SECTION H — ELECTRICITY

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 (generators specially adapted for electrophonic musical instruments G10H; masers or lasers H01S; generation of oscillations in plasma H05H)

Subclass index

1/00 Details

1/02 • Structural details of power oscillators, e.g. for heating (generators for heating by electromagnetic fields H05B 6/00)

1/04 • Reducing undesired oscillations, e.g. harmonics

5/00 Generation of oscillations using amplifier with regenerative feedback from output to input (H03B 9/00, H03B 15/00 take precedence)

5/02 • Details

5/04 • • Modifications of generator to compensate for variations in physical values, e.g. power supply, load, temperature

5/06 • • Modifications of generator to ensure starting of oscillations (starting of generators H03L 3/00)

5/08 • with frequency-determining element comprising lumped inductance and capacitance

5/10 • • active element in amplifier being vacuum tube (H03B 5/14 takes precedence)

5/12 • • active element in amplifier being semiconductor device (H03B 5/14, H03B 7/06 take precedence)

5/14 • • the frequency-determining element being connected via a bridge circuit to a closed loop in which the signal is transmitted

5/16 • • • active element in amplifier being vacuum tube

5/18 • with frequency-determining element comprising distributed inductance and capacitance

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 • • the frequency-determining element being part of a bridge circuit in a closed loop in which the signal is transmitted; the frequency-determining element being connected via a bridge circuit to such a closed loop, 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

5/34 • • • active element in amplifier being vacuum tube (H03B 5/38 takes precedence)

5/36 • • • active element in amplifier being semiconductor device (H03B 5/38 takes precedence)

5/38 • • • the frequency-determining element being connected via a bridge circuit to a closed loop in which the signal is transmitted

5/40 • • being a magnetostrictive resonator (H03B 5/42 takes precedence)

5/42 • • the frequency-determining element being connected via a bridge circuit to a closed loop in which the 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

9/00 Generation of oscillations using transit-time effects [2]

9/01 • using discharge tubes **[2]**

9/02 • • using a retarding-field tube (using klystrons H03B 9/04) **[2]**

9/04 • • using a klystron **[2]**

9/06 • • • using a reflex klystron **[2]**

9/08 • • using a travelling-wave tube **[2]**

9/10 • • using a magnetron **[2]**

9/12 • using solid state devices, e.g. Gunn-effect devices **[2]**

9/14 • • and elements comprising distributed inductance and capacitance **[3]**

11/00 Generation of oscillations using a shock-excited tuned circuit (with feedback H03B 5/00)

11/02 • excited by spark

11/04 • excited by interrupter

11/06 • • by mechanical interrupter

11/08 • • interrupter being discharge tube

11/10 • • interrupter being semiconductor device

13/00 Generation of oscillations using deflection of electron beam in a cathode-ray tube

15/00 Generation of oscillations using galvano-magnetic devices, e.g. Hall-effect devices, devices using spin transfer effects, devices using giant magnetoresistance, or using super-conductivity effects

17/00 Generation of oscillations using a radiation source and a detector

19/00 Generation of oscillations by non-regenerative frequency multiplication or division of a signal from a separate source

19/03 • using non-linear inductance **[3]**

19/05 • using non-linear capacitance, e.g. varactor diodes **[3]**

19/06 • by means of discharge device or semiconductor device with more than two electrodes

19/08 • • by means of a discharge device

19/10 • • • using multiplication only

19/12 • • • using division only

19/14 • • by means of a semiconductor device

19/16 • using uncontrolled rectifying devices, e.g. rectifying diodes or Schottky diodes **[3]**

19/18 • • and elements comprising distributed inductance and capacitance **[3]**

19/20 • • being diodes exhibiting charge storage or enhancement effects **[3]**

21/00 Generation of oscillations by combining unmodulated signals of different frequencies (H03B 19/00 takes precedence) **[3]**

21/01 • by beating unmodulated signals of different frequencies **[3]**

21/02 • • by plural beating, i.e. for frequency synthesis **[3]**

21/04 • • using several similar stages **[3]**

23/00 Generation of oscillations periodically swept over a predetermined frequency range

25/00 Simultaneous generation by a free-running oscillator of oscillations having different frequencies

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

28/00 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) **[4]**

29/00 Generation of noise currents and voltages (gas-filled discharge tubes with solid cathode specially adapted as noise generators H01J 17/00)

H03C MODULATION (masers or lasers H01S; coding, decoding or code conversion H03M)

Note(s)

1. This subclass covers only modulation, keying, or interruption of sinusoidal oscillations or electromagnetic waves, the modulating signal having any desired waveform.
2. In this subclass, circuits usable both as modulator and demodulator are classified in the group dealing with the type of modulator involved.

1/00 Amplitude modulation (H03C 5/00, H03C 7/00 take precedence)

1/02 • Details

1/04 • • Means in, or combined with, modulating stage for reducing angle modulation

1/06 • • Modifications of modulator to reduce distortion, e.g. by feedback, and clearly applicable to more than one type of modulator

1/08 • by means of variable impedance element (H03C 1/28-H03C 1/34, H03C 1/46-H03C 1/52, H03C 1/62 take precedence)

1/10 • • the element being a current-dependent inductor

1/12 • • the element being a voltage-dependent capacitor

1/14 • • the element being a diode

1/16 • by means of discharge device having at least three electrodes (H03C 1/28-H03C 1/34, H03C 1/50, H03C 1/52, H03C 1/62 take precedence)

1/18 • • carrier applied to control grid

1/20 • • • modulating signal applied to anode

1/22 • • • modulating signal applied to same grid

1/24 • • • modulating signal applied to different grid

1/26 • • • modulating signal applied to cathode

1/28 • by means of transit-time tube

1/30 • • by means of a magnetron

1/32 • by deflection of electron beam in discharge tube

1/34 • by means of light-sensitive element

1/36 • by means of semiconductor device having at least three electrodes (H03C 1/34, H03C 1/50, H03C 1/52, H03C 1/62 take precedence)

1/38 • • carrier applied to base of a transistor

1/40 • • • modulating signal applied to collector
1/42 • • • modulating signal applied to base
1/44 • • • modulating signal applied to emitter
1/46 • Modulators with mechanically-driven or acoustically-driven parts
1/48 • by means of Hall-effect devices
1/50 • by converting angle modulation to amplitude modulation (H03C 1/28-H03C 1/34, H03C 1/46, H03C 1/48 take precedence)
1/52 • Modulators in which carrier or one sideband is wholly or partially suppressed (H03C 1/28-H03C 1/34, H03C 1/46, H03C 1/48 take precedence)
1/54 • • Balanced modulators, e.g. bridge type, ring type or double balanced type
1/56 • • • comprising variable two-pole elements only
1/58 • • • • comprising diodes
1/60 • • with one sideband wholly or partially suppressed
1/62 • Modulators in which amplitude of carrier component in output is dependent upon strength of modulating signal, e.g. no carrier output when no modulating signal is present (H03C 1/28-H03C 1/34, H03C 1/46, H03C 1/48 take precedence)

3/00 **Angle modulation** (H03C 5/00, H03C 7/00 take precedence)
3/02 • Details
3/04 • • Means in, or combined with, modulating stage for reducing amplitude modulation
3/06 • • Means for changing frequency deviation
3/08 • • Modifications of modulator to linearise modulation, e.g. by feedback, and clearly applicable to more than one type of modulator
3/09 • • Modifications of modulator for regulating the mean frequency **[3]**
3/10 • by means of variable impedance (H03C 3/30-H03C 3/38 take precedence)
3/12 • • by means of a variable reactive element
3/14 • • • simulated by circuit comprising active element with at least three electrodes, e.g. reactance-tube circuit
3/16 • • • • in which the active element simultaneously serves as the active element of an oscillator
3/18 • • • the element being a current-dependent inductor
3/20 • • • the element being a voltage-dependent capacitor
3/22 • • • the element being a semiconductor diode, e.g. varicap diode
3/24 • • by means of a variable resistive element, e.g. tube
3/26 • • • comprising two elements controlled in push-pull by modulating signal
3/28 • • using variable impedance driven mechanically or acoustically
3/30 • by means of transit-time tube
3/32 • • the tube being a magnetron
3/34 • by deflection of electron beam in discharge tube
3/36 • by means of light-sensitive element
3/38 • by converting amplitude modulation to angle modulation
3/40 • • using two signal paths the outputs of which have a predetermined phase difference and at least one output being amplitude-modulated
3/42 • by means of electromechanical devices (H03C 3/28 takes precedence) **[3]**

5/00 **Amplitude modulation and angle modulation produced simultaneously or at will by the same modulating signal** (H03C 7/00 takes precedence)
5/02 • by means of transit-time tube
5/04 • • the tube being a magnetron
5/06 • by deflection of electron beam in discharge tube

7/00 **Modulating electromagnetic waves** (devices or arrangements for the modulation of light G02F 1/00)
7/02 • in transmission line, waveguide, cavity resonator, or radiation field of aerial
7/04 • • Polarisation of transmitted wave being modulated

99/00 **Subject matter not provided for in other groups of this subclass [2006.01]**

H03D **DEMODULATION OR TRANSFERENCE OF MODULATION FROM ONE CARRIER TO ANOTHER** (masers, lasers H01S; circuits capable of acting both as modulator and demodulator H03C, e.g. balanced modulators H03C 1/54; details applicable to both modulators and frequency-changers H03C; demodulating pulses which have been modulated with a continuously-variable signal H03K 9/00; transforming types of pulse modulation H03K 11/00; relay systems, e.g. repeater stations H04B 7/14; demodulators adapted for digitally modulated-carrier systems H04L 27/00; synchronous demodulators adapted for colour television H04N 9/66)

Note(s)

This subclass covers only:
- demodulation or transference of signals modulated on a sinusoidal carrier or on electromagnetic waves;
- comparing phase or frequency of two mutually-independent oscillations.

