

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 (H03B 5/1278 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 (see provisionally also H03B 5/1835)}
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 ([H03B 5/1805](#) ,
[H03B 5/1817](#) , [H03B 5/1864](#) and [H03B 5/1882](#) 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
[H03B 5/1835](#))}
- 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 ([H03B 5/26](#) takes precedence)
- H03B 5/24 .. active element in amplifier being semiconductor device ([H03B 5/26](#) 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 [H01L 41/00](#))
- H03B 5/323 . . . {the resonator having more than two terminals ([H03B 5/326](#) 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 ([H03B 5/38](#) takes precedence)
- H03B 5/36 . . . active element in amplifier being semiconductor device ({[H03B 5/323](#) ,
[H03B 5/326](#)} , [H03B 5/38](#) take precedence)
- H03B 5/362 {the amplifier being a single transistor ([H03B 5/364](#) to [H03B 5/368](#) take
precedence)}
- H03B 5/364 {the amplifier comprising field effect transistors ([H03B 5/366](#) 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 ([H03B 5/42](#) takes precedence; selection of
magneto-strictive material {[H01F 1/00](#)} ; [H01L 41/00](#))
- H03B 5/42 .. frequency-determining element connected via bridge circuit to closed ring around
which signal is transmitted

H03B 7/00**Generation of oscillations using active element having a negative resistance between two of its electrodes ([H03B 9/00](#) takes precedence)**

- [H03B 7/02](#) . with frequency-determining element comprising lumped inductance and capacitance
- [H03B 7/04](#) . . active element being vacuum tube
- [H03B 7/06](#) . . active element being semiconductor device
- [H03B 7/08](#) . . . being a tunnel diode
- [H03B 7/10](#) . . active element being gas-discharge or arc-discharge tube
- [H03B 7/12](#) . with frequency-determining element comprising distributed inductance and capacitance
- [H03B 7/14](#) . . active element being semiconductor device
- [H03B 7/143](#) . . . {and which comprises an element depending on a voltage or a magnetic field, e.g. varactor- YIG}
- [H03B 7/146](#) . . . {with several semiconductor devices}

H03B 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](#))}**

- [H03B 9/01](#) . using discharge tubes
- [H03B 9/02](#) . . using a retarding-field tube ([using klystrons \[H03B 9/04\]\(#\)](#))
- [H03B 9/04](#) . . using a klystron
- [H03B 9/06](#) . . . using a reflex klystron
- [H03B 9/08](#) . . using a travelling-wave tube
- [H03B 9/10](#) . . using a magnetron
- [H03B 9/12](#) . using solid state devices, e.g. Gunn-effect devices
- [H03B 2009/123](#) . . {using Gunn diodes}
- [H03B 2009/126](#) . . {using impact ionization avalanche transit time (IMPATT) diodes}
- [H03B 9/14](#) . . and elements comprising distributed inductance and capacitance
- [H03B 9/141](#) . . . {and comprising a voltage sensitive element, e.g. varactor}
- [H03B 9/142](#) . . . {and comprising a magnetic field sensitive element, e.g. YIG}
- [H03B 9/143](#) . . . {using more than one solid state device}
- [H03B 9/145](#) . . . {the frequency being determined by a cavity resonator, e.g. a hollow waveguide cavity or a coaxial cavity ([H03B 9/141](#) to [H03B 9/143](#) , [H03B 9/147](#) , [H03B 9/148](#) take precedence)}
- [H03B 9/146](#) {formed by a disc, e.g. a waveguide cap resonator}
- [H03B 9/147](#) . . . {the frequency being determined by a stripline resonator ([H03B 9/141](#) to [H03B 9/143](#) , [H03B 9/148](#) take precedence)}
- [H03B 9/148](#) . . . {the frequency being determined by a dielectric resonator ([H03B 9/141](#) to [H03B 9/143](#) take precedence)}

H03B 11/00**Generation of oscillations using a shock-excited tuned circuit ([with feedback \[H03B 5/00\]\(#\)](#))**

- [H03B 11/02](#) . excited by spark ([spark gaps therefor \[H01T 9/00\]\(#\)](#))
- [H03B 11/04](#) . 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

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