuited or short-circuited wave transmission line a quarter wave length long at the desired resonant frequency. Included are transmission lines wherein the principal wave may be of TEM mode (e.g., parallel wire and coaxial lines) or E or H mode having longitudinal as well as transverse wave components (e.g., hollow conductors, dielectric rods, single wire surface-wave mode wave guides).

SEE OR SEARCH THIS CLASS, SUBCLASS:

5, for magnetron type oscillators having automatic frequency control and which utilize distributed parameter resonators.

6+, for beam tube type (e.g., Klystron) oscillators having automatic frequency control and which utilize cavity resonators.

9, for microwave oscillators having automatic frequency stabilization and which utilize distributed parameter resonators as discriminator means in the A.F.S. loop.

79+, for beam tube oscillators utilizing distributed parameter resonators.

86+, for oscillators having a magnetically controlled active element (e.g., magnetron) and which utilize distributed parameter resonators.

93, Retarding field type oscillators with distributed parameter resonators.

95, for oscillators wherein the frequency determining network is of the so-called "butterfly" type.

154+, for oscillators utilizing electromechanical resonators whose frequency may be determined by distributed physical parameters of mass, stiffness and mechanical friction.

167+, for LC oscillators in general wherein the parameters L and C are separate and distinct lumped elements.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclasses 4+ for cathode-ray tube circuits and wherein the cathode-ray tube includes distributed parameter resonator structure and subclasses 39+ for space discharge device load with distributed parameter type transmission line (e.g., wave guide, coaxial cable) which line may act as a resonator.

330, Amplifiers, subclass 45 for a linear amplifier having an electron beam vacuum tube coupled to a cavity resonator; subclass 49 for a linear amplifier having a vacuum tube amplifying device which has distributed parameter characteristics which may involve a resonator; and subclass 56 for linear amplifiers involving wave guide, cavity, of concentric line resonator coupling, generally.

333, Wave Transmission Lines and Networks, subclasses 219+ for resonators of the distributed parameter type, per se.

334, Tuners, subclasses 41+ for tuners of the distributed parameter type.

97 Tube enclosed by resonator structure:

This subclass is indented under subclass 96. Subject matter wherein the oscillator includes a frequency determining network comprising a hollow conductive structure, such as a coaxial line resonator or a cavity type resonator, and wherein the active element of the oscillator is effectively enclosed thereby.

SEE OR SEARCH THIS CLASS, SUBCLASS:

67, for oscillators that include an electromagnetic or electrostatic shield which may enclose the active element of the oscillator and wherein the shield is not the frequency determining network or resonator of the oscillator.

68+, wherein the oscillator is enclosed by an outer casing or housing which casing or housing is not the frequency determining network or resonator of the oscillator.

SEE OR SEARCH CLASS:

315, Electric Lamp and Discharge Devices: Systems, subclass 39 for the combination of a space discharge device with a distributed parameter transmission line and wherein the line may enclose the space discharge device.

98 Disk seal tube (e.g., lighthouse, pencil tube):

This subclass is indented under subclass 97. Subject matter wherein the active element comprises an electron tube including an envelope having an axis of symmetry and wherein at least one electrode, usually the control grid of the tube, has an external contact comprising a planar disc or annulus whose center of revolution is on the axis of symmetry of the tube envelope and normal thereto. Examples of such electron tubes are the lighthouse tube and the pencil tube wherein the anode, grid and cathode external contacts are surfaces of revolution about the axis of the tube envelope and are displaced longitudinally there along.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, subclasses 237+, especially subclasses 249+, for the structure of lighthouse and pencil type space discharge devices.

99 PARALLEL WIRE TYPE:

This subclass is indented under subclass 96. Subject matter wherein the frequency determining network comprises at least two elongated conductors so oriented that their

longitudinal axis are parallel, are displaced relative to each other and lie in a common plane.

(1) Note. The cross-sectional configuration of the individual conductors may have any geometric form, but is usually circular, as is true of the well known Lecher wires, for example.

SEE OR SEARCH THIS CLASS, SUBCLASS:
101, for parallel conductor resonators wherein one conductor is surrounded by and within another conductor.

100 Push-pull type:
This subclass is indented under subclass 99. Subject matter wherein the parallel wire resonator oscillator includes two or more active elements connected in push-pull relation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
102, for push-pull oscillators having a coaxial or shielded line type resonator.
114, for transistor oscillators of the push-pull type.
159, for push-pull crystal oscillators.
168, for push-pull LC oscillators in general.

101 Coaxial or shielded line type:
This subclass is indented under subclass 96. Subject matter wherein the frequency determining network comprises at least two elongated conductors, one of the conductors being enclosed by and electrically shielded by the other conductor, the conductors being so arranged that their longitudinal axes are parallel or coincident (i.e., coaxial line).

SEE OR SEARCH THIS CLASS, SUBCLASS:
97+, for coaxial or shielded line resonators wherein the active element of the oscillator is enclosed by resonator structure.

102 Push-pull type:
This subclass is indented under subclass 101. Subject matter wherein the coaxial or shielded line type resonator oscillator includes two or more active elements connected in push-pull relation.

SEE OR SEARCH THIS CLASS, SUBCLASS:
100, for push-pull oscillators having a parallel wire type resonator.
114, for push-pull transistor oscillators.
159, for push-pull crystal oscillators.
168, for push-pull LC oscillators in general.

103 TUBE STRUCTURE FORMS INDUCTIVE PART OF RESONANT CIRCUIT:
This subclass is indented under the class definition. Subject matter wherein some structure or structures of the active element, such as the space discharge electrodes or the internal leads associated therewith, have an appreciable inductive reactance which reactance is effectively included as part of the frequency determining network of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
79+, for oscillators of the beam tube type wherein the frequency determining network is structurally a part of the beam tube.
86+, for magnetic field controlled space discharge device oscillators wherein the resonator is a structural part of the device (e.g., magnetron type with rising-sun anode blocks).

104 TRANSIT TIME OSCILLATOR:
This subclass is indented under the class definition. Subject matter wherein the oscillator comprises an electron tube, having input and output electrodes, and a frequency determining network effectively coupled between the output and input electrodes and wherein the electrode spacing or the electrode biasing potentials, or both, are so chosen that the time of flight or transit angle of the electrons between the electrodes is an appreciable part of a cycle of the generated oscillations, the arrangement being such that energy is continuously supplied to the frequency determining network in proper phase to sustain oscillations.

SEE OR SEARCH THIS CLASS, SUBCLASS:

5, for magnetron type oscillators having automatic frequency control and wherein the active element may relay on electron transit time effects to generate oscillations.

6+, for beam tube oscillators (e.g., Klyston) of the velocity modulated type having automatic frequency stabilization.

79+, for beam tube oscillators wherein electron transit time effects are utilized to generate oscillations.

86+, for oscillators utilizing a magnetically controlled space discharge device, e.g., magnetron, which device may be of the electron transit type.

92+, for retarding field type oscillators (e.g., Barkhausen-Kurz) wherein the transit time effects of electrons oscillating about a positive grid are utilized to generate oscillations.

105 WITH PARASITIC OSCILLATION CONTROL OR PREVENTION MEANS:

This subclass is indented under the class definition. Subject matter wherein the oscillator, when in operation, generates or tends to generate undesired spurious oscillations and wherein means are provided in the oscillator circuit to suppress, control or prevent the generation of such undesired oscillations.