Subclass index

1/00 **Demodulation of amplitude-modulated oscillations** (H03D 5/00, H03D 9/00, H03D 11/00 take precedence; amplitude demodulators adapted for digitally modulated carrier systems, e.g. using on-off keying, single sideband or vestigial sideband modulation H04L 27/06)

1/02 • Details
1/04 • • Modifications of demodulators to reduce interference by undesired signals
1/06 • • Modifications of demodulators to reduce distortion, e.g. by negative feedback
1/08 • by means of non-linear two-pole elements (H03D 1/22, H03D 1/26, H03D 1/28 take precedence)
1/10 • • of diodes
1/12 • • • with provision for equalising ac and dc loads
1/14 • by means of non-linear elements having more than two poles (H03D 1/22, H03D 1/26, H03D 1/28 take precedence)
1/16 • • of discharge tubes
1/18 • • of semiconductor devices
1/20 • • with provision for preventing undesired type of demodulation, e.g. preventing anode detection in a grid detection circuit
1/22 • Homodyne or synchrodyne circuits
1/24 • • for demodulation of signals wherein one sideband or the carrier has been wholly or partially suppressed
1/26 • by means of transit-time tubes
1/28 • by deflecting an electron beam in a discharge tube (H03D 1/26 takes precedence)

3/00 Demodulation of angle-modulated oscillations (H03D 5/00, H03D 9/00, H03D 11/00 take precedence; frequency demodulators adapted for digitally modulated carrier systems, i.e. using frequency shift keying H04L 27/14; phase demodulators adapted for digitally modulated carrier systems, i.e. using phase shift keying H04L 27/22)

3/02 • by detecting phase difference between two signals obtained from input signal (H03D 3/28-H03D 3/32 take precedence)
3/04 • • by counting or integrating cycles of oscillations
3/06 • • by combining signals additively or in product demodulators
3/08 • • • by means of diodes, e.g. Foster-Seeley discriminator
3/10 • • • • in which the diodes are simultaneously conducting during the same half period of the signal, e.g. ratio detector
3/12 • • • by means of discharge tubes having more than two electrodes
3/14 • • • by means of semiconductor devices having more than two electrodes
3/16 • • • by means of electromechanical resonators
3/18 • • by means of synchronous gating arrangements
3/20 • • • producing pulses whose amplitude or duration depends on the phase difference
3/22 • • by means of active elements with more than two electrodes to which two signals are applied derived from the signal to be demodulated and having a phase difference related to the frequency deviation, e.g. phase detector
3/24 • • Modifications of demodulators to reject or remove amplitude variations by means of locked-in oscillator circuits
3/26 • by means of sloping amplitude/frequency characteristic of tuned or reactive circuit (H03D 3/28-H03D 3/32 take precedence)
3/28 • Modifications of demodulators to reduce effect of temperature variations
3/30 • by means of transit-time tubes
3/32 • by deflecting an electron beam in a discharge tube (H03D 3/30 takes precedence)
3/34 • by means of electromechanical devices (H03D 3/16 takes precedence) **[3]**

5/00 Circuits for demodulating amplitude-modulated or angle-modulated oscillations at will (H03D 9/00, H03D 11/00 take precedence; demodulators adapted for digitally modulated carrier systems characterised by combinations of amplitude and angle modulation, e.g. quadrature amplitude modulation H04L 27/38)

7/00 Transference of modulation from one carrier to another, e.g. frequency-changing (H03D 9/00, H03D 11/00 take precedence; dielectric amplifiers, magnetic amplifiers, parametric amplifiers used as frequency-changers H03F)

7/02 • by means of diodes (H03D 7/14-H03D 7/22 take precedence)
7/04 • • having negative resistance characteristic, e.g. tunnel diode
7/06 • by means of discharge tubes having more than two electrodes (H03D 7/14-H03D 7/22 take precedence)
7/08 • • the signals to be mixed being applied between the same two electrodes
7/10 • • the signals to be mixed being applied between different pairs of electrodes
7/12 • by means of semiconductor devices having more than two electrodes (H03D 7/14-H03D 7/22 take precedence)
7/14 • Balanced arrangements
7/16 • Multiple frequency-changing (superheterodyne receivers H04B 1/26)
7/18 • Modifications of frequency-changers for eliminating image frequencies
7/20 • by means of transit-time tubes
7/22 • by deflecting an electron beam in a discharge tube (H03D 7/20 takes precedence)

9/00 Demodulation or transference of modulation of modulated electromagnetic waves (devices or arrangements for demodulating light, transferring the modulation of modulated light or for changing the frequency of light G02F 2/00)

9/02 • Demodulation using distributed inductance and capacitance, e.g. in feeder lines
9/04 • • for angle-modulated oscillations
9/06 • Transference of modulation using distributed inductance and capacitance

11/00 Super-regenerative demodulator circuits

11/02 • for amplitude-modulated oscillations
11/04 • • by means of semiconductor devices having more than two electrodes
11/06 • for angle-modulated oscillations
11/08 • • by means of semiconductor devices having more than two electrodes

13/00 Circuits for comparing the phase or frequency of two mutually-independent oscillations (arrangements for measuring phase angle between a voltage and a current or between voltages or currents G01R 25/00)

99/00 Subject matter not provided for in other groups of this subclass [2006.01]

H03F **AMPLIFIERS** (measuring, testing G01R; optical parametric amplifiers G02F; circuit arrangements with secondary emission tubes H01J 43/30; masers, lasers H01S; dynamo-electric amplifiers H02K; control of amplification H03G; coupling arrangements independent of the nature of the amplifier, voltage dividers H03H; amplifiers capable only of dealing with pulses H03K; repeater circuits in transmission lines H04B 3/36, H04B 3/58; application of speech amplifiers in telephonic communication H04M 1/60, H04M 3/40)

Note(s)

This subclass covers:

- linear amplification, there being linear relationship between the amplitudes of input and output, and the output having substantially the same waveform as the input;
- dielectric amplifiers, magnetic amplifiers, and parametric amplifiers when used as oscillators or frequency-changers;
- constructions of active elements of dielectric amplifiers and parametric amplifiers if no provision exists elsewhere.

Subclass index

1/00 **Details of amplifiers with only discharge tubes, only semiconductor devices or only unspecified devices as amplifying elements**
1/02 • Modifications of amplifiers to raise the efficiency, e.g. gliding Class A stages, use of an auxiliary oscillation
1/04 • • in discharge-tube amplifiers
1/06 • • • to raise the efficiency of amplifying modulated radio frequency waves; to raise the efficiency of amplifiers acting also as modulators **[2]**
1/07 • • • • Doherty-type amplifiers **[2]**
1/08 • Modifications of amplifiers to reduce detrimental influences of internal impedances of amplifying elements (wide-band amplifiers with inter-stage coupling networks incorporating these impedances H03F 1/42; eliminating transit-time effects in vacuum tubes H01J 21/34)
1/10 • • by use of amplifying elements with multiple electrode connections
1/12 • • by use of attenuating means
1/13 • • • in discharge-tube amplifiers **[2]**
1/14 • • by use of neutralising means
1/16 • • • in discharge-tube amplifiers
1/18 • • by use of distributed coupling
1/20 • • • in discharge-tube amplifiers
1/22 • • by use of cascode coupling, i.e. earthed cathode or emitter stage followed by earthed grid or base stage respectively
1/24 • • • in discharge-tube amplifiers
1/26 • Modifications of amplifiers to reduce influence of noise generated by amplifying elements
1/28 • • in discharge-tube amplifiers
1/30 • Modifications of amplifiers to reduce influence of variations of temperature or supply voltage
1/32 • Modifications of amplifiers to reduce non-linear distortion (by negative feedback H03F 1/34)
1/33 • • in discharge-tube amplifiers **[2]**
1/34 • Negative-feedback-circuit arrangements with or without positive feedback (H03F 1/02-H03F 1/30, H03F 1/38-H03F 1/50, H03F 3/50 take precedence) **[3]**
1/36 • • in discharge-tube amplifiers
1/38 • Positive-feedback circuit arrangements without negative feedback
1/40 • • in discharge-tube amplifiers
1/42 • Modifications of amplifiers to extend the bandwidth
1/44 • • of tuned amplifiers
1/46 • • • with tubes only
1/48 • • of aperiodic amplifiers
1/50 • • • with tubes only
1/52 • Circuit arrangements for protecting such amplifiers **[3]**
1/54 • • with tubes only **[3]**
1/56 • Modifications of input or output impedances, not otherwise provided for **[3]**

3/00 **Amplifiers with only discharge tubes or only semiconductor devices as amplifying elements**

Note(s)

Groups H03F 3/20-H03F 3/72 take precedence over groups H03F 3/02-H03F 3/189.

3/02 • with tubes only (subsequent subgroups take precedence)
3/04 • with semiconductor devices only (subsequent subgroups take precedence)
3/06 • • using hole storage effect
3/08 • • controlled by light
3/10 • • with diodes
3/12 • • • with Esaki diodes
3/14 • • with amplifying devices having more than three electrodes or more than two PN junctions
3/16 • • with field-effect devices
3/18 • with semiconductor devices of complementary types (subsequent subgroups take precedence)
3/181 • Low-frequency amplifiers, e.g. audio preamplifiers **[2]**
3/183 • • with semiconductor devices only **[2]**
3/185 • • • with field-effect devices (H03F 3/187 takes precedence) **[2]**
3/187 • • • in integrated circuits **[2]**

3/189 • High-frequency amplifiers, e.g. radio frequency amplifiers **[2]**
3/19 • • with semiconductor devices only **[2]**
3/191 • • • Tuned amplifiers (H03F 3/193, H03F 3/195 take precedence) **[2]**
3/193 • • • with field-effect devices (H03F 3/195 takes precedence) **[2]**
3/195 • • • in integrated circuits **[2]**
3/20 • Power amplifiers, e.g. Class B amplifiers, Class C amplifiers (H03F 3/26-H03F 3/30 take precedence)
3/21 • • with semiconductor devices only **[2]**
3/213 • • • in integrated circuits **[2]**
3/217 • • • Class D power amplifiers; Switching amplifiers **[2]**
3/22 • • with tubes only (H03F 3/24 takes precedence)
3/24 • • of transmitter output stages
3/26 • Push-pull amplifiers; Phase-splitters therefor (duplicated single-ended push-pull arrangements or phase-splitters therefor H03F 3/30)
3/28 • • with tubes only
3/30 • Single-ended push-pull amplifiers; Phase-splitters therefor
3/32 • • with tubes only
3/34 • Dc amplifiers in which all stages are dc-coupled (H03F 3/45 takes precedence) **[3]**
3/343 • • with semiconductor devices only **[2]**
3/345 • • • with field-effect devices (H03F 3/347 takes precedence) **[2]**
3/347 • • • in integrated circuits **[2]**
3/36 • • with tubes only
3/38 • Dc amplifiers with modulator at input and demodulator at output; Modulators or demodulators specially adapted for use in such amplifiers (modulators in general H03C; demodulators in general H03D; amplitude modulation of pulses in general H03K 7/02; amplitude demodulation of pulses in general H03K 9/02)
3/387 • • with semiconductor devices only **[2]**
3/393 • • • with field-effect devices **[2]**
3/40 • • with tubes only
3/42 • Amplifiers with two or more amplifying elements having their dc paths in series with the load, the control electrode of each element being excited by at least part of the input signal, e.g. so-called totem-pole amplifiers
3/44 • • with tubes only
3/45 • Differential amplifiers **[2]**
3/46 • Reflex amplifiers
3/48 • • with tubes only
3/50 • Amplifiers in which input is applied to, or output is derived from, an impedance common to input and output circuits of the amplifying element, e.g. cathode follower
3/52 • • with tubes only
3/54 • Amplifiers using transit-time effect in tubes or semiconductor devices (parametric amplifiers H03F 7/00; solid state travelling-wave devices H01L 45/02)
3/55 • • with semiconductor devices only **[2]**
3/56 • • using klystrons
3/58 • • using travelling-wave tubes
3/60 • Amplifiers in which coupling networks have distributed constants, e.g. with waveguide resonators (H03F 3/54 takes precedence)
3/62 • Two-way amplifiers
3/64 • • with tubes only
3/66 • Amplifiers simultaneously generating oscillations of one frequency and amplifying signals of another frequency
3/68 • Combinations of amplifiers, e.g. multi-channel amplifiers for stereophonics
3/70 • Charge amplifiers **[2]**
3/72 • Gated amplifiers, i.e. amplifiers which are rendered operative or inoperative by means of a control signal **[2]**

