

**CPC****COOPERATIVE PATENT CLASSIFICATION****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](#))

**H03B 1/00****Details****H03B 1/02**

- . Structural details of power oscillators, e.g. for heating [{\(construction of transmitters H04B ; features of generators for heating by electromagnetic fields H05B 6/00\)}](#)

**H03B 1/04**

- . Reducing undesired oscillations, e.g. harmonics

**H03B 5/00**

**Generation of oscillations using amplifier with regenerative feedback from output to input** ([H03B 9/00](#) , [H03B 15/00](#) take precedence)

**H03B 5/02**

- . Details

**H03B 5/04**

- . . Modifications of generator to compensate for variations in physical values, e.g. power supply, load, temperature

**H03B 5/06**

- . . Modifications of generator to ensure starting of oscillations

**H03B 5/08**

- . with frequency-determining element comprising lumped inductance and capacitance

**H03B 5/10**

- . . active element in amplifier being vacuum tube ([H03B 5/14](#) takes precedence)

**H03B 5/12**

- . . active element in amplifier being semiconductor device ([H03B 5/14](#) takes precedence)

**WARNING**

Subgroups [H03B 5/1203](#) to [H03B 5/1296](#) are incomplete pending reclassification; see also the other subgroups of [H03B 5/12](#)

**H03B 5/1203**

- . . . {the amplifier being a single transistor}

**H03B 5/1206**

- . . . {using multiple transistors for amplification}

**H03B 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. ([H03B 5/1215](#) takes precedence)}

**H03B 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}

**H03B 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}

**H03B 5/1218**

- . . . . {the generator being of the balanced type}

**H03B 5/1221**

- . . . . {the amplifier comprising multiple amplification stages connected in cascade}

H03B 5/1225	....	{the generator comprising multiple amplifiers connected in parallel}
H03B 5/1228	...	{the amplifier comprising one or more field effect transistors}
H03B 5/1231	...	{the amplifier comprising one or more bipolar transistors}
H03B 5/1234	...	{and comprising means for varying the output amplitude of the generator ( <a href="#">H03B 5/1278</a> takes precedence)}
H03B 5/1237	...	{comprising means for varying the frequency of the generator}
H03B 5/124	....	{the means comprising a voltage dependent capacitance}
H03B 5/1243	.....	{the means comprising voltage variable capacitance diodes}
H03B 5/1246	.....	{the means comprising transistors used to provide a variable capacitance}
H03B 5/125	.....	{the transistors being bipolar transistors}
H03B 5/1253	.....	{the transistors being field-effect transistors}
H03B 5/1256	....	{the means comprising a variable inductance}
H03B 5/1259	.....	{the means comprising a variable active inductor e.g. gyrator circuits}
H03B 5/1262	....	{the means comprising switched elements}
H03B 5/1265	.....	{switched capacitors}
H03B 5/1268	.....	{switched inductors}
H03B 5/1271	....	{the frequency being controlled by a control current i.e. current controlled oscillators}
H03B 5/1275	....	{having further means for varying a parameter in dependence on the frequency}
H03B 5/1278	.....	{the parameter being an amplitude of a signal, e.g. maintaining a constant output amplitude over the frequency range}
H03B 5/1281	.....	{the parameter being the amount of feedback}
H03B 5/1284	.....	{the parameter being another frequency, e.g. a harmonic of the oscillating frequency}
H03B 5/1287	.....	{the parameter being a quality factor, e.g. Q factor of the frequency determining element}
H03B 5/129	.....	{the parameter being a bias voltage or a power supply}
H03B 5/1293	....	{having means for achieving a desired tuning characteristic e.g. linearising the frequency characteristic across the tuning voltage range}
H03B 5/1296	...	{the feedback circuit comprising a transformer}
H03B 5/14	..	frequency-determining element connected via bridge circuit to closed ring around which signal is transmitted
H03B 5/16	...	active element in amplifier being vacuum tube
H03B 5/18	.	with frequency-determining element comprising distributed inductance and capacitance
H03B 5/1805	..	{the frequency-determining element being a coaxial resonator}
H03B 5/1811	...	{the active element in the amplifier being a vacuum tube ( <a href="#">see provisionally also H03B 5/1835</a> )}
H03B 5/1817	..	{the frequency-determining element being a cavity resonator}
H03B 5/1823	...	{the active element in the amplifier being a semiconductor device}
H03B 5/1829	....	{the semiconductor device being a field-effect device}