(1) Note. The spurious oscillations may be caused, for example, by (1) parasitic resonant circuits formed by the tube leads and interelectrode capacitance of the active element of the oscillator, (2) secondary emission effects due to positive excursions of the grid of the active element of the oscillator which produces a negative resistance and causes the production of dynatron oscillations, (3) electron transit time effects, particularly in a tetrode or pentode, when the grid is positive with respect to cathode and output electrode, which effects may produce Barkhausen oscillations, and (4) the radio frequency chokes in the electrode biasing circuits which chokes may be of such values as to cause the generation of low frequency parasitic oscillations.

SEE OR SEARCH THIS CLASS, SUBCLASS:

88+, for magnetically controlled space discharge devices with means to stabilize the generated frequency.

175+, for oscillators in general with means to stabilize the generated frequency.

106 WITH PERIODOIC OR REPETITIOUS AMPLITUDE VARYING MEANS (E.G., TREMOLO):

This subclass is indented under the class definition. Subject matter wherein the oscillator is provided with means to cyclically or repetitively vary the amplitude of the generated means are provided to simultaneously vary the amplitude and frequency of the generated wave cyclically or repetitively.

SEE OR SEARCH THIS CLASS, SUBCLASS:

47, for plural oscillator systems wherein one oscillator varies the amplitude of the generated oscillations of another oscillator.

55, for plural oscillator systems provided with means to synchronize, trigger or pulse at least one oscillator.

145, for multivibrators with sync, trigger or pulsing means.

149, for blocking oscillators with sync, trigger or pulsing means.

153, for relaxation oscillators in general with sync, trigger or pulsing means.

172+, for oscillators in general with sync, trigger or pulsing means.

182+, for oscillators in general provided with oscillation amplitude control means.

107 SOLID STATE ACTIVE ELEMENT OSCILLATOR:

This subclass is indented under the class definition. Oscillators wherein the oscillator comprises at least two components (1) a two-terminal or four-terminal active element of electrically conductive, semi-conductive, ferromagnetic or ferroelectric material in the solid state, and (2) a frequency determining network. Usually the two-terminal active element constitutes a negative resistance so connected to the frequency determining network that the resulting oscillator is a two-terminal negative resis-

tance oscillator, whereas the four-terminal active element is so connected to the frequency determining network that the resulting oscillator is of the feedback type.

(1) Note. Oscillator system elements recited in the Class 331 definition of an oscillator system occur in a Gunn element with input and output terminals, even though a Gunn Oscillator isn't even an integrated circuit.

(2) Note. If an oscillator system involving an active solid state device or integrated circuit is claimed, nominally or in detail, then it is properly classified in Class 331, whereas if an oscillator system is not claimed or a subcombination thereof which involves an active solid state device is claimed, and is not elsewhere classifiable, then they are properly classified in Class 257.

SEE OR SEARCH THIS CLASS, SUBCLASS:

52, for plural oscillator systems comprising two or more oscillators of the semi-conductor active element type connected in cascade.

94, for molecularly resonant type oscillator wherein the resonance properties of particles of a gas, liquid or solid are utilized to produce oscillations.

126+, for oscillators wherein the active element thereof comprises a device of the gaseous discharge type.

SEE OR SEARCH CLASS:

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), for active solid-state devices, especially subclasses 6 through 8 for Gunn effect oscillators, and subclasses 446 and 499+ for integrated circuit devices with electrically isolated components.

307, Electrical Transmission or Interconnection Systems, subclasses 401+ for miscellaneous systems, not elsewhere classifiable utilizing ferromagnetic or ferroelectric active elements, and subclass 132 for switching systems of the self-sustaining repetitive make and break type, usually employing electromagnetic relays.

310, Electrical Generator or Motor Structure, subclass 301 for the structure of electric generators or motors utilizing the thermal or pyromagnetic properties of a solid, and subclasses 311+ for the structure of electric generators or motors utilizing the piezoelectric properties of a solid.

322, Electricity: Single Generator Systems, subclass 2 for electrical systems utilizing means of the nonmagnetic type for generating electricity.

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, appropriate subclasses for miscellaneous transistor or electron tube nonlinear circuits.

330, Amplifiers, subclasses 250+ for linear amplifiers utilizing solid state active elements.

336, Inductor Devices, subclasses 155+ for the structure of inductive regulators with no relatively moving parts, e.g., saturable core transformers or inductors.

361, Electricity: Electrical Systems and Devices, subclass 435 for liquid state, electrolytic circuit breaker devices for converting D. C. to pulses.

438, Semiconductor Device Manufacturing: Process, for methods of making semiconductor electrical devices.

108 Transistors:

This subclass is indented under subclass 107. Oscillators in which the active element consists of a device of electronic conducting, semi-conductive material utilizing the current amplification properties of the material, which device has three or more electrodes.

(1) Note. If an oscillator system involving an active solid state device or integrated circuit is claimed, nominally or in detail, then it is properly classified in Class 331, whereas if an oscillator system is not claimed or a subcombination thereof which involves an active solid state device is claimed, and is not elsewhere classifiable, then they are properly classified in Class 257.

SEE OR SEARCH CLASS:

257, Active Solid-State Devices (e.g., Transistors, Solid-State Diodes), appropriate subclasses for active solid-state devices, including field effect or bipolar transistors, per se, subclasses 6 through 8 for Gunn effect oscillators, and subclasses 446 and 499+ for integrated circuit devices with electrically isolated components.

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, appropriate subclasses for miscellaneous transistor or electron tube nonlinear circuits.

330, Amplifiers, subclasses 250+ for linear amplifiers systems utilizing transistors.

109 Amplitude stabilization and control:

This subclass is indented under subclass 108. Subject matter wherein means are provided for adjusting, controlling or regulating the amplitude of the generated oscillations. The oscillation amplitude control means may be manually set or varied or may be controlled automatically responsive to changes in some condition, such as the amplitude of the generated oscillations.

SEE OR SEARCH THIS CLASS, SUBCLASS:

15, for automatic frequency stabilized oscillators having amplitude compensation means.

40, for beat frequency oscillators with amplitude control means.

47, for plural oscillator systems where one oscillator varies the oscillation amplitude of another oscillator.

62, for oscillators with means to protect the oscillator against overload.

65, for oscillators whose oscillation amplitude may be controlled by means responsive to some external physical condition (e.g., humidity, pressure, temperature).

75+, for oscillators combined with an active element in the output circuit thereof which element may be a wave shaper or amplitude control means.

106, for oscillators having means for periodically or repetitiously varying the oscillation amplitude.

182+, for oscillators in general provided with amplitude control or stabilization means.

SEE OR SEARCH CLASS:

330, Amplifiers, subclass 290 for linear transistor amplifiers having d.c. feedback stabilization control means; subclasses 250+ for linear transistor amplifiers having signal feedback means; and subclasses 278+ for linear transistor amplifiers having signal volume level control means.

110 Bridge type:

This subclass is indented under subclass 108. Subject matter wherein the frequency determining element of the oscillator consists of a feedback network of the balanced lattice or similar type having two pairs of conjugately related terminals, one pair of terminals being connected to the output circuit and the other pair of terminals being connected to the input circuit of the transistor, the arrangement being such that regeneration (oscillation) occurs only at the desired frequency, energy at all other frequencies being attenuated because of degeneration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

138+, for bridge type oscillators in general.