5/00 Amplifiers with both discharge tubes and semiconductor devices as amplifying elements

7/00 Parametric amplifiers (devices or arrangements for the parametric generation or amplification of light, infra-red or ultra-violet waves G02F 1/39)
7/02 • using variable-inductance element; using variable-permeability element
7/04 • using variable-capacitance element; using variable-permitivity element
7/06 • with electron beam tube

9/00 Magnetic amplifiers
9/02 • current-controlled, i.e. the load current flowing in both directions through a main coil **[2]**
9/04 • voltage-controlled, i.e. the load current flowing in only one direction through a main coil, e.g. Logan circuits (H03F 9/06 takes precedence) **[2]**
9/06 • Control by voltage time integral, i.e. the load current flowing in only one direction through a main coil, whereby the main coil winding also can be used as a control winding, e.g. Ramey circuits **[2]**

11/00 Dielectric amplifiers

13/00 Amplifiers using amplifying element consisting of two mechanically- or acoustically-coupled transducers, e.g. telephone-microphone amplifier

15/00 Amplifiers using galvano-magnetic effects not involving mechanical movement, e.g. using Hall effect

17/00 Amplifiers using electroluminescent element or photocell

19/00 Amplifiers using superconductivity effects

99/00 Subject matter not provided for in other groups of this subclass [2009.01]

H03G CONTROL OF AMPLIFICATION (impedance networks, e.g. attenuators, H03H; control of transmission in lines H04B 3/04)

Note(s)

1. This subclass covers:

- control of gain of amplifiers or frequency-changers;
- control of frequency range of amplifiers;
- limiting amplitude or rate of change of amplitude.

2. Attention is drawn to the Note following the title of subclass H03F.

Subclass index

1/00 Details of arrangements for controlling amplification
1/02 • Remote control of amplification, tone, or bandwidth (remote control in general G05, G08; combined with remote tuning or selection of resonant circuits H03J)
1/04 • Modifications of control circuit to reduce distortion caused by control (modifications to reduce influence of variations of internal impedance of amplifying elements caused by control H03F 1/08)

3/00 Gain control in amplifiers or frequency changers (gated amplifiers H03F 3/72; peculiar to television receivers H04N)
3/02 • Manually-operated control
3/04 • • in untuned amplifiers
3/06 • • • having discharge tubes
3/08 • • • • incorporating negative feedback
3/10 • • • having semiconductor devices
3/12 • • • • incorporating negative feedback
3/14 • • in frequency-selective amplifiers
3/16 • • • having discharge tubes
3/18 • • • having semiconductor devices
3/20 • Automatic control (combined with volume compression or expansion H03G 7/00)
3/22 • • in amplifiers having discharge tubes
3/24 • • • Control dependent upon ambient noise level or sound level
3/26 • • • Muting amplifier when no signal is present
3/28 • • • • in frequency-modulation receivers
3/30 • • in amplifiers having semiconductor devices
3/32 • • • the control being dependent upon ambient noise level or sound level
3/34 • • • Muting amplifier when no signal is present

5/00 Tone control or bandwidth control in amplifiers
5/02 • Manually-operated control (variable bandpass or bandstop filters H03H 7/12)
5/04 • • in untuned amplifiers
5/06 • • • having discharge tubes
5/08 • • • • incorporating negative feedback
5/10 • • • having semiconductor devices
5/12 • • • • incorporating negative feedback
5/14 • • in frequency-selective amplifiers
5/16 • Automatic control
5/18 • • in untuned amplifiers
5/20 • • • having discharge tubes
5/22 • • • having semiconductor devices
5/24 • • in frequency-selective amplifiers
5/26 • • • having discharge tubes
5/28 • • • having semiconductor devices

7/00 Volume compression or expansion in amplifiers
7/02 • having discharge tubes
7/04 • • incorporating negative feedback
7/06 • having semiconductor devices
7/08 • • incorporating negative feedback

9/00 Combinations of two or more types of control, e.g. gain control and tone control
9/02 • in untuned amplifiers (combined tone controls for low and high frequencies H03G 5/00)
9/04 • • having discharge tubes
9/06 • • • for gain control and tone control
9/08 • • • • incorporating negative feedback
9/10 • • • for tone control and volume expansion or compression
9/12 • • having semiconductor devices
9/14 • • • for gain control and tone control
9/16 • • • • incorporating negative feedback
9/18 • • • for tone control and volume expansion or compression
9/20 • in frequency-selective amplifiers
9/22 • • having discharge tubes
9/24 • • having semiconductor devices
9/26 • in untuned amplifying stages as well as in frequency-selective amplifying stages (gain control in both stages H03G 3/00; tone control or bandwidth control H03G 5/00)
9/28 • • all amplifying stages having discharge tubes
9/30 • • all amplifying stages having semiconductor devices

11/00 Limiting amplitude; Limiting rate of change of amplitude
11/02 • by means of diodes (H03G 11/04, H03G 11/06, H03G 11/08 take precedence)
11/04 • Limiting level dependent on strength of signal; Limiting level dependent on strength of carrier on which signal is modulated
11/06 • Limiters of angle-modulated signals; such limiters combined with discriminators (discriminators having an inherent limiting action H03D 3/00)
11/08 • Limiting rate of change of amplitude

99/00 Subject matter not provided for in other groups of this subclass [2006.01]

H03H IMPEDANCE NETWORKS, e.g. RESONANT CIRCUITS; RESONATORS (measuring, testing G01R; arrangements for producing a reverberation or echo sound G10K 15/08; impedance networks or resonators consisting of distributed impedances, e.g. of the waveguide type, H01P; control of amplification, e.g. bandwidth control of amplifiers, H03G; tuning resonant circuits, e.g. tuning coupled resonant circuits, H03J; networks for modifying the frequency characteristics of communication systems H04B)

Note(s)

1. This subclass covers:
   - networks comprising lumped impedance elements;
   - networks comprising distributed impedance elements together with lumped impedance elements;
   - networks comprising electromechanical or electro-acoustic elements;
   - networks simulating reactances and comprising discharge tubes or semiconductor devices;
   - constructions of electromechanical resonators.
2. In this subclass, the following expression is used with the meaning indicated:
   - "passive elements" means resistors, capacitors, inductors, mutual inductors, or diodes.
3. Attention is drawn to the Notes following the titles of class B81 and subclass B81B relating to "micro-structural devices" and "micro-structural systems".
4. In this subclass, main groups with a higher number take precedence.

Subclass index

1/00 Constructional details of impedance networks whose electrical mode of operation is not specified or applicable to more than one type of network (constructional details of electromechanical transducers H03H 9/00)

1/02 • RC networks, e.g. filters (structural combinations of capacitors with other electric elements H01G) **[3]**

2/00 Networks using elements or techniques not provided for in groups H03H 3/00-H03H 21/00 [3]

3/00 Apparatus or processes specially adapted for the manufacture of impedance networks, resonating circuits, resonators

3/007 • for the manufacture of electromechanical resonators or networks **[3]**

3/013 • • for obtaining desired frequency or temperature coefficient (H03H 3/04, H03H 3/10 take precedence) **[3]**

3/02 • • for the manufacture of piezo-electric or electrostrictive resonators or networks (H03H 3/08 takes precedence) **[3]**

3/04 • • • for obtaining desired frequency or temperature coefficient **[3]**

3/06 • • for the manufacture of magnetostrictive resonators or networks **[3]**

3/08 • • for the manufacture of resonators or networks using surface acoustic waves **[3]**

3/10 • • • for obtaining desired frequency or temperature coefficient **[3]**

5/00 One-port networks comprising only passive electrical elements as network components [3]

5/02 • without voltage- or current-dependent elements

5/10 • • comprising at least one element with prescribed temperature coefficient

5/12 • with at least one voltage- or current-dependent element

7/00 Multiple-port networks comprising only passive electrical elements as network components (receiver input circuits H04B 1/18; networks simulating a length of communication cable H04B 3/40) **[3]**

7/01 • Frequency selective two-port networks **[3]**

7/03 • • comprising means for compensation of loss **[3]**

7/06 • • including resistors (H03H 7/075, H03H 7/09, H03H 7/12, H03H 7/13 take precedence) **[3]**

7/065 • • • Parallel T-filters **[3]**

7/07 • • • Bridged T-filters **[3]**

7/075 • • Ladder networks, e.g. electric wave filters **[3]**

7/09 • • Filters comprising mutual inductance **[3]**

7/12 • • Bandpass or bandstop filters with adjustable bandwidth and fixed centre frequency (H03H 7/09 takes precedence; automatic control of bandwidth in amplifiers H03G 5/16)

7/13 • • using electro-optical elements **[3]**

7/18 • Networks for phase shifting

7/19 • • Two-port phase shifters providing a predetermined phase shift, e.g. "all-pass" filters **[3]**

7/20 • • Two-port phase shifters providing an adjustable phase shift **[3]**

7/21 • • providing two or more phase shifted output signals, e.g. n-phase output **[3]**
7/24 • Frequency-independent attenuators
7/25 • • comprising an element controlled by an electric or magnetic variable (H03H 7/27 takes precedence) **[3]**
7/27 • • comprising a photo-electric element **[3]**
7/30 • Time-delay networks
7/32 • • with lumped inductance and capacitance
7/34 • • with lumped and distributed reactance
7/38 • Impedance-matching networks
7/40 • • Automatic matching of load impedance to source impedance
7/42 • Balance/unbalance networks
7/46 • Networks for connecting several sources or loads, working on different frequencies or frequency bands, to a common load or source (for use in multiplex transmission systems H04J 1/00)
7/48 • Networks for connecting several sources or loads, working on the same frequency or frequency band, to a common load or source (phase shifters providing two or more output signals H03H 7/21) **[3]**
7/52 • One-way transmission networks, i.e. unilines
7/54 • Modifications of networks to reduce influence of variations of temperature **[3]**

