

# CPC COOPERATIVE PATENT CLASSIFICATION

## H ELECTRICITY

(NOTE omitted)

## H03 ELECTRONIC CIRCUITRY

### H03B GENERATION OF OSCILLATIONS, DIRECTLY OR BY FREQUENCY-CHANGING, BY CIRCUITS EMPLOYING ACTIVE ELEMENTS WHICH OPERATE IN A NON-SWITCHING MANNER; GENERATION OF NOISE BY SUCH CIRCUITS ([generators adapted for electrophonic musical instruments G10H](#); masers or lasers [H01S](#); generation of oscillations in plasma [H05H](#))

#### **WARNING**

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

|             |   |        |   |
|-------------|---|--------|---|
| <b>1/00</b> | <b>Details</b>  | 5/1231 | . . . {the amplifier comprising one or more bipolar transistors}  |
| 1/02        | . Structural details of power oscillators, e.g. for heating ( <a href="#">construction of transmitters H04B</a> ; features of generators for heating by electromagnetic fields <a href="#">H05B 6/00</a> )                          | 5/1234 | . . . {and comprising means for varying the output amplitude of the generator ( <a href="#">H03B 5/1278 takes precedence</a> )} |
| 1/04        | . Reducing undesired oscillations, e.g. harmonics   | 5/1237 | . . . {comprising means for varying the frequency of the generator}   |
| <b>5/00</b> | <b>Generation of oscillations using amplifier with regenerative feedback from output to input (<a href="#">H03B 9/00</a>, <a href="#">H03B 15/00</a> take precedence)</b>   | 5/124  | . . . . {the means comprising a voltage dependent capacitance}  |
| 5/02        | . Details   | 5/1243 | . . . . . {the means comprising voltage variable capacitance diodes}  |
| 5/04        | . . Modifications of generator to compensate for variations in physical values, e.g. power supply, load, temperature  | 5/1246 | . . . . . {the means comprising transistors used to provide a variable capacitance}   |
| 5/06        | . . Modifications of generator to ensure starting of oscillations   | 5/125  | . . . . . {the transistors being bipolar transistors}   |
| 5/08        | . with frequency-determining element comprising lumped inductance and capacitance   | 5/1253 | . . . . . {the transistors being field-effect transistors}  |
| 5/10        | . . active element in amplifier being vacuum tube ( <a href="#">H03B 5/14 takes precedence</a> )  | 5/1256 | . . . . . {the means comprising a variable inductance}  |
| 5/12        | . . active element in amplifier being semiconductor device ( <a href="#">H03B 5/14 takes precedence</a> )   | 5/1259 | . . . . . {the means comprising a variable active inductor, e.g. gyrator circuits}  |
| 5/1203      | . . . {the amplifier being a single transistor}   | 5/1262 | . . . . . {the means comprising switched elements}  |
| 5/1206      | . . . {using multiple transistors for amplification}  | 5/1265 | . . . . . {switched capacitors}   |
| 5/1209      | . . . . {the amplifier having two current paths operating in a differential manner and a current source or degeneration circuit in common to both paths, e.g. a long-tailed pair. ( <a href="#">H03B 5/1215 takes precedence</a> )} | 5/1268 | . . . . . {switched inductors}  |
| 5/1212      | . . . . {the amplifier comprising a pair of transistors, wherein an output terminal of each being connected to an input terminal of the other, e.g. a cross coupled pair}   | 5/1271 | . . . . . {the frequency being controlled by a control current, i.e. current controlled oscillators}                            |
| 5/1215      | . . . . . {the current source or degeneration circuit being in common to both transistors of the pair, e.g. a cross-coupled long-tailed pair}   | 5/1275 | . . . . . {having further means for varying a parameter in dependence on the frequency}   |
| 5/1218      | . . . . . {the generator being of the balanced type}  | 5/1278 | . . . . . {the parameter being an amplitude of a signal, e.g. maintaining a constant output amplitude over the frequency range} |
| 5/1221      | . . . . . {the amplifier comprising multiple amplification stages connected in cascade}   | 5/1281 | . . . . . {the parameter being the amount of feedback}  |
| 5/1225      | . . . . . {the generator comprising multiple amplifiers connected in parallel}  | 5/1284 | . . . . . {the parameter being another frequency, e.g. a harmonic of the oscillating frequency}                                 |
| 5/1228      | . . . {the amplifier comprising one or more field effect transistors}   | 5/1287 | . . . . . {the parameter being a quality factor, e.g. Q factor of the frequency determining element}                            |
|             |   | 5/129  | . . . . . {the parameter being a bias voltage or a power supply}  |