111 Relaxation oscillator:

This subclass is indented under subclass 108. Oscillators for generating nonsinusoidol waves which are cyclic in nature and wherein each cycle consists of a period determined by the charging time of a capacitor or inductor of the oscillator followed by a period determined by the discharge time of the capacitor or inductor through a resistive element of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

129+, for relaxation oscillators of the gaseous space discharge type.

143+, for relaxation oscillators in general not provided for in a preceding subclass. See also the search notes appended to subclass 143 as to further

fields of search relating to relaxation oscillators.

SEE OR SEARCH CLASS:
307, Electrical Transmission or Interconnections Systems, subclasses 401+ for relaxation systems utilizing nonlinear reactors which systems are not of the free-running type.
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, appropriate subclasses for miscellaneous relaxation circuits and subclasses 185+ for such circuits which may utilize a stable state circuit.

112 Blocking oscillator type:
This subclass is indented under subclass 111. Oscillators comprising at least one active element of the transistor type, a closely-coupled transformer coupling the output circuit of the transistor to the input circuit in positive feedback relation and a time constant network in the input circuit of the transistor, the conduction and relaxation periods of the oscillator being determined by the impedance parameters of the transformer and time constant network.

SEE OR SEARCH THIS CLASS, SUBCLASS:
146+, for blocking oscillators in general.

113 Multivibrator type:
This subclass is indented under subclass 111. Oscillators which comprise a symmetrical arrangement of a two-stage resistance coupled transistor amplifier in which the output of each stage supplies input to the other stage.

SEE OR SEARCH THIS CLASS, SUBCLASS:
144+, for a stable or free running multivibrators in general.

SEE OR SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclasses 401+ for miscellaneous multivibrators of the nonfree-running type employing active elements of ferromagnetic or ferroelectric type.
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclasses 185+ for miscellaneous stable state circuits (e.g., bistable multivibrator).

114 Push-pull:
This subclass is indented under subclass 108. Oscillators wherein at least two transistors of the same or opposite conductivity type are connected in a symmetrical balanced circuit arrangement so that their respective input and output signals are in phase opposition.

SEE OR SEARCH THIS CLASS, SUBCLASS:
100, for push-pull oscillators with parallel wire type resonators.
102, for push-pull oscillators with coaxial line type resonators.
159, for crystal oscillators with plural electron tubes connected in push-pull.
168, for LC oscillators in general having plural electron tubes connected in push-pull.

SEE OR SEARCH CLASS:
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, subclass 595 for miscellaneous circuits utilizing a push/pull relation.
330, Amplifiers, subclasses 262+ for push-pull transistor linear amplifiers.

115 Negative resistance:
This subclass is indented under subclass 108. Oscillators in which the oscillator comprises a two terminal negative resistance device comprising a transistor connected to a tuned circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:
86+, for magnetron oscillators which may be of the negative resistance type.
126+, for negative resistance oscillators of the gaseous space discharge type.
132+, for negative resistance oscillators in general not provided for in any preceding subclass. See the search notes appended to this subclass for negative resistance devices classified in other classes.

116 Electromechanical resonator controlled:
This subclass is indented under subclass 108. Subject matter wherein the frequency determining element of the oscillator is of the electromechanical resonator type.

SEE OR SEARCH THIS CLASS, SUBCLASS:
73, for electron-coupled plural grid tube oscillators utilizing piezoelectric crystal oscillation frequency determining means.
139, for bridge-type oscillators with piezoelectric crystal in bridge circuit.
154+, for oscillators in general utilizing electromechanical resonator means as the oscillation frequency determining means.

117 L-C type:
This subclass is indented under subclass 108. Subject matter wherein the frequency determining element of the oscillator is of lumped parameter LC type.

SEE OR SEARCH THIS CLASS, SUBCLASS:
95, for oscillators wherein the LC resonator is of the butterfly type.
96+, for oscillators wherein the resonator is of the distributed parameter type.
128, wherein a gaseous space discharge device is utilized to impulse or shock excite an LC circuit.
154+, for oscillators having a frequency determining element of the electromechanical type (e.g., tuning fork, magnetostrictive, or piezoelectric vibrator).
165+, for shock-excited LC circuits in general.
167+, for LC type oscillators in general.

126 GASEOUS SPACE DISCHARGE DEVICE:
This subclass is indented under the class definition. Oscillators wherein means consisting of a gaseous space discharge device is utilized to control a source of energy for exciting the frequency determining network of the oscillator.

(1) Note. A gaseous space discharge device is a device having at least two electrodes in a gas or vapor medium and whereby a flow of electricity results between the electrodes when the gas or vapor is ionized.

SEE OR SEARCH CLASS:
314, Electric Lamp and Discharge Devices: Consumable Electrodes, appropriate subclasses, for systems wherein the discharge device is the ultimate load of the system and is of the consumable electrode type (e.g., arc lamp).
315, Electric Lamp and Discharge Devices: Systems, appropriate subclasses, for systems wherein the gaseous space discharge device is the ultimate load of the system.

127 Spark or open arc type:
This subclass is indented under subclass 126. Subject matter wherein the gaseous space discharge device comprises at least two electrodes usually in an unconfined gas or vapor medium, the discharge therebetween being of the nature of a sudden disruptive breakdown of the medium (i.e., spark) as distinguished from an arc, glow or brush discharges, which discharges are of much longer duration.

SEE OR SEARCH CLASS:
314, Electric Lamp and Discharge Devices: Consumable Electrodes, appropriate subclasses, for systems wherein the discharge device is of the open arc, consumable electrode type (e.g., arc lamp) and wherein the device is the ultimate load of the system.
363, Electric Power Conversion Systems, subclasses 112+ for electronic tube current conversion systems (D.C.-A.C., A.C.-D.C.) of the open arc device (e.g., spark gap) type, and subclasses 166+ for frequency conversion systems utilizing an open arc device.

128 Drives shock excited L.C. circuit:
This subclass is indented under subclass 126. Subject matter wherein the gaseous space discharge device is utilized to impulse a resonant circuit of the lumped LC type, which current is then permitted to oscillate freely at its natural frequency.

SEE OR SEARCH THIS CLASS, SUBCLASS:

79+, for beam tube oscillators wherein an electron beam may shock-excite a resonant circuit.

165+, for shock-excited resonant circuits in general, not classifiable in any preceding subclass.

129 Relaxation oscillator:

This subclass is indented under subclass 126. Oscillators for generating nonsinusoidal waves which are cyclic in nature and wherein each cycle consists of a period determined by the charging time of a capacitor or inductor of the oscillator followed by a period determined by the discharging time of the capacitor or inductor through a resistor element, the means for controlling the charge or discharge of the capacitor or inductor being of the gaseous space discharge type of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

111+, for relaxation oscillators utilizing transistors.

143+, for relaxation oscillators not provided for in any preceding subclass.

SEE OR SEARCH CLASS:

307, Electrical Transmission or Interconnection Systems, subclasses 401+ for relaxation systems utilizing nonlinear reactors and which are not of the free-running type.

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, appropriate subclasses for miscellaneous relaxation circuits and subclasses 185+ for such circuits which may utilize a stable state circuit.

130 Plural gaseous devices:

This subclass is indented under subclass 129. Oscillators wherein the capacitor or inductor charge or discharge means consists of more than a single gaseous space discharge device.

SEE OR SEARCH THIS CLASS, SUBCLASS:

113, for mulitivibrators utilizing plural transistors.

144+, for multivibrators utilizing plural tubes.