H03B 5/1835	...	{the active element in the amplifier being a vacuum tube}
H03B 5/1841	..	{the frequency-determining element being a strip line resonator ( <a href="#">H03B 5/1805</a> , <a href="#">H03B 5/1817</a> , <a href="#">H03B 5/1864</a> and <a href="#">H03B 5/1882</a> take precedence)}
H03B 5/1847	...	{the active element in the amplifier being a semiconductor device}
H03B 5/1852	....	{the semiconductor device being a field-effect device}
H03B 5/1858	...	{the active element in the amplifier being a vacuum tube (see provisionally also <a href="#">H03B 5/1835</a> )}
H03B 5/1864	..	{the frequency-determining element being a dielectric resonator}
H03B 5/187	...	{the active element in the amplifier being a semiconductor device}
H03B 5/1876	....	{the semiconductor device being a field-effect device}
H03B 5/1882	..	{the frequency-determining element being a magnetic-field sensitive resonator, e.g. a Yttrium Iron Garnet or a magnetostatic surface wave resonator}
H03B 5/1888	...	{the active element in the amplifier being a semiconductor device}
H03B 5/1894	....	{the semiconductor device being a field-effect device}
H03B 5/20	.	with frequency-determining element comprising resistance and either capacitance or inductance, e.g. phase-shift oscillator
H03B 5/22	..	active element in amplifier being vacuum tube ( <a href="#">H03B 5/26</a> takes precedence)
H03B 5/24	..	active element in amplifier being semiconductor device ( <a href="#">H03B 5/26</a> takes precedence)
H03B 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
H03B 5/28	...	active element in amplifier being vacuum tube
H03B 5/30	.	with frequency-determining element being electromechanical resonator
H03B 5/32	..	being a piezo-electric resonator (selection of piezo-electric material <a href="#">H01L 41/00</a> )
H03B 5/323	...	{the resonator having more than two terminals ( <a href="#">H03B 5/326</a> takes precedence)}
H03B 5/326	...	{the resonator being an acoustic wave device, e.g. SAW or BAW device}
H03B 5/34	...	active element in amplifier being vacuum tube ( <a href="#">H03B 5/38</a> takes precedence)
H03B 5/36	...	active element in amplifier being semiconductor device ({ <a href="#">H03B 5/323</a> , <a href="#">H03B 5/326</a> } , <a href="#">H03B 5/38</a> take precedence)
H03B 5/362	....	{the amplifier being a single transistor ( <a href="#">H03B 5/364</a> to <a href="#">H03B 5/368</a> take precedence)}
H03B 5/364	....	{the amplifier comprising field effect transistors ( <a href="#">H03B 5/366</a> takes precedence)}
H03B 5/366	....	{and comprising means for varying the frequency by a variable voltage or current}
H03B 5/368	.....	{the means being voltage variable capacitance diodes}
H03B 5/38	...	frequency-determining element being connected via bridge circuit to closed ring around which signal is transmitted
H03B 5/40	..	being a magnetostrictive resonator ( <a href="#">H03B 5/42</a> takes precedence; selection of magneto-strictive material { <a href="#">H01F 1/00</a> } ; <a href="#">H01L 41/00</a> )
H03B 5/42	..	frequency-determining element connected via bridge circuit to closed ring around which signal is transmitted