9/00 Networks comprising electromechanical or electro-acoustic elements; Electromechanical resonators (manufacture of piezo-electric or magnetostrictive elements H01L 41/00; loudspeakers, microphones, gramophone pick-ups or the like H04R)
9/02 • Details **[3]**
9/05 • • Holders; Supports **[3]**
9/08 • • • Holders with means for regulating temperature
9/09 • • • Elastic or damping supports **[3]**
9/10 • • • Mounting in enclosures
9/12 • • • • for networks with interaction of optical and acoustic waves
9/125 • • Driving means, e.g. electrodes, coils **[3]**
9/13 • • • for networks consisting of piezo-electric or electrostrictive materials (H03H 9/145 takes precedence) **[3]**
9/135 • • • for networks consisting of magnetostrictive materials (H03H 9/145 takes precedence) **[3]**
9/145 • • • for networks using surface acoustic waves **[3]**
9/15 • Constructional features of resonators consisting of piezo-electric or electrostrictive material (H03H 9/25 takes precedence) **[3]**
9/17 • • having a single resonator (crystal tuning forks H03H 9/21) **[3]**
9/19 • • • consisting of quartz **[3]**
9/205 • • having multiple resonators (crystal tuning forks H03H 9/21) **[3]**
9/21 • • Crystal tuning forks **[3]**
9/215 • • • consisting of quartz **[3]**
9/22 • Constructional features of resonators consisting of magnetostricitve material
9/24 • Constructional features of resonators of material which is not piezo-electric, electrostrictive, or magnetostrictive
9/25 • Constructional features of resonators using surface acoustic waves **[3]**

Note(s)

Groups H03H 9/15-H03H 9/25 take precedence over groups H03H 9/30-H03H 9/74.

9/30 • Time-delay networks
9/36 • • with non-adjustable delay time (H03H 9/40, H03H 9/42 take precedence) **[3]**
9/38 • • with adjustable delay time (H03H 9/40, H03H 9/42 take precedence) **[3]**
9/40 • • Frequency-dependent delay lines, e.g. dispersive delay lines (H03H 9/42 takes precedence) **[3]**
9/42 • • using surface acoustic waves **[3]**
9/44 • • • Frequency-dependent delay lines, e.g. dispersive delay lines **[3]**
9/46 • Filters (multiple-port electromechanical filters H03H 9/70) **[3]**
9/48 • • Coupling means therefor **[3]**
9/50 • • • Mechanical coupling means **[3]**
9/52 • • • Electric coupling means **[3]**
9/54 • • comprising resonators of piezo-electric or electrostrictive material (H03H 9/64 takes precedence) **[3]**
9/56 • • • Monolithic crystal filters **[3]**
9/58 • • • Multiple crystal filters **[3]**
9/60 • • • • Electric coupling means therefor **[3]**
9/62 • • comprising resonators of magnetostrictive material (H03H 9/64 takes precedence) **[3]**
9/64 • • using surface acoustic waves **[3]**
9/66 • Phase shifters **[3]**
9/68 • • using surface acoustic waves **[3]**
9/70 • Multiple-port networks for connecting several sources or loads, working on different frequencies or frequency bands, to a common or source **[3]**
9/72 • • Networks using surface acoustic waves **[3]**
9/74 • Multiple-port networks for connecting several sources or loads, working on the same frequency or frequency band, to a common load or source (networks for phase shifting H03H 9/66) **[3]**
9/76 • • Networks using surface acoustic waves **[3]**

11/00 Networks using active elements
11/02 • Multiple-port networks **[3]**
11/04 • • Frequency selective two-port networks **[3]**
11/06 • • • comprising means for compensation of loss **[3]**
11/08 • • • using gyrators **[3]**
11/10 • • • using negative impedance converters (H03H 11/08 takes precedence) **[3]**
11/12 • • • using amplifiers with feedback (H03H 11/08, H03H 11/10 take precedence) **[3]**
11/14 • • • using electro-optical devices **[3]**
11/16 • • Networks for phase shifting **[3]**
11/18 • • • Two-port phase shifters providing a predetermined phase shift, e.g. "all-pass" filters **[3]**
11/20 • • • Two-port phase shifters providing an adjustable phase shift **[3]**
11/22 • • • providing two or more phase shifted output signals, e.g. n-phase output **[3]**
11/24 • • Frequency-independent attenuators **[3]**
11/26 • • Time-delay networks (analogue shift registers G11C 27/04) **[3]**
11/28 • • Impedance matching networks **[3]**
11/30 • • • Automatic matching of source impedance to load impedance **[3]**
11/32 • • Balance-unbalance networks **[3]**
11/34 • • Networks for connecting several sources or loads working on different frequencies or frequency bands, to a common load or source (for use in multiplex transmission systems H04J 1/00) **[3]**

11/36 • • Networks for connecting several sources or loads, working on the same frequency or frequency band, to a common load or source (phase shifters providing two or more output signals H03H 11/22) **[3]**
11/38 • • One-way transmission networks, i.e. unilines **[3]**
11/40 • • Impedance converters **[3]**
11/42 • • • Gyrators (used in frequency selective networks H03H 11/08) **[3]**
11/44 • • • Negative impedance converters (H03H 11/42 takes precedence; used in frequency-selective networks H03H 11/10) **[3]**
11/46 • One-port networks **[3]**
11/48 • • simulating reactances **[3]**
11/50 • • • using gyrators **[3]**
11/52 • • simulating negative resistances **[3]**
11/54 • Modifications of networks to reduce influence of variations of temperature **[3]**

15/00 **Transversal filters** (electromechanical filters H03H 9/46, H03H 9/70) **[3]**
15/02 • using analogue shift registers **[3]**

17/00 **Networks using digital techniques [3]**
17/02 • Frequency-selective networks **[3]**
17/04 • • Recursive filters **[3]**
17/06 • • Non-recursive filters **[3]**
17/08 • Networks for phase-shifting **[3]**

19/00 **Networks using time-varying elements, e.g. N-path filters [3]**

21/00 **Adaptive networks [3]**

H03J **TUNING RESONANT CIRCUITS; SELECTING RESONANT CIRCUITS** (indicating arrangements for measuring G01D; measuring, testing G01R; remote-control in general G05, G08; automatic control or stabilisation of generators H03L)

Note(s)

This subclass covers also the control of tuning, including the combined control of tuning and other functions, e.g. combinations of tuning control and volume control, combinations of control of local oscillator and of supplementary resonant circuits.

Subclass index

1/00 **Details of adjusting, driving, indicating, or mechanical control arrangements for resonant circuits in general** (machine elements in general F16; coupling of knobs to shafts F16D) **[3]**
1/02 • Indicating arrangements
1/04 • • with optical indicating means
1/06 • Driving or adjusting arrangements; combined with other driving or adjusting arrangements, e.g. of gain control

Note(s)

Groups H03J 1/14, H03J 1/16 take precedence over groups H03J 1/08-H03J 1/12.

1/08 • • Toothed-gear drive; Worm drive
1/10 • • Rope drive; Chain drive
1/12 • • Friction drive
1/14 • • Special arrangements for fine and coarse tuning
1/16 • • Single control means independently performing two or more functions
1/18 • Control by auxiliary power
1/20 • • the auxiliary power being switched on as long as controlling current is switched on
1/22 • • with stepping arrangements actuated by control pulses

3/00 **Continuous tuning** (H03J 7/00, H03J 9/00 take precedence; combination of continuous and discontinuous tuning other than for bandspreading H03J 5/00) **[3]**
3/02 • Details
3/04 • • Arrangements for compensating for variations of physical values, e.g. temperature (automatic control of ambient conditions G05D)
3/06 • • Arrangements for obtaining constant bandwidth or gain throughout tuning range or ranges (automatic gain control H03G)
3/08 • • • by varying a second parameter simultaneously with the tuning, e.g. coupling bandpass filter
3/10 • • Circuit arrangements for fine tuning, e.g. bandspreading
3/12 • • Electrically-operated arrangements for indicating correct tuning
3/14 • • • Visual indication, e.g. magic eye
3/16 • • Tuning without displacement of reactive element, e.g. by varying permeability
3/18 • • • by discharge tube or semiconductor device simulating variable reactance
3/20 • of single resonant circuit by varying inductance only or capacitance only
3/22 • of single resonant circuit by varying inductance and capacitance simultaneously
3/24 • of more than one resonant circuit simultaneously, the circuits being tuned to substantially the same frequency, e.g. for single-knob tuning
3/26 • • the circuits being coupled so as to form a bandpass filter

3/28 • of more than one resonant circuit simultaneously, the tuning frequencies of the circuits having a substantially constant difference throughout the tuning range
3/30 • • Arrangements for ensuring tracking with variable inductors
3/32 • • Arrangements for ensuring tracking with variable capacitors

5/00 Discontinuous tuning; Selecting predetermined frequencies; Selecting frequency bands with or without continuous tuning in one or more of the bands, e.g. push-button tuning, turret tuner (H03J 7/00, H03J 9/00 take precedence; for bandspreading H03J 3/10) **[3]**
5/02 • with variable tuning element having a number of predetermined settings and adjustable to a desired one of these settings
5/04 • • operated by hand
5/06 • • • Settings determined by single indexing means with snap action
5/08 • • • Settings determined by a number of separately-actuated positioning means
5/10 • • • Settings determined by a number of positioning means mounted on a common support, which is adjustable to desired positions, a different positioning means being in operation in each position
5/12 • • • Settings determined by a number of separately-actuated driving means which adjust the tuning element directly to desired settings
5/14 • • operated by auxiliary power
5/16 • • • Settings determined by a number of separate positioning means actuated by hand
5/18 • • • Settings determined by a number of separate positioning means actuated by electromagnets
5/20 • • • Settings determined by a number of positioning means actuated by a second means adjustable to different positions by the same or by a second auxiliary power
5/22 • • • Settings determined by a number of separately actuated driving means which adjust the tuning element directly to desired settings
5/24 • with a number of separate pretuned tuning circuits or separate tuning elements selectively brought into circuit, e.g. for waveband selection, for television channel selection (switches in general H01H)
5/26 • • operated by hand
5/28 • • • Tuning circuits or elements supported on a revolving member with contacts arranged in a plane perpendicular to the axis
5/30 • • • Tuning circuits or elements supported on a revolving member with contacts arranged in lines parallel to the axis
5/32 • • • Stationary tuning circuits or elements selected by push-button