- 5/1293 . . . {having means for achieving a desired tuning characteristic, e.g. linearising the frequency characteristic across the tuning voltage range}
- 5/1296 . . . {the feedback circuit comprising a transformer}
- 5/14 . . frequency-determining element connected via bridge circuit to closed ring around which signal is transmitted
- 5/16 . . . active element in amplifier being vacuum tube
- 5/18 . with frequency-determining element comprising distributed inductance and capacitance
- 5/1805 . . {the frequency-determining element being a coaxial resonator}
- 5/1811 . . . {the active element in the amplifier being a vacuum tube (see provisionally also H03B 5/1835)}
- 5/1817 . . {the frequency-determining element being a cavity resonator}
- 5/1823 . . . {the active element in the amplifier being a semiconductor device}
- 5/1829 . . . . {the semiconductor device being a field-effect device}
- 5/1835 . . . {the active element in the amplifier being a vacuum tube}
- 5/1841 . . {the frequency-determining element being a strip line resonator (H03B 5/1805, H03B 5/1817, H03B 5/1864 and H03B 5/1882 take precedence)}
- 5/1847 . . . {the active element in the amplifier being a semiconductor device}
- 5/1852 . . . . {the semiconductor device being a field-effect device}
- 5/1858 . . . {the active element in the amplifier being a vacuum tube (see provisionally also H03B 5/1835)}
- 5/1864 . . {the frequency-determining element being a dielectric resonator}
- 5/187 . . . {the active element in the amplifier being a semiconductor device}
- 5/1876 . . . . {the semiconductor device being a field-effect device}
- 5/1882 . . {the frequency-determining element being a magnetic-field sensitive resonator, e.g. a Yttrium Iron Garnet or a magnetostatic surface wave resonator}
- 5/1888 . . . {the active element in the amplifier being a semiconductor device}
- 5/1894 . . . . {the semiconductor device being a field-effect device}
- 5/20 . with frequency-determining element comprising resistance and either capacitance or inductance, e.g. phase-shift oscillator
- 5/22 . . active element in amplifier being vacuum tube (H03B 5/26 takes precedence)
- 5/24 . . active element in amplifier being semiconductor device (H03B 5/26 takes precedence)
- 5/26 . . frequency-determining element being part of bridge circuit in closed ring around which signal is transmitted; frequency-determining element being connected via a bridge circuit to such a closed ring, e.g. Wien-Bridge oscillator, parallel-T oscillator
- 5/28 . . . active element in amplifier being vacuum tube
- 5/30 . with frequency-determining element being electromechanical resonator
- 5/32 . . being a piezoelectric resonator (selection of piezoelectric material H10N 30/00)
- 5/323 . . . {the resonator having more than two terminals (H03B 5/326 takes precedence)}
- 5/326 . . . {the resonator being an acoustic wave device, e.g. SAW or BAW device}
- 5/34 . . . active element in amplifier being vacuum tube (H03B 5/38 takes precedence)
- 5/36 . . . active element in amplifier being semiconductor device ((H03B 5/323, H03B 5/326), H03B 5/38 take precedence)
- 5/362 . . . . {the amplifier being a single transistor (H03B 5/364 - H03B 5/368 take precedence)}
- 5/364 . . . . {the amplifier comprising field effect transistors (H03B 5/366 takes precedence)}
- 5/366 . . . . {and comprising means for varying the frequency by a variable voltage or current}
- 5/368 . . . . . {the means being voltage variable capacitance diodes}
- 5/38 . . . frequency-determining element being connected via bridge circuit to closed ring around which signal is transmitted
- 5/40 . . being a magnetostrictive resonator (H03B 5/42 takes precedence; selection of magneto-strictive material {H01F 1/00}; H10N 30/00)
- 5/42 . . frequency-determining element connected via bridge circuit to closed ring around which signal is transmitted
- 7/00 Generation of oscillations using active element having a negative resistance between two of its electrodes (H03B 9/00 takes precedence)**
- 7/02 . with frequency-determining element comprising lumped inductance and capacitance
- 7/04 . . active element being vacuum tube
- 7/06 . . active element being semiconductor device
- 7/08 . . . being a tunnel diode
- 7/10 . . active element being gas-discharge or arc-discharge tube
- 7/12 . with frequency-determining element comprising distributed inductance and capacitance
- 7/14 . . active element being semiconductor device
- 7/143 . . . {and which comprises an element depending on a voltage or a magnetic field, e.g. varactor-YIG}
- 7/146 . . . {with several semiconductor devices}
- 9/00 Generation of oscillations using transit-time effects {(construction of tube and circuit arrangements not adapted to a particular application H01J; construction of the semiconductor devices H10)}**
- 9/01 . using discharge tubes
- 9/02 . . using a retarding-field tube (using klystrons H03B 9/04)
- 9/04 . . using a klystron
- 9/06 . . . using a reflex klystron
- 9/08 . . using a travelling-wave tube
- 9/10 . . using a magnetron
- 9/12 . using solid state devices, e.g. Gunn-effect devices
- 2009/123 . . {using Gunn diodes}
- 2009/126 . . {using impact ionization avalanche transit time [IMPATT] diodes}