<b>H03B 7/00</b>	<b>Generation of oscillations using active element having a negative resistance between two of its electrodes (<a href="#">H03B 9/00</a> takes precedence)</b>
<a href="#">H03B 7/02</a>	. with frequency-determining element comprising lumped inductance and capacitance
<a href="#">H03B 7/04</a>	.. active element being vacuum tube
<a href="#">H03B 7/06</a>	.. active element being semiconductor device
<a href="#">H03B 7/08</a>	... being a tunnel diode
<a href="#">H03B 7/10</a>	.. active element being gas-discharge or arc-discharge tube
<a href="#">H03B 7/12</a>	. with frequency-determining element comprising distributed inductance and capacitance
<a href="#">H03B 7/14</a>	.. active element being semiconductor device
<a href="#">H03B 7/143</a>	... {and which comprises an element depending on a voltage or a magnetic field, e.g. varactor- YIG}
<a href="#">H03B 7/146</a>	... {with several semiconductor devices}
<b>H03B 9/00</b>	<b>Generation of oscillations using transit-time effects {(construction of tube and circuit arrangements not adapted to a particular application <a href="#">H01J</a> ; construction of the semiconductor devices <a href="#">H01L</a>)}</b>
<a href="#">H03B 9/01</a>	. using discharge tubes
<a href="#">H03B 9/02</a>	.. using a retarding-field tube ( <a href="#">using klystrons <a href="#">H03B 9/04</a></a> )
<a href="#">H03B 9/04</a>	.. using a klystron
<a href="#">H03B 9/06</a>	... using a reflex klystron
<a href="#">H03B 9/08</a>	.. using a travelling-wave tube
<a href="#">H03B 9/10</a>	.. using a magnetron
<a href="#">H03B 9/12</a>	. using solid state devices, e.g. Gunn-effect devices
<a href="#">H03B 2009/123</a>	.. {using Gunn diodes}
<a href="#">H03B 2009/126</a>	.. {using impact ionization avalanche transit time (IMPATT) diodes}
<a href="#">H03B 9/14</a>	.. and elements comprising distributed inductance and capacitance
<a href="#">H03B 9/141</a>	... {and comprising a voltage sensitive element, e.g. varactor}
<a href="#">H03B 9/142</a>	... {and comprising a magnetic field sensitive element, e.g. YIG}
<a href="#">H03B 9/143</a>	... {using more than one solid state device}
<a href="#">H03B 9/145</a>	... {the frequency being determined by a cavity resonator, e.g. a hollow waveguide cavity or a coaxial cavity ( <a href="#">H03B 9/141</a> to <a href="#">H03B 9/143</a> , <a href="#">H03B 9/147</a> , <a href="#">H03B 9/148</a> take precedence)}
<a href="#">H03B 9/146</a>	.... {formed by a disc, e.g. a waveguide cap resonator}
<a href="#">H03B 9/147</a>	... {the frequency being determined by a stripline resonator ( <a href="#">H03B 9/141</a> to <a href="#">H03B 9/143</a> , <a href="#">H03B 9/148</a> take precedence)}
<a href="#">H03B 9/148</a>	... {the frequency being determined by a dielectric resonator ( <a href="#">H03B 9/141</a> to <a href="#">H03B 9/143</a> take precedence)}
<b>H03B 11/00</b>	<b>Generation of oscillations using a shock-excited tuned circuit (<a href="#">with feedback <a href="#">H03B 5/00</a></a>)</b>
<a href="#">H03B 11/02</a>	. excited by spark ( <a href="#">spark gaps therefor <a href="#">H01T 9/00</a></a> )
<a href="#">H03B 11/04</a>	. excited by interrupter

- H03B 11/06 . . . by mechanical interrupter
- H03B 11/08 . . . interrupter being discharge tube
- H03B 11/10 . . . interrupter being semiconductor device
  
- H03B 13/00** **Generation of oscillations using deflection of electron beam in a cathode-ray tube**
  
- H03B 15/00** **Generation of oscillations using galvano-magnetic devices, e.g. Hall-effect devices, or using super-conductivity effects (galvano-magnetic devices per se [H01L 43/00](#))**
- H03B 15/003 . {using superconductivity effects (devices using superconductivity [H01L 39/00](#))}
- H03B 15/006 . {using spin transfer effects or giant magnetoresistance}
  
- H03B 17/00** **Generation of oscillations using radiation source and detector, e.g. with interposed variable obturator**
  
- H03B 19/00** **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](#))**
- H03B 19/03 . using non-linear inductance
- H03B 19/05 . using non-linear capacitance, e.g. varactor diodes
- H03B 19/06 . by means of discharge device or semiconductor device with more than two electrodes
- H03B 19/08 . . . by means of a discharge device
- H03B 19/10 . . . . using multiplication only
- H03B 19/12 . . . . using division only
- H03B 19/14 . . . by means of a semiconductor device
- H03B 19/16 . using uncontrolled rectifying devices, e.g. rectifying diodes or Schottky diodes
- H03B 19/18 . . . and elements comprising distributed inductance and capacitance
- H03B 19/20 . . . being diodes exhibiting charge storage or enhancement effects
  
- H03B 21/00** **Generation of oscillations by combining unmodulated signals of different frequencies ([H03B 19/00](#) takes precedence; frequency changing circuits in general [H03D](#))**
- H03B 21/01 . by beating unmodulated signals of different frequencies
- H03B 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](#))}
- H03B 21/025 . . . . {by repeated mixing in combination with division of frequency only}
- H03B 21/04 . . . using several similar stages
  
- H03B 23/00** **Generation of oscillations periodically swept over a predetermined frequency range (angle-modulating circuits in general [H03C 3/00](#))**
  