7/00 Automatic frequency control; Automatic scanning over a band of frequencies [3]
7/02 • Automatic frequency control (H03J 7/18 takes precedence; automatic tuning control for television receivers H04N 5/50) **[3]**
7/04 • • where the frequency control is accomplished by varying the electrical characteristics of a non-mechanically adjustable element or where the nature of the frequency controlling element is not significant **[3]**
7/06 • • • using counters or frequency dividers **[3]**
7/08 • • • using varactors, i.e. voltage variable reactive diodes (H03J 7/06 takes precedence) **[3]**
7/10 • • • • Modification of automatic frequency control sensitivity or linearising automatic frequency control operation **[3]**
7/12 • • • • Combination of automatic frequency control voltage with stabilised varactor supply voltage **[3]**
7/14 • • • Controlling the magnetic state of inductor cores (H03J 7/06 takes precedence) **[3]**
7/16 • • where the frequency control is accomplished by mechanical means, e.g. by a motor **[3]**
7/18 • Automatic scanning over a band of frequencies **[3]**
7/20 • • where the scanning is accomplished by varying the electrical characteristics of a non-mechanically adjustable element **[3]**
7/22 • • • in which an automatic frequency control circuit is brought into action after the scanning action has been stopped (H03J 7/24 takes precedence) **[3]**
7/24 • • • using varactors, i.e. voltage variable reactive diodes (H03J 7/28 takes precedence) **[3]**
7/26 • • • • in which an automatic frequency control circuit is brought into action after the scanning action has been stopped **[3]**
7/28 • • • using counters or frequency dividers **[3]**
7/30 • • where the scanning is accomplished by mechanical means, e.g. by a motor **[3]**
7/32 • • with simultaneous display of received frequencies, e.g. panoramic receivers **[3]**

9/00 Remote-control of tuned circuits; Combined remote-control of tuning and other functions, e.g. brightness, amplification (mechanical remote-control arrangements H03J 1/00) **[3]**
9/02 • using radio transmission; using near-field transmission **[3]**
9/04 • using ultrasonic, sonic or infrasonic waves **[3]**
9/06 • using electromagnetic waves other than radio waves, e.g. light **[3]**

H03K PULSE TECHNIQUE (measuring pulse characteristics G01R; modulating sinusoidal oscillations with pulses H03C; transmission of digital information H04L; discriminator circuits detecting phase difference between two signals by counting or integrating cycles of oscillation H03D 3/04; automatic control, starting, synchronisation or stabilisation of generators of electronic oscillations or pulses where the type of generator is irrelevant or unspecified H03L; coding, decoding or code conversion, in general H03M) **[4]**

Note(s)

1. This subclass covers :
   - methods, circuits, devices, or apparatus using active elements operating in a discontinuous or switching manner for generating, counting, amplifying, shaping, modulating, demodulating, or otherwise manipulating signals;
   - electronic switching not involving contact-making and breaking;

- logic circuits handling electric pulses.

2. In this subclass, the following expression is used with the meaning indicated:
   - "active element" exercises control over the conversion of input energy into an oscillation or a discontinuous flow of energy.
3. In this subclass, where the claims of a patent document are not limited to a specific circuit element, the document is classified at least according to the elements used in the described embodiment.

Subclass index

3/00 **Circuits for generating electric pulses; Monostable, bistable or multistable circuits** (H03K 4/00 takes precedence; for digital function generators in computers G06F 1/02) **[5]**
3/01 • Details **[3]**
3/011 • • Modifications of generator to compensate for variations in physical values, e.g. voltage, temperature **[6]**
3/012 • • Modifications of generator to improve response time or to decrease power consumption **[6]**
3/013 • • Modifications of generator to prevent operation by noise or interference **[3]**
3/014 • • Modifications of generator to ensure starting of oscillations **[6]**
3/015 • • Modifications of generator to maintain energy constant **[6]**
3/017 • • Adjustment of width or dutycycle of pulses (pulse width modulation H03K 7/08) **[3]**
3/02 • Generators characterised by the type of circuit or by the means used for producing pulses (H03K 3/64-H03K 3/84 take precedence)
3/021 • • by the use, as active elements, of more than one type of element or means, e.g. BIMOS, composite devices such as IGBT **[6]**
3/023 • • by the use of differential amplifiers or comparators, with internal or external positive feedback **[3]**
3/0231 • • • Astable circuits **[6]**
3/0232 • • • Monostable circuits **[6]**
3/0233 • • • Bistable circuits **[6]**
3/0234 • • • Multistable circuits **[6]**
3/027 • • by the use of logic circuits, with internal or external positive feedback **[3]**
3/03 • • • Astable circuits **[3]**
3/033 • • • Monostable circuits **[3]**
3/037 • • • Bistable circuits **[3]**
3/038 • • • Multistable circuits **[6]**
3/04 • • by the use, as active elements, of vacuum tubes only, with positive feedback (H03K 3/023, H03K 3/027 take precedence) **[3]**
3/05 • • • using means other than a transformer for feedback
3/06 • • • • using at least two tubes so coupled that the input of one is derived from the output of another, e.g. multivibrator
3/08 • • • • • astable
3/09 • • • • • • Stabilisation of output **[2]**
3/10 • • • • • monostable
3/12 • • • • • bistable
3/13 • • • • • • Bistables with hysteresis, e.g. Schmitt trigger **[6]**
3/14 • • • • • multistable
3/16 • • • using a transformer for feedback, e.g. blocking oscillator with saturable core
3/22 • • • • specially adapted for amplitude comparison, i.e. Multiar
3/26 • • by the use, as active elements, of bipolar transistors with internal or external positive feedback (H03K 3/023, H03K 3/027 take precedence) **[2]**
3/28 • • • using means other than a transformer for feedback
3/281 • • • • using at least two transistors so coupled that the input of one is derived from the output of another, e.g. multivibrator
3/282 • • • • • astable
3/283 • • • • • • Stabilisation of output **[2]**
3/284 • • • • • monostable
3/286 • • • • • bistable **[3]**
3/287 • • • • • • using additional transistors in the feedback circuit (H03K 3/289 takes precedence) **[3]**
3/288 • • • • • • using additional transistors in the input circuit (H03K 3/289 takes precedence) **[3]**
3/2885 • • • • • • • the input circuit having a differential configuration **[5]**
3/289 • • • • • • of the master-slave type **[3]**
3/2893 • • • • • • Bistables with hysteresis, e.g. Schmitt trigger **[6]**
3/2897 • • • • • • • with an input circuit of differential configuration **[6]**
3/29 • • • • • multistable
3/30 • • • using a transformer for feedback, e.g. blocking oscillator
3/313 • • by the use, as active elements, of semiconductor devices with two electrodes, one or two potential-jump barriers, and exhibiting a negative resistance characteristic **[3]**
3/315 • • • the devices being tunnel diodes

3/33 • • by the use, as active elements, of semiconductor devices exhibiting hole storage or enhancement effect
3/335 • • by the use, as active elements, of semiconductor devices with more than two electrodes and exhibiting avalanche effect
3/35 • • by the use, as active elements, of bipolar semiconductor devices with more than two PN junctions, or more than three electrodes, or more than one electrode connected to the same conductivity region (H03K 3/023, H03K 3/027 take precedence) **[3]**
3/351 • • • the devices being unijunction transistors (H03K 3/352 takes precedence) **[3]**
3/352 • • • the devices being thyristors **[3]**
3/3525 • • • • Anode gate thyristors or programmable unijunction transistors **[6]**
3/353 • • by the use, as active elements, of field-effect transistors with internal or external positive feedback (H03K 3/023, H03K 3/027 take precedence) **[2, 3]**
3/354 • • • Astable circuits **[3]**
3/355 • • • Monostable circuits **[3]**
3/356 • • • Bistable circuits **[3]**
3/3562 • • • • of the master-slave type **[6]**
3/3565 • • • • Bistables with hysteresis, e.g. Schmitt trigger **[6]**
3/3568 • • • Multistable circuits **[6]**
3/357 • • by the use, as active elements, of bulk negative resistance devices, e.g. Gunn-effect devices **[2]**
3/36 • • by the use, as active elements, of semiconductors, not otherwise provided for **[2]**
3/37 • • by the use, as active elements, of gas-filled tubes, e.g. astable trigger circuits (H03K 3/55 takes precedence)
3/38 • • by the use, as active elements, of superconductive devices **[3]**
3/40 • • by the use, as active elements, of electrochemical cells
3/42 • • by the use, as active elements, of opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled
3/43 • • by the use, as active elements, of beam deflection tubes
3/45 • • by the use, as active elements, of non-linear magnetic or dielectric devices
3/47 • • • the devices being parametrons
3/49 • • • the devices being ferro-resonant
3/51 • • • the devices being multi-aperture magnetic cores, e.g. transfluxors
3/53 • • by the use of an energy-accumulating element discharged through the load by a switching device controlled by an external signal and not incorporating positive feedback (H03K 3/335 takes precedence)
3/537 • • • the switching device being a spark gap **[3]**
3/543 • • • the switching device being a vacuum tube **[3]**
3/55 • • • the switching device being a gas-filled tube having a control electrode
3/57 • • • the switching device being a semiconductor device
3/59 • • by the use of galvano-magnetic devices, e.g. Hall-effect devices **[2]**
3/64 • Generators producing trains of pulses, i.e. finite sequences of pulses
3/66 • • by interrupting the output of a generator
3/70 • • • time intervals between all adjacent pulses of one train being equal
3/72 • • with means for varying repetition rate of trains
3/78 • Generating a single train of pulses having a predetermined pattern, e.g. a predetermined number
3/80 • Generating trains of sinusoidal oscillations (by keying or interruption of sinusoidal oscillations H03C; for transmission of digital information H04L)
3/84 • Generating pulses having a predetermined statistical distribution of a parameter, e.g. random pulse generators **[2]**
3/86 • Generating pulses by means of delay lines and not covered by the preceding subgroups **[2]**