|              |  |                |   |
|--------------|--|----------------|---|
| 9/14         | . . and elements comprising distributed inductance and capacitance   | 21/01          | . by beating unmodulated signals of different frequencies   |
| 9/141        | . . . {and comprising a voltage sensitive element, e.g. varactor}  | 21/02          | . . by plural beating, i.e. for frequency synthesis {; Beating in combination with multiplication or division of frequency (digital frequency synthesis using a ROM G06F 1/02; digital frequency synthesis in general H03K; indirect frequency synthesis using a PLL H03L 7/16)}  |
| 9/142        | . . . {and comprising a magnetic field sensitive element, e.g. YIG}  | 21/025         | . . . {by repeated mixing in combination with division of frequency only}   |
| 9/143        | . . . {using more than one solid state device}   | 21/04          | . . using several similar stages  |
| 9/145        | . . . {the frequency being determined by a cavity resonator, e.g. a hollow waveguide cavity or a coaxial cavity (H03B 9/141 - H03B 9/143, H03B 9/147, H03B 9/148 take precedence)}               | <b>23/00</b>   | <b>Generation of oscillations periodically swept over a predetermined frequency range (angle-modulating circuits in general H03C 3/00)</b>  |
| 9/146        | . . . . {formed by a disc, e.g. a waveguide cap resonator}   | <b>25/00</b>   | <b>Simultaneous generation by a free-running oscillator of oscillations having different frequencies</b>  |
| 9/147        | . . . {the frequency being determined by a stripline resonator (H03B 9/141 - H03B 9/143, H03B 9/148 take precedence)}  | <b>27/00</b>   | <b>Generation of oscillations providing a plurality of outputs of the same frequency but differing in phase, other than merely two anti-phase outputs</b>   |
| 9/148        | . . . {the frequency being determined by a dielectric resonator (H03B 9/141 - H03B 9/143 take precedence)}   | <b>28/00</b>   | <b>Generation of oscillations by methods not covered by groups H03B 5/00 - H03B 27/00, including modification of the waveform to produce sinusoidal oscillations (analogue function generators for performing computing operations G06G 7/26; use of transformers for conversion of waveform in AC-AC converters H02M 5/18)</b> |
| <b>11/00</b> | <b>Generation of oscillations using a shock-excited tuned circuit (with feedback H03B 5/00)</b>  | <b>29/00</b>   | <b>Generation of noise currents and voltages {(gasfilled discharge tubes with solid cathode specially adapted as noise generators H01J 17/005)}</b>   |
| 11/02        | . excited by spark (spark gaps therefor H01T 9/00)   | <b>2200/00</b> | <b>Indexing scheme relating to details of oscillators covered by H03B</b>   |
| 11/04        | . excited by interrupter   | 2200/0002      | . Types of oscillators  |
| 11/06        | . . by mechanical interrupter  | 2200/0004      | . . Butler oscillator   |
| 11/08        | . . interrupter being discharge tube   | 2200/0006      | . . Clapp oscillator  |