131 Discharge device or rectifier in 'C' or 'L' charging or discharging circuit:

This subclass is indented under subclass 129. Oscillators wherein an electron tube or other unilaterally conducting device is included in the charging circuit or path of the capacitor or inductor.

132 NEGATIVE RESISTANCE OR NEGATIVE TRANSCONDUCTANCE OSCILLATOR:

This subclass is indented under the class definition. Oscillators wherein the oscillator comprises a two-terminal negative resistance device connected to a tuned circuit, the absolute magnitude of the negative resistance being less than the resonant impedance of the tuned circuit.

(1) Note. A negative resistance is a two-terminal device having a volt-ampere characteristic with negative slope over the range of voltages or currents wherein it is operative, that is, an increase in voltage results in a decrease in current, or vice versa. The term “negative resistance” as employed herein comprehends devices designated as the “negative transconductance” type.

SEE OR SEARCH THIS CLASS, SUBCLASS:

86+, for magnetron oscillators which may be of the negative resistance type.

115, for negative resistance type oscillators of the transistor type.

126+, for oscillators of gaseous space discharge type which may be of the negative resistance type.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, subclasses 213+ for negative resistance device systems, per se.

133 Secondary emission (e.g., dynatron):

This subclass is indented under subclass 132. Oscillators wherein the negative resistance device relies on the phenomenon of secondary emission to produce the negative resistance effect. Usually the negative resistance device

is of the dynatron type wherein the screen grid of a tetrode is biased more positively than the anode thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

89, for magnetron oscillators with a secondary emissive electrode.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, subclasses 103+ for the structure of secondary emitter type discharge devices.

329, Demodulators, particularly subclass 368 for an amplitude demodulator using an electron discharge device having three or more electrodes.

134 Transitron type:

This subclass is indented under subclass 132. Oscillators wherein the negative resistance device comprises a multigrid tube employing a retarding field to produce negative transconductance between two grids of the tube, which grids are usually coupled by a capacitor or a bias source.

135 PHASE SHIFT TYPE:

This subclass is indented under the class definition. Oscillators systems comprising a feedback amplifier having a predetermined phase shift between the input and output voltages thereof, the feedback path including a passive phase shifting network for providing a phase shift of such amount to cause the oscillator system to generate sustained oscillations.

(1) Note. Oscillator systems in this subclass rely on achieving proper phase shift between input and output voltages of the system by a nonresonant passive phase shifting network to produce oscillations and should be distinguished from those oscillators, classified elsewhere in this class, whose frequency is determined by the resonant properties of an LC type resonator.

SEE OR SEARCH CLASS:

323, Electricity: Power Supply or Regulation Systems, subclasses 212 through 219 for phase angle control circuits effective at a single frequency.

332, Modulators, particularly subclasses 140 and 142+ for oscillator systems which may be similar to those classified in Class 331, subclasses 135+.

333, Wave Transmission Lines and Networks, subclasses 138+ for delay networks, per se, for retarding wave energy a predetermined period of time over a range of frequencies.

136 Zero phase shift:

This subclass is indented under subclass 135. Oscillators wherein the amplifier and the passive phase shifting network each have a total phase shift of zero degrees.

137 With R.C. ladder-type phase shift network:

This subclass is indented under subclass 135. Oscillators wherein the amplifier and the passive phase shifting network each have a total phase shift other than zero or 360 degrees, and wherein the passive phase shifting network is of the ladder-type consisting only of resistive and capacitive components. Usually the amplifier and the passive phase shifting network each have a total phase shift of 180 degrees.

138 BRIDGE TYPE:

This subclass is indented under the class definition. Oscillators wherein the frequency determining element of the oscillator consists of a feedback network of the balanced lattice or similar type having two pairs of conjugately related terminals, one pair of terminals being connected to the output circuit and the other pair of terminals being connected to the input circuit of the active element of the oscillator, the arrangement being such that regeneration occurs only at a desired frequency, energy at all other frequencies being attenuated due to degeneration.

SEE OR SEARCH THIS CLASS, SUBCLASS:

110, for transistor oscillators utilizing a bridge-type frequency determining network.

SEE OR SEARCH CLASS:

323, Electricity: Power Supply or Regulation Systems, subclass 365 for bridge networks of general application.

332, Modulators, subclass 172 for amplitude modulation systems utilizing bridge networks.

333, Wave Transmission Lines and Networks, subclasses 117+ for hybrid networks for connecting two or more circuits in conjugate relation, subclasses 169+ for wave filters of the lattice type, and subclasses 170+ for wave filters of the bridged-T type.

139 Piezoelectric crystal in bridge:

This subclass is indented under subclass 138. Oscillators wherein the feedback network includes a piezoelectric crystal for determining the generated frequency of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

116, for crystal controlled transistor type oscillators.

158+, for crystal controlled oscillators in general.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclasses 311+ for piezoelectric devices and systems not elsewhere classified, and note under SEARCH CLASS of Class 310 subclass 311, the extensive list of classes relating to piezoelectric crystals and systems utilizing crystals.

332, Modulators, particularly subclasses 139+ for frequency modulators utilizing piezoelectric crystals.

333, Wave Transmission Lines and Networks, subclass 30 for delay networks, and subclass 72 for filter networks utilizing piezoelectric crystals.

140 R.C. or R.L. type:

This subclass is indented under subclass 138. Oscillators wherein the feedback network includes only capacitance and resistance elements or inductance and resistance elements for determining the generated frequency of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

111+, for transistor relaxation oscillators utilizing RC or RL timing networks.

129+, for gas tube relaxation oscillators utilizing RC or RL timing networks.

137, for phase shift oscillators with RC ladder type phase shift network.

143, for relaxation oscillators in general utilizing RC or RL timing networks.

141 Wien bridge:

This subclass is indented under subclass 140. Oscillators wherein the feedback network lattice comprises two pure resistance arms and two impedance arms, one impedance arm including a series-connected capacitor and resistor and the other impedance arm including a parallel-connected capacitor and resistor, positive feedback being obtained through the impedance arms and negative feedback through the pure resistance arms. These oscillators are generally known as Wien bridge type.

142 Double T bridge:

This subclass is indented under subclass 140. Oscillators wherein the feedback network comprises two T networks connected in parallel, one T network consisting of two resistors in series with a capacitor connected to the common connection of the resistor, the other T network consisting of two capacitors in series with a resistor connected to the common connection of the capacitors.

143 RELAXATION OSCILLATORS:

This subclass is indented under the class definition. Oscillators for generating nonsinusoidal waves which are cyclic in nature and wherein each cycle consists of a period determined by the charging time of a capacitor or inductor followed by a period determined by the discharging time of the capacitor or inductor through a resistive element.

(1) Note. Relaxation oscillators to be classified herein must be free-running. Non-free-running relaxation oscillators are classified in Class 327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems.

SEE OR SEARCH THIS CLASS, SUBCLASS:

20+, for relaxation oscillators of the television synchronized type involving automatic frequency control.

59, for an oscillator which may be converted from one type of oscillator to another, e.g., sinusoidal oscillator to relaxation oscillator.
61, for single oscillators for producing plural outputs simultaneously which outputs are of diverse wave form, e.g., sine wave and square wave.
78, for electrical noise or random frequency generators.
111+, for relaxation oscillators of the transistor type.
129+, for relaxation oscillators utilizing gaseous space discharge devices.