4/00 Generating pulses having essentially a finite slope or stepped portions
4/02 • having stepped portions, e.g. staircase waveform
4/04 • having parabolic shape
4/06 • having triangular shape
4/08 • • having sawtooth shape
4/10 • • • using as active elements vacuum tubes only
4/12 • • • • in which a sawtooth voltage is produced across a capacitor
4/14 • • • • • using two tubes so coupled that the input of each one is derived from the output of the other, e.g. multivibrator
4/16 • • • • • using a single tube with positive feedback through transformer, e.g. blocking oscillator
4/18 • • • • • using a single tube exhibiting negative resistance between two of its electrodes, e.g. transitron, dynatron
4/20 • • • • • using a tube with negative feedback by capacitor, e.g. Miller integrator
4/22 • • • • • • combined with transitron, e.g. phantastron, sanatron
4/24 • • • • • Boot-strap generators
4/26 • • • • in which a sawtooth current is produced through an inductor
4/28 • • • • • using a tube operating as a switching device **[3]**
4/32 • • • • • • combined with means for generating the driving pulses
4/34 • • • • • • • using a single tube with positive feedback through a transformer
4/36 • • • • • • • using a single tube exhibiting negative resistance between two of its electrodes, e.g. transitron, dynatron
4/38 • • • • • • • • combined with Miller integrator
4/39 • • • • • using a tube operating as an amplifier **[3]**
4/41 • • • • • • with negative feedback through a capacitor, e.g. Miller integrator **[3]**
4/43 • • • • • • combined with means for generating the driving pulses **[3]**
4/48 • • • using as active elements semiconductor devices (H03K 4/787-H03K 4/84 take precedence)
4/50 • • • • in which a sawtooth voltage is produced across a capacitor
4/501 • • • • • the starting point of the flyback period being determined by the amplitude of the voltage across the capacitor, e.g. by a comparator **[6]**
4/502 • • • • • • the capacitor being charged from a constant-current source **[6]**

4/52 • • • • • using two semiconductor devices so coupled that the input of each one is derived from the output of the other, e.g. multivibrator
4/54 • • • • • using a single semiconductor device with positive feedback through a transformer, e.g. blocking oscillator
4/56 • • • • • using a semiconductor device with negative feedback through a capacitor, e.g. Miller integrator
4/58 • • • • • Boot-strap generators
4/60 • • • • in which a sawtooth current is produced through an inductor
4/62 • • • • • using a semiconductor device operating as a switching device **[3]**
4/64 • • • • • • combined with means for generating the driving pulses
4/66 • • • • • • • using a single device with positive feedback, e.g. blocking oscillator
4/68 • • • • • • Generators in which the switching device is conducting during the fly-back part of the cycle
4/69 • • • • • using a semiconductor device operating as an amplifier **[3]**
4/71 • • • • • • with negative feedback through a capacitor, e.g. Miller integrator **[3]**
4/72 • • • • • • combined with means for generating the driving pulses
4/787 • • • using as active elements semiconductor devices with two electrodes and exhibiting a negative resistance characteristic **[2]**
4/793 • • • • using tunnel diodes **[2]**
4/80 • • • using as active elements multi-layer diodes
4/83 • • • using as active elements semiconductor devices with more than two PN junctions or with more than three electrodes or more than one electrode connected to the same conductivity region **[2]**
4/84 • • • • Generators in which the semiconductor device is conducting during the fly-back part of the cycle
4/86 • • • using as active elements gas-filled tubes
4/88 • • • using as active elements electrochemical cells
4/90 • • • Linearisation of ramp (modifying slopes of pulses H03K 6/04; scanning distortion correction for television receivers H04N 3/23); Synchronisation of pulses **[2]**
4/92 • having a waveform comprising a portion of a sinusoid (generating sinusoidal oscillations H03B) **[2]**
4/94 • having trapezoidal shape **[2]**

5/00 **Manipulation of pulses not covered by one of the other main groups of this subclass** (circuits with regenerative action H03K 3/00, H03K 4/00; by the use of non-linear magnetic or dielectric devices H03K 3/45)

Note(s)

In this group, the input signals are of the pulse type.

5/003 • Changing the DC level (reinsertion of dc component of a television signal H04N 5/16) **[6]**
5/007 • • Base line stabilisation (thresholding H03K 5/08) **[6]**
5/01 • Shaping pulses (discrimination against noise or interference H03K 5/125)
5/02 • • by amplifying (H03K 5/04 takes precedence)
5/04 • • by increasing duration; by decreasing duration
5/05 • • • by the use of clock signals or other time reference signals **[3]**
5/06 • • • by the use of delay lines or other analogue delay elements **[3]**
5/07 • • • by the use of resonant circuits **[3]**
5/08 • • by limiting, by thresholding, by slicing, i.e. combined limiting and thresholding (H03K 5/07 takes precedence; comparing one pulse with another H03K 5/22; providing a determined threshold for switching H03K 17/30) **[3]**
5/12 • • by steepening leading or trailing edges
5/125 • Discriminating pulses (measuring characteristics of individual pulses G01R 29/02; separation of synchronising signals in television systems H04N 5/08) **[6]**
5/1252 • • Suppression or limitation of noise or interference (specially adapted for transmission systems H04B 15/00, H04L 25/08) **[6]**
5/1254 • • • specially adapted for pulses generated by closure of switches, i.e. anti-bouncing devices (debouncing circuits for electronic time-pieces G04G 5/00) **[6]**
5/13 • *Arrangements having a single output and transforming input signals into pulses delivered at desired time intervals* ***[1, 2014.01]***
5/131 • • *Digitally controlled* ***[2014.01]***
5/133 • • *using a chain of active-delay devices* ***[2014.01]***
5/134 • • • *with field-effect transistors* ***[2014.01]***
5/135 • • by the use of time reference signals, e.g. clock signals **[3]**
5/14 • • *by the use of delay lines (H03K 5/133 takes precedence)* ***[3, 2014.01]***
5/145 • • by the use of resonant circuits **[3]**
5/15 • Arrangements in which pulses are delivered at different times at several outputs, i.e. pulse distributors (distributing, switching, or gating arrangements H03K 17/00) **[2]**
5/151 • • with two complementary outputs **[6]**
5/153 • Arrangements in which a pulse is delivered at the instant when a predetermined characteristic of an input signal is present or at a fixed time interval after this instant (switching at zero crossing H03K 17/13)
5/1532 • • Peak detectors (measuring characteristics of individual pulses G01R 29/02) **[6]**
5/1534 • • Transition or edge detectors **[6]**
5/1536 • • Zero-crossing detectors (in measuring circuits G01R 19/175) **[6]**
5/156 • Arrangements in which a continuous pulse train is transformed into a train having a desired pattern
5/159 • Applications of delay lines not covered by the preceding subgroups
5/19 • Monitoring patterns of pulse trains (indicating amplitude G01R 19/00; indicating frequency G01R 23/00; measuring characteristics of individual pulses G01R 29/02) **[3]**
5/22 • Circuits having more than one input and one output for comparing pulses or pulse trains with each other according to input signal characteristics, e.g. slope, integral (indicating phase difference of two cyclic pulse trains G01R 25/00) **[3]**
5/24 • • the characteristic being amplitude **[3]**
5/26 • • the characteristic being duration, interval, position, frequency, or sequence **[3]**

6/00 **Manipulating pulses having a finite slope and not covered by one of the other main groups of this subclass** (circuits with regenerative action H03K 4/00)

Note(s)

In this group, the input signals are of the pulse type.

6/02 • Amplifying pulses
6/04 • Modifying slopes of pulses, e.g. S-correction (S-correction in television H04N 3/23)

7/00 Modulating pulses with a continuously-variable modulating signal
7/02 • Amplitude modulation, i.e. PAM
7/04 • Position modulation, i.e. PPM
7/06 • Frequency or rate modulation, i.e. PFM or PRM
7/08 • Duration or width modulation
7/10 • Combined modulation, e.g. rate modulation and amplitude modulation

9/00 Demodulating pulses which have been modulated with a continuously-variable signal
9/02 • of amplitude-modulated pulses
9/04 • of position-modulated pulses
9/06 • of frequency- or rate-modulated pulses
9/08 • of duration- or width-modulated pulses
9/10 • of pulses having combined modulation

11/00 Transforming types of modulation, e.g. position-modulated pulses into duration-modulated pulses

12/00 Producing pulses by distorting or combining sinusoidal waveforms (shaping pulses H03K 5/01; combining sinewaves using elements operating in a non-switching manner H03B 21/00) **[3]**

17/00 Electronic switching or gating, i.e. not by contact-making and -breaking (gated amplifiers H03F 3/72; switching arrangements for exchange systems using static devices H04Q 3/52)
17/04 • Modifications for accelerating switching **[3]**
17/041 • • without feedback from the output circuit to the control circuit **[6]**
17/0412 • • • by measures taken in the control circuit **[6]**
17/0414 • • • • Anti-saturation measures **[6]**
17/0416 • • • by measures taken in the output circuit **[6]**
17/042 • • by feedback from the output circuit to the control circuit **[6]**
17/0422 • • • Anti-saturation measures **[6]**
17/0424 • • • by the use of a transformer **[6]**
17/06 • Modifications for ensuring a fully conducting state **[3]**
17/08 • Modifications for protecting switching circuit against overcurrent or overvoltage **[3]**
17/081 • • without feedback from the output circuit to the control circuit **[6]**
17/0812 • • • by measures taken in the control circuit **[6]**
17/0814 • • • by measures taken in the output circuit **[6]**
17/082 • • by feedback from the output to the control circuit **[6]**
17/10 • Modifications for increasing the maximum permissible switched voltage **[3]**
17/12 • Modifications for increasing the maximum permissible switched current **[3]**
17/13 • Modifications for switching at zero crossing (generating an impulse at zero crossing H03K 5/1536) **[3]**
17/14 • Modifications for compensating variations of physical values, e.g. of temperature **[3]**
17/16 • Modifications for eliminating interference voltages or currents **[3]**
17/18 • Modifications for indicating state of switch **[3]**
17/20 • Modifications for resetting core switching units to a predetermined state **[3]**
17/22 • Modifications for ensuring a predetermined initial state when the supply voltage has been applied (bi-stable generators H03K 3/12) **[3]**
17/24 • • Storing the actual state when the supply voltage fails **[3]**
17/26 • Modifications for temporary blocking after receipt of control pulses **[3]**
17/28 • Modifications for introducing a time delay before switching (modifications to provide a choice of time-intervals for executing more than one switching action H03K 17/296) **[3]**
17/284 • • in field-effect transistor switches **[3]**
17/288 • • in tube switches **[3]**
17/292 • • in thyristor, unijunction transistor or programmable unijunction transistor switches **[3]**
17/296 • Modifications to provide a choice of time-intervals for executing more than one switching action and automatically terminating their operation after the programme is completed (electronic clocks comprising means to be operated at preselected times or after preselected time-intervals G04G 15/00) **[3]**
17/30 • Modifications for providing a predetermined threshold before switching (shaping pulses by thresholding H03K 5/08) **[3]**
17/51 • characterised by the use of specified components (H03K 17/04-H03K 17/30, H03K 17/94 take precedence) **[3]**
17/52 • • by the use, as active elements, of gas-filled tubes **[3]**
17/54 • • by the use, as active elements, of vacuum tubes (using diodes H03K 17/74) **[3]**
17/56 • • by the use, as active elements, of semiconductor devices (using diodes H03K 17/74) **[3]**
17/567 • • • Circuits characterised by the use of more than one type of semiconductor device, e.g. BIMOS, composite devices such as IGBT **[6]**
17/58 • • • the devices being tunnel diodes **[3]**
17/60 • • • the devices being bipolar transistors (bipolar transistors having four or more electrodes H03K 17/72) **[3]**
17/605 • • • • with galvanic isolation between the control circuit and the output circuit (H03K 17/78 takes precedence) **[5]**
17/61 • • • • • using transformer coupling **[5]**
17/615 • • • • in a Darlington configuration **[5]**
17/62 • • • • Switching arrangements with several input- or output-terminals, e.g. multiplexers, distributors (logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00) **[3]**
17/64 • • • • having inductive loads **[3]**
17/66 • • • • Switching arrangements for passing the current in either direction at will; Switching arrangements for reversing the current at will **[3]**
17/68 • • • • specially adapted for switching ac currents or voltages **[3]**
17/687 • • • the devices being field-effect transistors **[3]**
17/689 • • • • with galvanic isolation between the control circuit and the output circuit (H03K 17/78 takes precedence) **[5]**
17/691 • • • • • using transformer coupling **[5]**
17/693 • • • • Switching arrangements with several input- or output-terminals, e.g. multiplexers, distributors (logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00) **[3]**