- H03B 25/00** **Simultaneous generation by a free-running oscillator of oscillations having different frequencies**

<b>H03B 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>
<b>H03B 28/00</b>	<b>Generation of oscillations by methods not covered by groups <a href="#">H03B 5/00</a> to <a href="#">H03B 27/00</a> , including modification of the waveform to produce sinusoidal oscillations (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>
<b>H03B 29/00</b>	<b>Generation of noise currents and voltages {(gasfilled discharge tubes with solid cathode specially adapted as noise generators <a href="#">H01J 17/005</a>)}</b>
<b>H03B 2200/00</b>	<b>Indexing scheme relating to details of oscillators covered by <a href="#">H03B</a></b>
<a href="#">H03B 2200/0002</a>	. Types of oscillators
<a href="#">H03B 2200/0004</a>	. . Butler oscillator
<a href="#">H03B 2200/0006</a>	. . Clapp oscillator
<a href="#">H03B 2200/0008</a>	. . Colpitts oscillator
<a href="#">H03B 2200/001</a>	. . Hartley oscillator
<a href="#">H03B 2200/0012</a>	. . Pierce oscillator
<a href="#">H03B 2200/0014</a>	. Structural aspects of oscillators
<a href="#">H03B 2200/0016</a>	. . including a ring, disk or loop shaped resonator
<a href="#">H03B 2200/0018</a>	. . relating to the cutting angle of a crystal, e.g. AT cut quartz
<a href="#">H03B 2200/002</a>	. . making use of ceramic material
<a href="#">H03B 2200/0022</a>	. . characterised by the substrate, e.g. material
<a href="#">H03B 2200/0024</a>	. . including parallel striplines
<a href="#">H03B 2200/0026</a>	. . relating to the pins of integrated circuits
<a href="#">H03B 2200/0028</a>	. . based on a monolithic microwave integrated circuit (MMIC)
<a href="#">H03B 2200/003</a>	. Circuit elements of oscillators
<a href="#">H03B 2200/0032</a>	. . including a device with a Schottky junction
<a href="#">H03B 2200/0034</a>	. . including a buffer amplifier
<a href="#">H03B 2200/0036</a>	. . including an emitter or source coupled transistor pair or a long tail pair
<a href="#">H03B 2200/0038</a>	. . including a current mirror
<a href="#">H03B 2200/004</a>	. . including a variable capacitance, e.g. a varicap, a varactor or a variable capacitance of a diode or transistor
<a href="#">H03B 2200/0042</a>	. . . the capacitance diode being in the feedback path
<a href="#">H03B 2200/0044</a>	. . including optical elements e.g. optical injection locking
<a href="#">H03B 2200/0046</a>	. . including measures to switch the gain of an amplifier
<a href="#">H03B 2200/0048</a>	. . including measures to switch the frequency band, e.g. by harmonic selection
<a href="#">H03B 2200/005</a>	. . including measures to switch a capacitor
<a href="#">H03B 2200/0052</a>	. . including measures to switch the feedback circuit
<a href="#">H03B 2200/0054</a>	. . including measures to switch a filter, e.g. for frequency tuning or for harmonic selection
<a href="#">H03B 2200/0056</a>	. . including a diode used for switching

- H03B 2200/0058 . . with particular transconductance characteristics, e.g. an operational transconductance amplifier
- H03B 2200/006 . Functional aspects of oscillators
- H03B 2200/0062 . . Bias and operating point
- H03B 2200/0064 . . Pulse width, duty cycle or on/off ratio
- H03B 2200/0066 . . Amplitude or AM detection
- H03B 2200/0068 . . Frequency or FM detection
- H03B 2200/007 . . Generation of oscillations based on harmonic frequencies, e.g. overtone oscillators
- H03B 2200/0072 . . Frequency hopping and enabling of rapid frequency changes
- H03B 2200/0074 . . Locking of an oscillator by injecting an input signal directly into the oscillator
- H03B 2200/0076 . . Power combination of several oscillators oscillating at the same frequency
- H03B 2200/0078 . . generating or using signals in quadrature
- H03B 2200/008 . . making use of a reference frequency
- H03B 2200/0082 . . Lowering the supply voltage and saving power
- H03B 2200/0084 . . dedicated to Terahertz frequencies
- H03B 2200/0086 . . relating to the Q factor or damping of the resonant circuit
- H03B 2200/0088 . . Reduction of noise
- H03B 2200/009 . . . Reduction of phase noise
- H03B 2200/0092 . . Measures to linearise or reduce distortion of oscillator characteristics
- H03B 2200/0094 . . Measures to ensure starting of oscillations
- H03B 2200/0096 . . Measures to ensure stopping of oscillations
- H03B 2200/0098 . . having a balanced output signal

