

# CPC COOPERATIVE PATENT CLASSIFICATION

## H ELECTRICITY

(NOTE omitted)

### H03 BASIC 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** ([measuring, testing G01R](#); [generators adapted for electrophonic musical instruments G10H](#); [Speech synthesis G10L](#); [masers, lasers H01S](#); [dynamo-electric machines H02K](#); [power inverter circuits H02M](#); [by using pulse techniques H03K](#); [automatic control of generators H03L](#); [starting, synchronisation or stabilisation of generators where the type of generator is irrelevant or unspecified H03L](#); [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>	5/1225	. . . . {the generator comprising multiple amplifiers connected in parallel}
1/02	. Structural details of power oscillators, e.g. for heating {(construction of transmitters <a href="#">H04B</a> ; features of generators for heating by electromagnetic fields <a href="#">H05B 6/00</a> )}	5/1228	. . . {the amplifier comprising one or more field effect transistors}
1/04	. Reducing undesired oscillations, e.g. harmonics	5/1231	. . . {the amplifier comprising one or more bipolar transistors}
<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>	5/1234	. . . {and comprising means for varying the output amplitude of the generator ( <a href="#">H03B 5/1278</a> takes precedence)}
5/02	. Details	5/1237	. . . {comprising means for varying the frequency of the generator}
5/04	. . Modifications of generator to compensate for variations in physical values, e.g. power supply, load, temperature	5/124	. . . . {the means comprising a voltage dependent capacitance}
5/06	. . Modifications of generator to ensure starting of oscillations	5/1243	. . . . . {the means comprising voltage variable capacitance diodes}
5/08	. with frequency-determining element comprising lumped inductance and capacitance	5/1246	. . . . . {the means comprising transistors used to provide a variable capacitance}
5/10	. . active element in amplifier being vacuum tube ( <a href="#">H03B 5/14</a> takes precedence)	5/125	. . . . . {the transistors being bipolar transistors}
5/12	. . active element in amplifier being semiconductor device ( <a href="#">H03B 5/14</a> takes precedence)	5/1253	. . . . . {the transistors being field-effect transistors}
5/1203	. . . {the amplifier being a single transistor}	5/1256	. . . . {the means comprising a variable inductance}
5/1206	. . . {using multiple transistors for amplification}	5/1259	. . . . . {the means comprising a variable active inductor, e.g. gyrator circuits}
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</a> takes precedence)}	5/1262	. . . . . {the means comprising switched elements}
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}	5/1265	. . . . . {switched capacitors}
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}	5/1268	. . . . . {switched inductors}
5/1218	. . . . {the generator being of the balanced type}	5/1271	. . . . {the frequency being controlled by a control current, i.e. current controlled oscillators}
5/1221	. . . . {the amplifier comprising multiple amplification stages connected in cascade}	5/1275	. . . . {having further means for varying a parameter in dependence on the frequency}
		5/1278	. . . . . {the parameter being an amplitude of a signal, e.g. maintaining a constant output amplitude over the frequency range}
		5/1281	. . . . . {the parameter being the amount of feedback}