17/695 • • • • having inductive loads (protecting switching circuit against inductive flyback voltage H03K 17/08) **[6]**

17/70 • • • the devices having only two electrodes and exhibiting negative resistance (the devices being tunnel diodes H03K 17/58) **[3]**

17/72 • • • Bipolar semiconductor devices with more than two PN junctions, e.g. thyristors, programmable unijunction transistors, or with more than three electrodes, e.g. silicon controlled switches, or with more than one electrode connected to the same conductivity region, e.g. unijunction transistors **[3]**

17/722 • • • • with galvanic isolation between the control circuit and the output circuit (H03K 17/78 takes precedence) **[5]**

17/723 • • • • • using transformer coupling **[5]**

17/725 • • • • for ac voltages or currents (H03K 17/722, H03K 17/735 take precedence) **[3, 5]**

17/73 • • • • for dc voltages or currents (H03K 17/722, H03K 17/735 take precedence) **[3, 5]**

17/732 • • • • • Measures for enabling turn-off **[5]**

17/735 • • • • Switching arrangements with several input- or output-terminals, e.g. multiplexers, distributors (H03K 17/722 takes precedence; logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00) **[3, 5]**

17/74 • • by the use, as active elements, of diodes (by the use of more than one type of semiconductor device H03K 17/567; by the use of tunnel diodes H03K 17/58; by the use of negative resistance diodes H03K 17/70) **[3]**

17/76 • • • Switching arrangements with several input- or output-terminals, e.g. multiplexers, distributors (logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00) **[3]**

17/78 • • by the use, as active elements, of opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled **[3]**

17/785 • • • controlling field-effect transistor switches **[5]**

17/79 • • • controlling semiconductor switches with more than two PN-junctions, or more than three electrodes, or more than one electrode connected to the same conductivity region **[5]**

17/795 • • • controlling bipolar transistors **[5]**

17/80 • • by the use, as active elements, of non-linear magnetic or dielectric devices **[3]**

17/81 • • • Switching arrangements with several input- or output-terminals, e.g. multiplexers, distributors (logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00) **[3]**

17/82 • • • the devices being transfluxors **[3]**

17/84 • • • the devices being thin-film devices **[3]**

17/86 • • • the devices being twistors **[3]**

17/88 • • by the use, as active elements, of beam-deflection tubes **[3]**

17/90 • • by the use, as active elements, of galvano-magnetic devices, e.g. Hall-effect devices (H03K 17/95, H03K 17/97 take precedence) **[2, 3]**

17/92 • • by the use, as active elements, of superconductive devices **[2, 3]**

17/94 • characterised by the way in which the control signals are generated **[3, 4]**

17/945 • • Proximity switches (H03K 17/96 takes precedence) **[3]**

17/95 • • • using a magnetic detector **[3]**

17/955 • • • using a capacitive detector **[3]**

17/96 • • Touch switches (specially adapted for electronic time-pieces with no moving parts G04G 21/08) **[3]**

17/965 • • Switches controlled by moving an element forming part of the switch **[3]**

17/967 • • • having a plurality of control members, e.g. keyboard (H03K 17/969, H03K 17/972, H03K 17/98 take precedence) **[4]**

17/968 • • • using opto-electronic devices **[4]**

17/969 • • • • having a plurality of control members, e.g. keyboard **[4]**

17/97 • • • using a magnetic movable element **[3]**

17/972 • • • • having a plurality of control members, e.g. keyboard **[4]**

17/975 • • • using a capacitive movable element **[3]**

17/98 • • • • having a plurality of control members, e.g. keyboard **[4]**

19/00 **Logic circuits, i.e. having at least two inputs acting on one output** (circuits for computer systems using fuzzy logic G06N 7/02)**; Inverting circuits**

19/003 • Modifications for increasing the reliability **[3]**

19/007 • Fail-safe circuits **[3]**

19/01 • Modifications for accelerating switching **[3]**

19/013 • • in bipolar transistor circuits **[3]**

19/017 • • in field-effect transistor circuits **[3]**

19/0175 • Coupling arrangements; Interface arrangements (interface arrangements for digital computers G06F 3/00, G06F 13/00) **[5]**

19/018 • • using bipolar transistors only **[5]**

19/0185 • • using field-effect transistors only **[5]**

19/02 • using specified components (H03K 19/003-H03K 19/0175 take precedence) **[3, 5]**

19/04 • • using gas-filled tubes

19/06 • • using vacuum tubes (using diode rectifiers H03K 19/12)

19/08 • • using semiconductor devices (H03K 19/173 takes precedence; wherein the semiconductor devices are only diode rectifiers H03K 19/12) **[3]**

19/082 • • • using bipolar transistors **[3]**

19/084 • • • • Diode–transistor logic **[3]**

19/086 • • • • Emitter coupled logic **[3]**

19/088 • • • • Transistor–transistor logic **[3]**

19/09 • • • • Resistor–transistor logic **[3]**

19/091 • • • • Integrated injection logic or merged transistor logic **[3]**

19/094 • • • using field-effect transistors **[3]**

19/0944 • • • • using MOSFET (H03K 19/096 takes precedence) **[5]**

19/0948 • • • • • using CMOS **[5]**

19/0952 • • • • using Schottky type FET (H03K 19/096 takes precedence) **[5]**

19/0956 • • • • Schottky diode FET logic (H03K 19/096 takes precedence) **[5]**

19/096 • • • • Synchronous circuits, i.e. using clock signals **[3]**

19/098 • • • using thyristors **[3]**

19/10 • • • using tunnel diodes **[3]**

19/12 • • using diode rectifiers

19/14 • • using opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled (optical logic elements G02F 3/00)

19/16 • • using saturable magnetic devices

19/162 • • • using parametrons

19/164 • • • using ferro-resonant devices

19/166 • • • using transfluxors

19/168 • • • using thin-film devices

19/17 • • using twistors
19/173 • • using elementary logic circuits as components **[3]**
19/177 • • • arranged in matrix form **[3]**
19/18 • • using galvano-magnetic devices, e.g. Hall-effect devices **[2]**
19/185 • • using dielectric elements with variable dielectric constant, e.g. ferro-electric capacitors **[2]**
19/19 • • • using ferro-resonant devices **[2]**
19/195 • • using superconductive devices **[2, 3]**
19/20 • characterised by logic function, e.g. AND, OR, NOR, NOT circuits (H03K 19/003-H03K 19/01 take precedence)
19/21 • • EXCLUSIVE-OR circuits, i.e. giving output if input signal exists at only one input; COINCIDENCE circuits, i.e. giving output only if all input signals are identical **[3]**
19/23 • • Majority or minority circuits, i.e. giving output having the state of the majority or the minority of the inputs **[3]**

21/00 Details of pulse counters or frequency dividers
21/02 • Input circuits **[4]**
21/08 • Output circuits **[4]**
21/10 • • comprising logic circuits
21/12 • • with parallel read-out **[4]**
21/14 • • with series read-out of number stored **[4]**
21/16 • Circuits for carrying-over pulses between successive decades
21/17 • • with field-effect transistors **[4]**
21/18 • Circuits for visual indication of the result **[4]**
21/20 • • using glow-discharge lamps
21/38 • Starting, stopping, or resetting the counter (counters with a base other than a power of two H03K 23/48, H03K 23/66) **[4]**
21/40 • Monitoring; Error detection; Preventing or correcting improper counter operation **[4]**

23/00 Pulse counters comprising counting chains; Frequency dividers comprising counting chains (H03K 29/00 takes precedence)
23/40 • Gating or clocking signals applied to all stages, i.e. synchronous counters **[4]**
23/42 • • Out-of-phase gating or clocking signals applied to counter stages **[4]**
23/44 • • • using field-effect transistors **[4]**
23/46 • • • using charge transfer devices, i.e. bucket brigade or charge coupled devices **[4]**
23/48 • • with a base or radix other than a power of two (H03K 23/42 takes precedence) **[4]**
23/50 • • using bi-stable regenerative trigger circuits (H03K 23/42-H03K 23/48 take precedence) **[4]**
23/52 • • • using field-effect transistors **[4]**
23/54 • • • Ring counters, i.e. feedback shift register counters (H03K 23/52 takes precedence) **[4]**
23/56 • • • Reversible counters (H03K 23/52 takes precedence) **[4]**
23/58 • Gating or clocking signals not applied to all stages, i.e. asynchronous counters (H03K 23/74-H03K 23/84 take precedence) **[4]**
23/60 • • with field-effect transistors **[4]**
23/62 • • reversible **[4]**
23/64 • with a base or radix other than a power of two (H03K 23/40-H03K 23/62 take precedence) **[4]**
23/66 • • with a variable counting base, e.g. by presetting or by adding or suppressing pulses **[4]**
23/68 • • with a base which is a non-integer **[4]**
23/70 • • with a base which is an odd number (H03K 23/66 takes precedence) **[4]**
23/72 • • Decade counters (H03K 23/66 takes precedence) **[4]**
23/74 • using relays **[4]**
23/76 • using magnetic cores or ferro-electric capacitors **[4]**
23/78 • using opto-electronic devices **[4]**
23/80 • using semiconductor devices having only two electrodes, e.g. tunnel diode, multi-layer diode **[4]**
23/82 • using gas-filled tubes **[4]**
23/84 • using thyristors or unijunction transistors **[4]**
23/86 • reversible (H03K 23/40-H03K 23/84 take precedence) **[4]**