SEE OR SEARCH CLASS:
307, Electrical Transmission or Interconnection Systems, subclasses 401+ for nonlinear reactor type and subclass 132 for free-running electromagnetic circuit maker and breaker type pulse producers.
327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, appropriate subclasses for miscellaneous relaxation circuits and subclasses 185+ for such circuits which may utilize a stable state circuit.

144 Multivibrators:
This subclass is indented under subclass 143. Subject matter, wherein the relaxation oscillator comprises at least two discharge paths of the active element type, the output of each being coupled to the input of the other, at least one of the couplings including a resistance-capacitance or resistance-inductance network, the arrangement being such that the two discharge paths are caused to be actuated cyclically, the time constant of the network determining the fundamental frequency of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:
113, for a stable or free-running multivibrators of the transistor type.
130, for plural gas tube relaxation oscillators which may be of the a stable multivibrator type.
159+, for crystal oscillators of the plural tube type wherein the tubes may be alternately conductive (e.g., push-pull oscillator).
168, for plural tube LC oscillators of the push-pull type.

145 With sync, triggering or pulsing circuit:
This subclass is indented under subclass 144. Subject matter wherein the multivibrator includes an additional network for coupling to the oscillator a source, usually periodic of synchronizing or triggering potential to drive or lock the period of the freely running multivibrator to the period of the source or to some multiple or submultiple thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:
18+, for oscillators of the automatic frequency controlled type wherein the oscillator frequency is synchronized with a standard or reference frequency source.
41, for beat frequency oscillators that are locked to or synchronized with a standard or reference frequency.
55, for plural oscillators which are synchronized relative to each other or to another source.
87, for magnetron type oscillators with means to pulse the oscillator.
149, for blocking oscillators with sync, trigger or pulsing circuit.
153, for relaxation oscillators in general with synchronizing, triggering or pulsing circuit.
172+, for oscillators in general with synchronizing, triggering or pulsing means.

146 Blocking oscillators:
This subclass is indented under subclass 143. Subject matter wherein the relaxation oscillator comprises at least one active element, a closely-coupled transformer coupling the output circuit of the active element to the input circuit in positive feedback relation and a time constant network in the input circuit of the active element, the conduction and relaxation periods of the oscillator being determined by the impedance parameters of the transformer and time constant network.

SEE OR SEARCH THIS CLASS, SUBCLASS:

106, for oscillators for producing periodic pulses of oscillations of varying amplitude and frequency.

112, for blocking oscillators of the transistor type.

173, for oscillators in general of the self-pulsed type for producing periodic bursts or pulses of oscillatory energy.

147 Using discharge device with plural grids:

This subclass is indented under subclass 146. Subject matter wherein the active element of the oscillator comprises a plural grid tube.

SEE OR SEARCH THIS CLASS, SUBCLASS:

72, for electron coupled oscillators utilizing plural grid tubes.

73+, for crystal oscillators utilizing plural grid tubes.

144, for multivibrators utilizing plural grid tubes.

152+, for relaxation oscillators in general utilizing plural grid tubes, e.g., phantastron type.

148 With 3 or more winding feedback transformers:

This subclass is indented under subclass 146. Subject matter wherein the closely coupled transformer includes three or more windings effectively connected in the oscillator circuit.

149 With sync, trigger, or pulsing circuit (e.g., self-pulsing):

This subclass is indented under subclass 146. Subject matter wherein the blocking oscillator includes an additional network for coupling to the oscillator a periodic source of synchronizing or triggering potential to drive or lock the period of the freely-running oscillator to the period of the source or to some multiple or submultiple thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

18+, for oscillators of the automatic frequency stabilized type synchronized with respect to a standard or reference frequency source.

55, for plural oscillators which are synchronized relative to each other or to another source.

87, for magnetron type oscillators with means to pulse the oscillator.

145, for multivibrators with synchronizing triggering or pulsing circuit.

153, for relaxation oscillators in general with synchronizing triggering or pulsing circuit.

172, for oscillators in general with synchronizing, triggering or pulsing means.

150 Output supplied to another discharge device circuit:

This subclass is indented under subclass 143. Subject matter wherein the relaxation oscillator output circuit is connected to another discharge device circuit. By way of example the other discharge device circuit may include a capacitor, the charging or discharging of the capacitor generating a repetitive time base in accordance with the pulsations of the relaxation oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

46, for plural oscillators connected in series-parallel.

50+, for plural oscillators connected in cascade or series.

75+, for oscillators with an active element connected to the output thereof.

151 Involving resonant or inductive wave forming circuit or transformer:

This subclass is indented under subclass 143. Subject matter wherein the relaxation oscillator includes a resonant circuit or a transformer.

SEE OR SEARCH THIS CLASS, SUBCLASS:

146+, for blocking oscillators utilizing a closely coupled transformer.

152 Multi-grid discharge device in charged capacitor circuit:

This subclass is indented under subclass 143. Subject matter wherein the relaxation oscillator includes a multi-grid discharge device in the capacitor circuit for controlling the charge on the capacitor of the time constant network of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

73, for crystal oscillators utilizing plural grid tubes.

132+, for negative resistance or negative transconductance oscillators utilizing plural grid tubes.

143, for relaxation oscillators utilizing a secondary emission discharge device of the plural grid type.

147, for blocking oscillators utilizing plural grid tubes.

153 With sync, trigger or pulsing circuit:

This subclass is indented under subclass 143. Subject matter wherein the relaxation oscillator includes an additional network for coupling to the oscillator a source, usually periodic, of synchronizing triggering or pulsing potential to drive or lock the period of the freely-running oscillator to the period of the source or to some multiple or submultiple thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

18+, for oscillators of the automatic frequency controlled type wherein the oscillator is synchronized with a standard or reference frequency source.

55, for plural oscillators which are synchronized relative to each other or to another source.

87, for magnetron type oscillators with means to pulse the oscillator.

145, for multivibrators with a synchronizing, triggering or pulsing circuit.

149, for blocking oscillators with synchronizing, triggering or pulsing circuit.

172, for oscillators in general with synchronizing, triggering or pulsing means.

154 ELECTROMECHANICAL RESONATOR:

This subclass is indented under the class definition. Oscillators wherein the frequency of the oscillator is determined by the mechanical period of vibration or oscillation of an electrically driven material body, the material body constituting a mechanical resonator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

3, for automatic frequency stabilized oscillators wherein the phenomenon of molecular resonance is utilized to control the oscillator frequency.

78, for electrical noise or random wave generators which utilize the random translatory motions of charged particles for generating fortuitously related waves.

94, for molecular or particle resonant type oscillators (e.g., maser).

116, for electromechanical resonator controlled transistor oscillators.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclasses 15+ for the structure of reciprocating motors.

318, Electricity: Motive Power Systems, subclass 114 for vibration producing motor systems, and subclasses 119+ for reciprocating motor systems.

330, Amplifiers, subclasses 94 and 109 for linear amplifier systems having frequency responsive means in a feedback path which may be of the electromechanical resonator type; subclass 174 for linear amplifier systems which have an electromechanical transducer means in the signal coupling means of the amplifier.

332, Modulators, particularly subclasses 139+ for frequency modulators utilizing an electromechanical resonant element.

333, Wave Transmission Lines and Networks, subclasses 148+ for delay networks of the electromechanical transducer type, and subclasses 186+ for wave filters of the electromechanical transducer type.