- 5/1284 . . . . {the parameter being another frequency, e.g. a harmonic of the oscillating frequency}
- 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 piezo-electric resonator ([selection of piezo-electric material H01L 41/00](#))
- 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} ; H01L 41/00](#))
- 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 [H01L](#))}**
- 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	19/20	. . being diodes exhibiting charge storage or enhancement effects
9/08	. . using a travelling-wave tube		
9/10	. . using a magnetron		
9/12	. using solid state devices, e.g. Gunn-effect devices	<b>21/00</b>	<b>Generation of oscillations by combining unmodulated signals of different frequencies</b> ( <a href="#">H03B 19/00</a> takes precedence; frequency changing circuits in general <a href="#">H03D</a> )
2009/123	. . {using Gunn diodes}	21/01	. by beating unmodulated signals of different frequencies
2009/126	. . {using impact ionization avalanche transit time [IMPATT] diodes}	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 <a href="#">G06F 1/02</a> ; digital frequency synthesis in general <a href="#">H03K</a> ; indirect frequency synthesis using a PLL <a href="#">H03L 7/16</a> )}
9/14	. . and elements comprising distributed inductance and capacitance	21/025	. . . {by repeated mixing in combination with division of frequency only}
9/141	. . . {and comprising a voltage sensitive element, e.g. varactor}	21/04	. . using several similar stages
9/142	. . . {and comprising a magnetic field sensitive element, e.g. YIG}	<b>23/00</b>	<b>Generation of oscillations periodically swept over a predetermined frequency range</b> (angle-modulating circuits in general <a href="#">H03C 3/00</a> )
9/143	. . . {using more than one solid state device}		
9/145	. . . {the frequency being determined by a cavity resonator, e.g. a hollow waveguide cavity or a coaxial cavity ( <a href="#">H03B 9/141</a> - <a href="#">H03B 9/143</a> , <a href="#">H03B 9/147</a> , <a href="#">H03B 9/148</a> take precedence)}	<b>25/00</b>	<b>Simultaneous generation by a free-running oscillator of oscillations having different frequencies</b>
9/146	. . . . {formed by a disc, e.g. a waveguide cap resonator}	<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>
9/147	. . . {the frequency being determined by a stripline resonator ( <a href="#">H03B 9/141</a> - <a href="#">H03B 9/143</a> , <a href="#">H03B 9/148</a> take precedence)}		
9/148	. . . {the frequency being determined by a dielectric resonator ( <a href="#">H03B 9/141</a> - <a href="#">H03B 9/143</a> take precedence)}	<b>28/00</b>	<b>Generation of oscillations by methods not covered by groups <a href="#">H03B 5/00</a> - <a href="#">H03B 27/00</a>, including modification of the waveform to produce sinusoidal oscillations</b> (analogue function generators for performing computing operations <a href="#">G06G 7/26</a> ; use of transformers for conversion of waveform in ac-ac converters <a href="#">H02M 5/18</a> )
<b>11/00</b>	<b>Generation of oscillations using a shock-excited tuned circuit (with feedback <a href="#">H03B 5/00</a>)</b>	<b>29/00</b>	<b>Generation of noise currents and voltages</b> {( <a href="#">gasfilled discharge tubes with solid cathode specially adapted as noise generators <a href="#">H01J 17/005</a></a> )}
11/02	. excited by spark (spark gaps therefor <a href="#">H01T 9/00</a> )		
11/04	. excited by interrupter		
11/06	. . by mechanical interrupter		
11/08	. . interrupter being discharge tube		
11/10	. . interrupter being semiconductor device		
<b>13/00</b>	<b>Generation of oscillations using deflection of electron beam in a cathode-ray tube</b>		
<b>15/00</b>	<b>Generation of oscillations using galvano-magnetic devices, e.g. Hall-effect devices, or using superconductivity effects</b>		
15/003	. {using superconductivity effects (devices using superconductivity <a href="#">H01L 39/00</a> )}	<b>2200/00</b>	<b>Indexing scheme relating to details of oscillators covered by <a href="#">H03B</a></b>
15/006	. {using spin transfer effects or giant magnetoresistance}	2200/0002	. Types of oscillators
<b>17/00</b>	<b>Generation of oscillations using radiation source and detector, e.g. with interposed variable obturator</b>	2200/0004	. . Butler oscillator
<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 <a href="#">H03D 7/00</a>)</b>	2200/0006	. . Clapp oscillator
19/03	. using non-linear inductance	2200/0008	. . Colpitts oscillator
19/05	. using non-linear capacitance, e.g. varactor diodes	2200/001	. . Hartley oscillator
19/06	. by means of discharge device or semiconductor device with more than two electrodes	2200/0012	. . Pierce oscillator
19/08	. . by means of a discharge device	2200/0014	. Structural aspects of oscillators
19/10	. . . using multiplication only	2200/0016	. . including a ring, disk or loop shaped resonator
19/12	. . . using division only	2200/0018	. . relating to the cutting angle of a crystal, e.g. AT cut quartz
19/14	. . by means of a semiconductor device	2200/002	. . making use of ceramic material
19/16	. using uncontrolled rectifying devices, e.g. rectifying diodes or Schottky diodes	2200/0022	. . characterised by the substrate, e.g. material
19/18	. . and elements comprising distributed inductance and capacitance	2200/0024	. . including parallel striplines
		2200/0026	. . relating to the pins of integrated circuits
		2200/0028	. . based on a monolithic microwave integrated circuit [MMIC]
		2200/003	. Circuit elements of oscillators
		2200/0032	. . including a device with a Schottky junction
		2200/0034	. . including a buffer amplifier
		2200/0036	. . including an emitter or source coupled transistor pair or a long tail pair
		2200/0038	. . including a current mirror

- 2200/004 . . including a variable capacitance, e.g. a varicap, a varactor or a variable capacitance of a diode or transistor
- 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

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- 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
- 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