| 11/10        | . . interrupter being semiconductor device   | 2200/0008      | . . Colpitts oscillator   |
| <b>13/00</b> | <b>Generation of oscillations using deflection of electron beam in a cathode-ray tube</b>  | 2200/001       | . . Hartley oscillator  |
| <b>15/00</b> | <b>Generation of oscillations using galvano-magnetic devices, e.g. Hall-effect devices, or using superconductivity effects</b>   | 2200/0012      | . . Pierce oscillator   |
| 15/003       | . {using superconductivity effects (devices using superconductivity H10N 60/00)}   | 2200/0014      | . Structural aspects of oscillators   |
| 15/006       | . {using spin transfer effects or giant magnetoresistance}   | 2200/0016      | . . including a ring, disk or loop shaped resonator   |
| <b>17/00</b> | <b>Generation of oscillations using radiation source and detector, e.g. with interposed variable obturator</b>   | 2200/0018      | . . relating to the cutting angle of a crystal, e.g. AT cut quartz  |
| <b>19/00</b> | <b>Generation of oscillations by non-regenerative frequency multiplication or division of a signal from a separate source (transference of modulation from one carrier to another H03D 7/00)</b> | 2200/002       | . . making use of ceramic material  |
| 19/03        | . using non-linear inductance  | 2200/0022      | . . characterised by the substrate, e.g. material   |
| 19/05        | . using non-linear capacitance, e.g. varactor diodes   | 2200/0024      | . . including parallel striplines   |
| 19/06        | . by means of discharge device or semiconductor device with more than two electrodes   | 2200/0026      | . . relating to the pins of integrated circuits   |
| 19/08        | . . by means of a discharge device   | 2200/0028      | . . based on a monolithic microwave integrated circuit [MMIC]   |
| 19/10        | . . . using multiplication only  | 2200/003       | . Circuit elements of oscillators   |
| 19/12        | . . . using division only  | 2200/0032      | . . including a device with a Schottky junction   |
| 19/14        | . . by means of a semiconductor device   | 2200/0034      | . . including a buffer amplifier  |
| 19/16        | . using uncontrolled rectifying devices, e.g. rectifying diodes or Schottky diodes   | 2200/0036      | . . including an emitter or source coupled transistor pair or a long tail pair  |
| 19/18        | . . and elements comprising distributed inductance and capacitance   | 2200/0038      | . . including a current mirror  |
| 19/20        | . . being diodes exhibiting charge storage or enhancement effects  | 2200/004       | . . including a variable capacitance, e.g. a varicap, a varactor or a variable capacitance of a diode or transistor   |
| <b>21/00</b> | <b>Generation of oscillations by combining unmodulated signals of different frequencies (H03B 19/00 takes precedence; frequency changing circuits in general H03D)</b>                           | 2200/0042      | . . . the capacitance diode being in the feedback path  |

