

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