367, Communications, Electrical: Acoustic Wave System and Devices, subclasses 141+ for underwater transducers of the electromechanical type.

155 With optical, piezoelectric or acoustic coupling means:

This subclass is indented under subclass 154. Subject matter wherein the mechanical resonator is coupled to the oscillator system by: (1) an

electrooptical transducer, (2) a piezoelectric transducer, or (3) an electroacoustic transducer.

SEE OR SEARCH THIS CLASS, SUBCLASS:

158+, for oscillators wherein the piezoelectric crystal constitutes the frequency determining element of the oscillator.

156 Vibrating reed or string type (e.g., tuning fork):

This subclass is indented under subclass 154. Oscillators wherein the resonator consists of an elongated member which vibrates transversely to its longitudinal dimension relative to a fixed point or points of support.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclass 25 for the structure of vibrating reed type electric motors.

157 Magnetostrictive:

This subclass is indented under subclass 154. Oscillators wherein the resonator consists of a member of ferromagnetic composition having magnetostrictive properties and whose period of vibration or oscillation is due to the changes in dimensions produced by the effect of an impressed alternating magnetic field.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclass 26 for the structure of reciprocating motors of the magnetostrictive type.

318, Electricity: Motive Power Systems, subclass 118 for magnetostrictive motor systems.

367, Communication, Electrical: Acoustic Wave Systems And Devices, appropriate subclasses for underwater transducers of the magnetostrictive type.

158 Crystal:

This subclass is indented under subclass 154. Subject matter wherein the frequency determining electrically driven material body is a crystal exhibiting the piezoelectric effect. Examples of such crystals are quartz, Rochelle salt, tourmaline or other crystal classes which do not possess a center of symmetry and wherein deformation of the crystal is proportional to the first power of the imposed electric field, the direction of deformation referring upon reversal of the field.

SEE OR SEARCH THIS CLASS, SUBCLASS:

70, for crystal oscillators provided with means to control the crystal temperature.

73, for crystal oscillators of the electron-coupled type.

139, for crystal oscillators of the bridge type.

155, for oscillators wherein a piezo crystal drives or is driven by the electromechanical resonator.

SEE OR SEARCH CLASS:

310, Electrical Generator or Motor Structure, subclasses 311+ for piezoelectric transducers in general.

318, Electricity: Motive Power Systems, subclass 116 for nonmagnetic motor systems which includes piezoelectric motor control systems.

322, Electricity: Single Generator Systems, subclass 2 for nonmagnetic generator systems including piezoelectric type generators.

324, Electricity: Measuring and Testing, subclass 56 for piezoelectric crystal testing.

332, Modulators, subclass 26 for phase or frequency modulators utilizing an electromechanical resonant element which may be of the piezoelectric type.

333, Wave Transmission Lines and Networks, subclasses 148+ for wave delay networks that may include piezoelectric elements, and subclasses 187+ for electric wave filters utilizing piezoelectric crystals.

367, Communications, Electrical: Acoustic Wave Systems and Devices, subclasses 157+ for underwater vibration transducers of the piezoelectric type.

369, Dynamic Information Storage or Retrieval, subclass 144 for a piezoelectric phonograph pickup.

159 Plural tube:

This subclass is indented under subclass 158. Subject matter wherein the oscillator includes at least two active elements as necessary ele-

ments of the oscillator circuit. By way of example, crystal oscillators with push-pull connected tubes are in this subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

45, for oscillators having a polyphase output and utilizing two or more tubes as active elements thereof.

100, for push-pull oscillators with parallel wire resonator.

102, for push-pull oscillators with coaxial line resonator.

114, for push-pull oscillators utilizing two or more transistors.

130, for relaxation oscillators utilizing plural gas tubes.

144, for multivibrators utilizing plural tubes.

168+, for LC oscillators in general utilizing plural tubes.

160 With means to limit crystal current or voltage:

This subclass is indented under subclass 158. Subject matter wherein impedance means or automatic switching means are associated with the crystal to divert excessive currents away from the crystal or for sensing excessive currents through the crystal, or overvoltage across the crystal, to effectively by pass or disable the crystal circuit or to disconnect the crystal from the oscillator circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

62+, for oscillator systems combined with means to protect the oscillator from damage caused by undesired changes in load current, voltage, temperature or humidity.

183, for oscillator systems having means to automatically control the amplitude of the generated oscillations.

161 With crystal substitution:

This subclass is indented under subclass 158. Subject matter wherein means are provided for effectively removing the crystal from the oscillator circuit and for effectively substituting another crystal therefor. Usually, but not necessarily, the crystals are selectively connected and disconnected from the oscillator circuit by an electrical circuit maker and breaker.

SEE OR SEARCH THIS CLASS, SUBCLASS:

40, for beat frequency oscillators wherein the frequency may be controlled by selectively substituting piezoelectric crystals.

49, for plural oscillator systems provided with means for selectively connecting one or more of two or more oscillators to a common output circuit.

179, for step-frequency change oscillator frequency adjusting means in general wherein LC circuits resonant at different frequencies may be interchangeably connected in the oscillator circuit.

162 Plural crystals in circuit:

This subclass is indented under subclass 158. Subject matter wherein two or more separate crystals are effectively connected in circuit with the active element of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

40, for plural oscillator systems of the beat frequency type that may include plural crystal oscillators.

161+, for crystal oscillators wherein means are provided for substituting at least one crystal for another crystal in the oscillator circuit.

163, for crystal oscillators wherein a single crystal having three or more electrodes so connected in the oscillator circuit as to present at least two separate resonant paths therein.

163 Crystal having three or more electrodes in circuit:

This subclass is indented under subclass 158. Subject matter wherein the crystal has three or more electrodes for establishing two or more separate resonant paths through the crystal.

SEE OR SEARCH THIS CLASS, SUBCLASS:

37, for single beat frequency oscillators of the crystal controlled type which utilize single crystals of the plural resonant path type and wherein each path may be resonant to a different frequency the two frequencies being beat

together in the active element of the oscillator.

162, for crystal oscillators having plural separate crystals in circuit.

164 Anode or cathode to grid crystal circuit:

This subclass is indented under subclass 158. Subject matter wherein the crystal is effectively coupled between the anode or output electrode and the grid or control electrode of the active element of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

170+, for LC type oscillators wherein a resonant circuit of the lumped circuit type is connected between the anode and cathode electrodes of the active element of the oscillator.

165 SHOCK EXCITED RESONANT CIRCUIT:

This subclass is indented under the class definition. Systems wherein means is provided for applying an electrical impulse to a resonant circuit which circuit is then permitted to oscillate freely at its natural frequency.

(1) Note. Systems utilizing an active element and a feed-back circuit to sustain forced oscillations are not considered shock-excited systems for classification herein, but will be found elsewhere in this class, e.g., miscellaneous L-C oscillators of the active element type are classified in subclasses 167+.

SEE OR SEARCH THIS CLASS, SUBCLASS:

79+, for beam tube oscillators wherein a sweeping, or modulated or bunched beam of charged particles may shock excite a resonator.

128, for systems wherein a gaseous space discharge device is utilized to shock-excite a resonant circuit.

166 With keying means of the active element type (e.g., burst generator):

This subclass is indented under subclass 165. Shock excited resonant circuits wherein a space discharge device having a control electrode is utilized as a switching means to control the electrical energy supplied to the resonant circuit.

SEE OR SEARCH THIS CLASS, SUBCLASS:

80, for shock-excited resonant circuits wherein the active element is a beam tube of the beam sweeping or deflecting type.