### **H03B 2201/00 Aspects of oscillators relating to varying the frequency of the oscillations**

- H03B 2201/01 . Varying the frequency of the oscillations by manual means
- H03B 2201/011 . . the means being an element with a variable capacitance
- H03B 2201/012 . . the means being an element with a variable inductance
- H03B 2201/014 . . the means being associated with an element comprising distributed inductances and capacitances
- H03B 2201/015 . . . the element being a cavity
- H03B 2201/017 . . . the element being a dielectric resonator
- H03B 2201/018 . . the means being a manual switch
- H03B 2201/02 . Varying the frequency of the oscillations by electronic means
- H03B 2201/0208 . . the means being an element with a variable capacitance, e.g. capacitance diode
- H03B 2201/0216 . . the means being an element with a variable inductance
- H03B 2201/0225 . . the means being associated with an element comprising distributed inductances and capacitances
- H03B 2201/0233 . . . the element being a cavity
- H03B 2201/0241 . . . the element being a magnetically variable element, e.g. an Yttrium Iron Garnet
- H03B 2201/025 . . the means being an electronic switch for switching in or out oscillator elements
- H03B 2201/0258 . . . the means comprising a diode



- H03B 2201/0266 . . . the means comprising a transistor
- H03B 2201/0275 . . the means delivering several selected voltages or currents
- H03B 2201/0283 . . . the means functioning digitally
- H03B 2201/0291 . . . . and being controlled by a processing device, e.g. a microprocessor
- H03B 2201/03 . Varying beside the frequency also another parameter of the oscillator in dependence on the frequency
- H03B 2201/031 . . the parameter being the amplitude of a signal, e.g. maintaining a constant output amplitude over the frequency range
- H03B 2201/033 . . the parameter being the amount of feedback
- H03B 2201/035 . . the parameter being another frequency, e.g. a harmonic of the oscillating frequency
- H03B 2201/036 . . the parameter being the quality factor of a resonator
- H03B 2201/038 . . the parameter being a bias voltage or a power supply
  
- H03B 2202/00 Aspects of oscillators relating to reduction of undesired oscillations**
- H03B 2202/01 . Reduction of undesired oscillations originated from distortion in one of the circuit elements of the oscillator
  - H03B 2202/012 . . the circuit element being the active device
  - H03B 2202/015 . . the circuit element being a limiter
  - H03B 2202/017 . . the circuit element being a frequency determining element
- H03B 2202/02 . Reduction of undesired oscillations originated from natural noise of the circuit elements of the oscillator
  - H03B 2202/022 . . the noise being essentially white noise, i.e. frequency independent noise
  - H03B 2202/025 . . the noise being coloured noise, i.e. frequency dependent noise
  - H03B 2202/027 . . . the noise being essentially proportional to the inverse of the frequency, i.e. the so-called 1/f noise
- H03B 2202/03 . Reduction of undesired oscillations originated from internal parasitic couplings, i.e. parasitic couplings within the oscillator itself
- H03B 2202/04 . Reduction of undesired oscillations originated from outside noise or interferences, e.g. from parasitic couplings with circuit elements outside the oscillator
  - H03B 2202/042 . . the circuit element belonging to the power supply
  - H03B 2202/044 . . the circuit element belonging to transmitter circuitry
  - H03B 2202/046 . . the circuit element belonging to receiver circuitry
  - H03B 2202/048 . . the circuit element being a frequency divider
- H03B 2202/05 . Reduction of undesired oscillations through filtering or through special resonator characteristics
- H03B 2202/06 . Reduction of undesired oscillations through modification of a bias voltage, e.g. selecting the operation point of an active device
- H03B 2202/07 . Reduction of undesired oscillations through a cancelling of the undesired oscillation
  - H03B 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
- H03B 2202/08 . Reduction of undesired oscillations originated from the oscillator in circuit elements external to the oscillator by means associated with the oscillator



- [H03B 2202/082](#) . . by avoiding coupling between these circuit elements
- [H03B 2202/084](#) . . . through shielding
- [H03B 2202/086](#) . . . through a frequency dependent coupling, e.g. which attenuates a certain frequency range
- [H03B 2202/088](#) . . by compensating through additional couplings with these circuit elements