- 2200/0044 . . including optical elements, e.g. optical injection locking
- 2200/0046 . . including measures to switch the gain of an amplifier
- 2200/0048 . . including measures to switch the frequency band, e.g. by harmonic selection
- 2200/005 . . including measures to switch a capacitor
- 2200/0052 . . including measures to switch the feedback circuit
- 2200/0054 . . including measures to switch a filter, e.g. for frequency tuning or for harmonic selection
- 2200/0056 . . including a diode used for switching
- 2200/0058 . . with particular transconductance characteristics, e.g. an operational transconductance amplifier
- 2200/006 . Functional aspects of oscillators
- 2200/0062 . . Bias and operating point
- 2200/0064 . . Pulse width, duty cycle or on/off ratio
- 2200/0066 . . Amplitude or AM detection
- 2200/0068 . . Frequency or FM detection
- 2200/007 . . Generation of oscillations based on harmonic frequencies, e.g. overtone oscillators
- 2200/0072 . . Frequency hopping and enabling of rapid frequency changes
- 2200/0074 . . Locking of an oscillator by injecting an input signal directly into the oscillator
- 2200/0076 . . Power combination of several oscillators oscillating at the same frequency
- 2200/0078 . . generating or using signals in quadrature
- 2200/008 . . making use of a reference frequency
- 2200/0082 . . Lowering the supply voltage and saving power
- 2200/0084 . . dedicated to Terahertz frequencies
- 2200/0086 . . relating to the Q factor or damping of the resonant circuit
- 2200/0088 . . Reduction of noise
- 2200/009 . . . Reduction of phase noise
- 2200/0092 . . Measures to linearise or reduce distortion of oscillator characteristics
- 2200/0094 . . Measures to ensure starting of oscillations
- 2200/0096 . . Measures to ensure stopping of oscillations
- 2200/0098 . . having a balanced output signal
- 2201/00 Aspects of oscillators relating to varying the frequency of the oscillations**
- 2201/01 . Varying the frequency of the oscillations by manual means
- 2201/011 . . the means being an element with a variable capacitance
- 2201/012 . . the means being an element with a variable inductance
- 2201/014 . . the means being associated with an element comprising distributed inductances and capacitances
- 2201/015 . . . the element being a cavity
- 2201/017 . . . the element being a dielectric resonator
- 2201/018 . . the means being a manual switch
- 2201/02 . Varying the frequency of the oscillations by electronic means
- 2201/0208 . . the means being an element with a variable capacitance, e.g. capacitance diode
- 2201/0216 . . the means being an element with a variable inductance
- 2201/0225 . . the means being associated with an element comprising distributed inductances and capacitances
- 2201/0233 . . . the element being a cavity
- 2201/0241 . . . the element being a magnetically variable element, e.g. an Yttrium Iron Garnet
- 2201/025 . . the means being an electronic switch for switching in or out oscillator elements
- 2201/0258 . . . the means comprising a diode
- 2201/0266 . . . the means comprising a transistor
- 2201/0275 . . the means delivering several selected voltages or currents
- 2201/0283 . . . the means functioning digitally
- 2201/0291 . . . . and being controlled by a processing device, e.g. a microprocessor
- 2201/03 . Varying beside the frequency also another parameter of the oscillator in dependence on the frequency
- 2201/031 . . the parameter being the amplitude of a signal, e.g. maintaining a constant output amplitude over the frequency range
- 2201/033 . . the parameter being the amount of feedback
- 2201/035 . . the parameter being another frequency, e.g. a harmonic of the oscillating frequency
- 2201/036 . . the parameter being the quality factor of a resonator
- 2201/038 . . the parameter being a bias voltage or a power supply
- 2202/00 Aspects of oscillators relating to reduction of undesired oscillations**
- 2202/01 . Reduction of undesired oscillations originated from distortion in one of the circuit elements of the oscillator
- 2202/012 . . the circuit element being the active device
- 2202/015 . . the circuit element being a limiter
- 2202/017 . . the circuit element being a frequency determining element
- 2202/02 . Reduction of undesired oscillations originated from natural noise of the circuit elements of the oscillator
- 2202/022 . . the noise being essentially white noise, i.e. frequency independent noise
- 2202/025 . . the noise being coloured noise, i.e. frequency dependent noise
- 2202/027 . . . the noise being essentially proportional to the inverse of the frequency, i.e. the so-called 1/f noise
- 2202/03 . Reduction of undesired oscillations originated from internal parasitic couplings, i.e. parasitic couplings within the oscillator itself
- 2202/04 . Reduction of undesired oscillations originated from outside noise or interferences, e.g. from parasitic couplings with circuit elements outside the oscillator
- 2202/042 . . the circuit element belonging to the power supply
- 2202/044 . . the circuit element belonging to transmitter circuitry
- 2202/046 . . the circuit element belonging to receiver circuitry
- 2202/048 . . the circuit element being a frequency divider
- 2202/05 . Reduction of undesired oscillations through filtering or through special resonator characteristics
- 2202/06 . Reduction of undesired oscillations through modification of a bias voltage, e.g. selecting the operation point of an active device
- 2202/07 . Reduction of undesired oscillations through a cancelling of the undesired oscillation
- 2202/073 . . by modifying the internal feedback of the oscillator

### H03B

- 2202/076 . . by using a feedback loop external to the oscillator, e.g. the so-called noise degeneration
- 2202/08 . Reduction of undesired oscillations originated from the oscillator in circuit elements external to the oscillator by means associated with the oscillator
- 2202/082 . . by avoiding coupling between these circuit elements
- 2202/084 . . . through shielding
- 2202/086 . . . through a frequency dependent coupling, e.g. which attenuates a certain frequency range
- 2202/088 . . by compensating through additional couplings with these circuit elements