167 L-C TYPE OSCILLATORS:

This subclass is indented under the class definition. Oscillators of the active element type wherein the frequency of oscillation is determined by an inductance-capacitance circuit of the lumped element type and which oscillators are not provided for in any of the preceding subclasses.

SEE OR SEARCH THIS CLASS, SUBCLASS:

95, for oscillators utilizing butterfly resonators.

96, for oscillators utilizing distributed parameter resonators.

128, for gas tube means to shock-excite an LC circuit.

154+, for oscillators utilizing electromechanical resonators.

165+, for systems wherein the resonator is shock-excited.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, subclasses 219+ for distributed parameter resonators, per se.

334, Tuners, appropriate subclasses for tuned networks for use in wave energy apparatus and comprising inductance and capacitance elements in circuit arrangement to form a resonant circuit and in which structure is provided for adjusting one or both of these elements for changing the means resonant frequency of the circuit.

168 Plural tubes:

This subclass is indented under subclass 167. Subject matter wherein the oscillator system includes two or more active elements.

SEE OR SEARCH THIS CLASS, SUBCLASS:

100, for parallel wire resonator oscillators of the push-pull type.

102, for coaxial or shielded line resonator oscillators of the push-pull type.

113, for plural transistor oscillators of the multivibrator type.

130, for plural gas tube relaxation oscillators.

144, for plural tube multivibrators.

159, for plural tube crystal oscillators.

169 Anode to cathode coupled or connected resonant circuit:

This subclass is indented under subclass 167. Subject matter wherein the inductance-capacitance circuit is effectively coupled or connected between the output electrode (anode) and the common electrode (cathode) of the active element.

170 Anode to grid coupled or connected resonant circuit:

This subclass is indented under subclass 167. Subject matter wherein the inductance-capacitance circuit is effectively coupled or connected between the output electrode (anode) and the input electrode (grid) of the active element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

164, for crystal oscillators with anode to grid connected crystal circuit.

171 Grid to cathode coupled or connected resonant circuit:

This subclass is indented under subclass 167. Subject matter wherein the inductance-capacitance circuit is effectively coupled or connected between the control electrode (grid) and the common electrode (cathode) of the active element.

SEE OR SEARCH THIS CLASS, SUBCLASS:

164, for crystal oscillators with crystal circuit connected between grid and cathode.

172 WITH SYNCHRONIZING, TRIGGERING OR PULSING CIRCUITS:

This subclass is indented under the class definition. Oscillators wherein (1) means are provided for maintaining a predetermined phase or frequency relationship between two sources of waves, one source being an excitation or standard source (snyc source) and the other source being the controlled oscillator, or (2) means are provided to initiate or stop oscillation of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

20+, for automatic frequency stabilized oscillators of the T.V. sync type.

55, for plural oscillator systems wherein at least one oscillator is synchronized, triggered or pulsed.

87, for magnetron type oscillators with pulsing means.

145, for multivibrators with sync, trigger, or pulsing means.

149, for blocking oscillators with sync, trigger, or pulsing means.

153, for relaxation oscillators is general with sync, trigger or pulsing means.

SEE OR SEARCH CLASS:

348, Television, subclasses 536+ for synchronizing systems peculiar to the television art and having means to control the oscillator.

375, Pulse or Digital Communications, subclasses 354+ for synchronizing systems peculiar to the telegraph.

173 Triggering or pulsing (e.g., burst generators):

This subclass is indented under subclass 172. Oscillators wherein means are provided to initiate or stop oscillation of the oscillator.

174 Self-quenched:

This subclass is indented under subclass 173. Oscillators wherein means are provided to stop or quench the generation of oscillations by the oscillator by internal action of the oscillator.

175 FREQUENCY STABILIZATION:

This subclass is indented under the class definition. Subject matter wherein means are provided in the oscillator circuit to prevent or

compensate for undesirable drift or change in oscillator frequency caused by changes in oscillator frequency such as by changes in (1) space discharge device characteristics, (2) circuit parameters, or (3) supply or bias voltages, or any combination of (1), (2) or (3).

(1) Note. This subclass does not provide for oscillators with automatic frequency stabilization wherein means are provided for sensing or detecting an undesired change in oscillator frequency, developing a control or error voltage proportional to such change and applying the control or error voltage to means for adjusting a frequency determining means of the oscillator in such a sense as to bring the oscillator back on frequency. For such subject matter search subclasses 1+ above.

SEE OR SEARCH THIS CLASS, SUBCLASS:

1+, for automatic frequency stabilized oscillators. See also (1) Note above.

41, for beat frequency oscillator systems with frequency stabilization means.

88, for magnetron type oscillators with frequency stabilization means.

176 Temperature or current responsive means in circuit:

This subclass is indented under subclass 175. Subject matter wherein the oscillator circuit or structure is modified by the addition of a current or temperature responsive element thereto to compensate for the undesirable drift in oscillator frequency caused by the effect of current flow on the circuit parameters or that due to temperature changes (internal or ambient).

SEE OR SEARCH THIS CLASS, SUBCLASS:

69, for an oscillator with outer casing or housing and including a temperature modifier, which modifier may act to stabilize the oscillator frequency with changes in ambient temperature.

70, for an oscillator provided with means for modifying or controlling the temperature of the oscillator or elements thereof.

177 WITH FREQUENCY ADJUSTING MEANS:

This subclass is indented under the class definition. Oscillators having means for setting or controlling the frequency of the generated wave oscillator by varying a frequency determining element or elements of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

16, for automatic frequency stabilized oscillators with means to compensate or correct for undesired affects when tuning the oscillator over a range of frequencies.

34, for automatic frequency stabilized oscillators with particular tuning or frequency adjusting means.

40, for beat frequency oscillator systems with frequency control means.

48, for plural oscillator systems with frequency adjusting means for at least one oscillator.

90, for magnetron type oscillators with frequency adjustment means.

SEE OR SEARCH CLASS:

333, Wave Transmission Lines and Networks, subclasses 235+ for tunable distributed parameter resonators.

334, Tuners, appropriate subclasses for tuned networks for use in wave energy apparatus and comprising inductance and capacitance elements in circuit arrangement to form a resonant circuit and in which structure is provided for adjusting one or both of these elements for changing the means resonant frequency of the circuit.

455, Telecommunications, subclasses 196.1+ for radio receivers with tunable heterodyning oscillator.

178 Cyclic frequency sweeping means (e.g., vibrato):

This subclass is indented under subclass 177. Oscillators wherein means is provided for periodically or continuously varying the output frequency of the oscillator over a range of frequencies. The means, for example, may be (1) another oscillator driving a reactance tube in the frequency determining circuit of the

oscillator whose frequency is being swept, or (2) a continuously running motor driving a reactance element in the frequency determining circuit of the oscillator whose frequency is being swept.

SEE OR SEARCH THIS CLASS, SUBCLASS:

4, for search sweep of an oscillator automatic frequency control system.

40, for beat frequency oscillator systems with frequency sweeping means.

106, for oscillator whose output amplitude varies periodically or repetitiously and which include frequency sweeping.

179 Step-frequency change (e.g., band selection, frequency-shift keying):

This subclass is indented under subclass 177. Oscillators having means for setting or adjusting the output frequency by discrete increments or steps as distinguished from a continuous variation of frequency from one frequency to another desired frequency setting.

(1) Note. The means may be manually operable switches for switching between tuned oscillatory circuits at will.

SEE OR SEARCH THIS CLASS, SUBCLASS:

161, for crystal oscillators wherein the frequency of oscillation is changed by crystal substitution.

180 Reactance tube type:

This subclass is indented under subclass 177. Oscillators, in which the varied frequency determining element consists of an active element type reactance tube and wherein an adjustable bias control is provided for varying the effective reactance of the tube.

SEE OR SEARCH THIS CLASS, SUBCLASS:

36, for reactance tubes utilized as a frequency control means in an automatic frequency control (osc.) system.

SEE OR SEARCH CLASS:

332, Modulators, particularly subclass 140 and 142+ for frequency modulators using reactance tubes.

333, Wave Transmission Lines and Networks, subclasses 213+ for reactance tube systems, per se.

334, Tuners, subclasses 14+ for tuners which have a reactance tube type tuning means.

181 Variable inductance device (e.g., saturable core or adjustable vane inductor):

This subclass is indented under subclass 177. Oscillators in which the variable frequency controlling element consists of an inductance device provided with means to vary the effective inductance of the device. By way of examples, the inductance device may have a core of variable permeability, means being provided to vary the permeability of the core and hence the inductance of the device, or the device may comprise a metallic member of magnetic or nonmagnetic material movable within the magnetic field of an inductance coil to vary the inductance thereof.

SEE OR SEARCH THIS CLASS, SUBCLASS:

36, for automatic frequency stabilized oscillator utilizing a particular frequency controlling reactance device (e.g., saturable inductor).

SEE OR SEARCH CLASS:

323, Electricity: Power Supply or Regulation Systems, appropriate subclasses, for voltage magnitude and phase control systems in general utilizing adjustable or variable inductance devices.

336, Inductor Devices, appropriate subclasses, for the structure for inductors of the adjustable or variable inductance type.

182 AMPLITUDE CONTROL OR STABILIZATION:

This subclass is indented under the class definition. Subject matter wherein means are provided in the oscillator circuit for adjusting, controlling or regulating the amplitude of the generated oscillations and not provided for in any preceding subclass. The oscillation amplitude control means may be manually set or varied or may be controlled automatically responsive to changes in some condition, such as the amplitude of the generated oscillations.

(1) Note. Class 323, Electricity: Power Supply or Regulation Systems, is the generic place for current or voltage magnitude control systems in general wherein a single electrical source is coupled to a single electrical load and the classes listed under "SEARCH CLASS" of the class definition and "SEARCH CLASS" under specific subclasses of Class 323 should be consulted to locate art directed to other electrical art devices and systems having means to control current and voltage magnitude therein.

SEE OR SEARCH THIS CLASS, SUBCLASS:

15, for automatic frequency stabilized oscillators having amplitude compensation means.

40, for beat frequency oscillators with amplitude control means.

47, for plural oscillator systems where one oscillator varies the oscillation amplitude of another oscillator.

62, for oscillators with means to protect the oscillator against overload.

65+, for oscillators whose oscillation amplitude may be controlled by means responsive to some external physical condition (e.g., humidity, pressure, temperature).

75+, for oscillators combined with an active element in the output circuit thereof which element may be a wave shaper or amplitude control means.

106, for oscillators having means for periodically or repetitiously varying the oscillation amplitude.

108, for transistor oscillators having means to control or stabilize the oscillation amplitude.

SEE OR SEARCH CLASS:

323, Electricity: Power Supply or Regulation Systems, appropriate subclasses, for current or voltage magnitude control systems in general wherein a single electrical source is coupled to a single electrical load (see also (1) Note above).

327, Miscellaneous Active Electrical Nonlinear Devices, Circuits, and Systems, appropriate subclasses for current or voltage magnitude control systems in general wherein a plurality of circuits is coupled to one or more other circuits (see also (1) Note above).

330, Amplifiers, appropriate subclasses for amplifier systems having amplitude control or stabilization means, particularly subclasses 96, and 127+.

183 Automatic:

This subclass is indented under subclass 182. Subject matter wherein means are provided for automatically controlling the amplitude of the generated oscillations in response to a change in some condition.

(1) Note. The variable condition may be the amplitude of the oscillations generated by the oscillator, a condition within the oscillator (e.g., such as electrode bias variations or changes in temperature of the active element or other components of the oscillator) or some condition external to the oscillator.

184 HAVING DISCHARGED DEVICE OR PARTICULAR CONSTRUCTION:

This subclass is indented under the class definition. Subject matter wherein the active element of the oscillator comprises a discharge device of unconventional and unique construction not provided in any preceding subclass.

SEE OR SEARCH THIS CLASS, SUBCLASS:

78, for electrical noise or random wave generator which may utilize discharge devices of unconventional structure.

86+, for oscillators with magnetically controlled space discharge devices (e.g., magnetron).

79+, for beam tube oscillators.

92, for retarding field type oscillators which may utilize discharge devices of unconventional structure.

94, for molecular or particle resonant type oscillator.

103, for oscillators where tube structure forms inductive part of the resonant circuit.

104, for transit time oscillators utilizing discharge devices which may be of unconventional structure.

107+, for oscillators utilizing solid state active elements.

126+, for oscillators utilizing gaseous space discharge devices.

132+, for negative resistance or transconductance type oscillators which may utilize space discharge devices of unconventional structure.

SEE OR SEARCH CLASS:

313, Electric Lamp and Discharge Devices, appropriate subclasses, for particular space discharge device structures.

315, Electric Lamp and Discharge Devices: Systems, particularly subclasses 3+ for combined cathode-ray tube and circuit element structure, and subclasses 32+ for combined discharge device or discharge device temperature modifying means and electric circuit device structure.

185 WITH PARTICULAR SOURCE OF POWER OR BIAS VOLTAGE:

This subclass is indented under the class definition. Subject matter wherein the oscillator includes a source of electrical energy for supplying power to the oscillator or for supplying biasing potential to the electrodes of the active element of the oscillator.

SEE OR SEARCH THIS CLASS, SUBCLASS:

71, for oscillators wherein the source of power is raw (unrectified) alternating current.

175, for oscillators having means to compensate for drift of electrode potential of the active element of the oscillator, where such potential drift would cause an undesired change in oscillator frequency.

183, for oscillators wherein the amplitude of the generated oscillations is controlled by adjusting or varying the biasing potential of a electrode, or electrodes, of the active element of the oscillator.

186 Regulated:

This subclass is indented under subclass 185. Subject matter wherein means are provided for automatically controlling the amplitude of the current or voltage of the source of electrical energy in response to some condition.

(1) Note. Usually the control means is responsive to change in amplitude of the current or voltage being regulated and acts to restore or maintain the amplitude of the current or voltage at a predetermined value.

SEE OR SEARCH CLASS:

323, Electricity: Power Supply or Regulation Systems, subclasses 234 through 303 for automatic regulators.

187 MISCELLANEOUS OSCILLATOR STRUCTURES:

This subclass is indented under the class definition. Subject matter relating to oscillator structures not provided for in any preceding subclass.

SEE OR SEARCH CLASS:

361, Electricity: Electrical Systems and Devices, subclass 679.01 for structural arrangements of diverse electronic or radio type devices not provided for in any other class or in other subclasses of Class 361.

455, Telecommunications, subclass 899 for miscellaneous structures of utility in and peculiar to radio apparatus or systems.

END