25/00 Pulse counters with step-by-step integration and static storage; Analogous frequency dividers
25/02 • comprising charge storage, e.g. capacitor without polarisation hysteresis
25/04 • • using auxiliary pulse generator triggered by the incoming pulses **[4]**
25/12 • comprising hysteresis storage

27/00 Pulse counters in which pulses are continuously circulated in a closed loop; Analogous frequency dividers (feedback shift register counters H03K 23/54) **[4]**

29/00 Pulse counters comprising multi-stable elements, e.g. for ternary scale, for decimal scale; Analogous frequency dividers
29/04 • using multi-cathode gas discharge tubes **[4]**
29/06 • using beam-type tubes, e.g. magnetrons, cathode-ray tubes **[4]**

99/00 Subject matter not provided for in other groups of this subclass [2013.01]

H03L AUTOMATIC CONTROL, STARTING, SYNCHRONISATION, OR STABILISATION OF GENERATORS OF ELECTRONIC OSCILLATIONS OR PULSES (of dynamo-electric generators H02P) **[3]**

Note(s)

1. This subclass covers:
   - automatic control circuits for generators of electronic oscillations or pulses;
   - starting, synchronisation, or stabilisation circuits for generators where the type of generator is irrelevant or unspecified.
2. This subclass does not cover stabilisation or starting circuits specially adapted to only one specific type of generator, which are covered by subclasses H03B, H03K.
3. In this subclass, the following expression is used with the meaning indicated:
   - "automatic control" covers only closed loop systems.

1/00 **Stabilisation of generator output against variations of physical values, e.g. power supply** (automatic control H03L 5/00, H03L 7/00) **[3]**

1/02 • against variations of temperature only **[3]**

1/04 • • Constructional details for maintaining temperature constant **[3]**

3/00 **Starting of generators [3]**

5/00 **Automatic control of voltage, current, or power [3]**

5/02 • of power **[3]**

7/00 **Automatic control of frequency or phase; Synchronisation** (tuning of resonant circuits in general H03J; synchronising in digital communication systems, see the relevant groups in class H04) **[3]**

7/02 • using a frequency discriminator comprising a passive frequency-determining element **[3]**

7/04 • • wherein the frequency-determining element comprises distributed inductance and capacitance **[3]**

7/06 • using a reference signal applied to a frequency- or phase-locked loop **[3]**

7/07 • • using several loops, e.g. for redundant clock signal generation (for indirect frequency synthesis H03L 7/22) **[5]**

7/08 • • Details of the phase-locked loop **[3]**

7/081 • • • provided with an additional controlled phase shifter **[5]**

7/083 • • • the reference signal being additionally directly applied to the generator (direct frequency synchronisation without loop H03L 7/24) **[5]**

7/085 • • • concerning mainly the frequency- or phase-detection arrangement including the filtering or amplification of its output signal (H03L 7/10 takes precedence; frequency or phase detection comparison in general H03D 3/00, H03D 13/00) **[5]**

7/087 • • • • using at least two phase detectors or a frequency and phase detector in the loop **[5]**

7/089 • • • • the phase or frequency detector generating up-down pulses (H03L 7/087 takes precedence) **[5]**

7/091 • • • • the phase or frequency detector using a sampling device (H03L 7/087 takes precedence) **[5]**

7/093 • • • • using special filtering or amplification characteristics in the loop (H03L 7/087-H03L 7/091 take precedence) **[5]**

7/095 • • • • using a lock detector (H03L 7/087 takes precedence) **[5]**

7/097 • • • • using a comparator for comparing the voltages obtained from two frequency to voltage converters **[5]**

7/099 • • • concerning mainly the controlled oscillator of the loop **[5]**

7/10 • • • for assuring initial synchronisation or for broadening the capture range **[3]**

7/107 • • • • using a variable transfer function for the loop, e.g. low pass filter having a variable bandwidth **[5]**

7/113 • • • • using frequency discriminator **[5]**

7/12 • • • • using a scanning signal (tuning circuits with automatic scanning over a band of frequencies H03J 7/18) **[3]**

7/14 • • • for assuring constant frequency when supply or correction voltages fail **[3]**

7/16 • • Indirect frequency synthesis, i.e. generating a desired one of a number of predetermined frequencies using a frequency- or phase-locked loop **[3]**

7/18 • • • using a frequency divider or counter in the loop (H03L 7/20, H03L 7/22 take precedence) **[3]**

7/181 • • • • a numerical count result being used for locking the loop, the counter counting during fixed time intervals **[5]**

7/183 • • • • a time difference being used for locking the loop, the counter counting between fixed numbers or the frequency divider dividing by a fixed number **[5]**

7/185 • • • • • using a mixer in the loop (H03L 7/187-H03L 7/195 take precedence) **[5]**

7/187 • • • • • using means for coarse tuning the voltage controlled oscillator of the loop (H03L 7/191-H03L 7/195 take precedence) **[5]**

7/189 • • • • • • comprising a D/A converter for generating a coarse tuning voltage **[5]**

7/191 • • • • • using at least two different signals from the frequency divider or the counter for determining the time difference (H03L 7/193, H03L 7/195 take precedence) **[5]**

7/193 • • • • • the frequency divider/counter comprising a commutable pre-divider, e.g. a two modulus divider (pulse counters/frequency dividers H03K 21/00-H03K 29/00) **[5]**

7/195 • • • • • in which the counter of the loop counts between two different non zero numbers, e.g. for generating an offset frequency (H03L 7/193 takes precedence; pulse counters for predetermined counting H03K 21/00-H03K 29/00) **[5]**

7/197 • • • • a time difference being used for locking the loop, the counter counting between numbers which are variable in time or the frequency divider dividing by a factor variable in time, e.g. for obtaining fractional frequency division **[5]**

7/199 • • • • • with reset of the frequency divider or the counter, e.g. for assuring initial synchronisation **[5]**

7/20 • • • using a harmonic phase-locked loop, i.e. a loop which can be locked to one of a number of harmonically related frequencies applied to it (H03L 7/22 takes precedence) **[3]**

7/22 • • • using more than one loop **[3]**

7/23 • • • • with pulse counters or frequency dividers **[5]**

7/24 • using a reference signal directly applied to the generator **[3]**

7/26 • using energy levels of molecules, atoms, or subatomic particles as a frequency reference **[3]**

9/00 **Automatic control not provided for in other groups of this subclass [2006.01]**

H03M CODING, DECODING OR CODE CONVERSION, IN GENERAL (using fluidic means F15C 4/00; optical analogue/digital converters G02F 7/00; coding, decoding or code conversion, specially adapted for particular applications, see the relevant subclasses, e.g. G01D, G01R, G06F, G06T, G09G, G10L, G11B, G11C, H04B, H04L, H04M, H04N; ciphering or deciphering for cryptography or other purposes involving the need for secrecy G09C) **[4]**

Subclass index

1/00 Analogue/digital conversion; Digital/analogue conversion (conversion of analogue values to or from differential modulation H03M 3/00) **[4]**
1/02 • Reversible analogue/digital converters **[4]**
1/04 • using stochastic techniques **[4]**
1/06 • Continuously compensating for, or preventing, undesired influence of physical parameters (periodically H03M 1/10) **[4]**
1/08 • • of noise **[4]**
1/10 • Calibration or testing **[4]**
1/12 • Analogue/digital converters (H03M 1/02-H03M 1/10 take precedence) **[4]**
1/14 • • Conversion in steps with each step involving the same or a different conversion means and delivering more than one bit **[4]**
1/16 • • • with scale factor modification, i.e. by changing the amplification between the steps **[4]**
1/18 • • Automatic control for modifying the range of signals the converter can handle, e.g. gain ranging **[4]**
1/20 • • Increasing resolution using an n bit system to obtain n + m bits, e.g. by dithering **[4]**
1/22 • • pattern-reading type **[4]**
1/24 • • • using relatively movable reader and disc or strip **[4, 6]**
1/26 • • • • with weighted coding, i.e. the weight given to a digit depends on the position of the digit within the block or code word, e.g. there is a given radix and the weights are powers of this radix **[4]**
1/28 • • • • with non-weighted coding **[4]**
1/30 • • • • • incremental **[4]**
1/32 • • • using cathode-ray tubes **[4]**
1/34 • • Analogue value compared with reference values (H03M 1/48 takes precedence) **[4]**
1/36 • • • simultaneously only, i.e. parallel type **[4]**
1/38 • • • sequentially only, e.g. successive approximation type (converting more than one bit per step H03M 1/14) **[4]**
1/40 • • • • recirculation type **[4]**
1/42 • • • • Sequential comparisons in series-connected stages with no change in value of analogue signal **[4]**
1/44 • • • • Sequential comparisons in series-connected stages with change in value of analogue signal **[4]**
1/46 • • • • with digital/analogue converter for supplying reference values to converter **[4]**
1/48 • • Servo-type converters **[4]**
1/50 • • with intermediate conversion to time interval (H03M 1/64 takes precedence) **[4]**
1/52 • • • Input signal integrated with linear return to datum **[4]**
1/54 • • • Input signal sampled and held with linear return to datum **[4]**
1/56 • • • Input signal compared with linear ramp **[4]**
1/58 • • • Non-linear conversion **[4]**
1/60 • • with intermediate conversion to frequency of pulses **[4]**
1/62 • • • Non-linear conversion **[4]**
1/64 • • with intermediate conversion to phase of sinusoidal signals **[4]**
1/66 • Digital/analogue converters (H03M 1/02-H03M 1/10 take precedence) **[4]**
1/68 • • with conversions of different sensitivity, i.e. one conversion relating to the more significant digital bits and another conversion to the less significant bits **[4]**
1/70 • • Automatic control for modifying converter range **[4]**
1/72 • • Sequential conversion in series-connected stages (H03M 1/68 takes precedence) **[4]**
1/74 • • Simultaneous conversion **[4]**
1/76 • • • using switching tree **[4]**
1/78 • • • using ladder network **[4]**
1/80 • • • using weighted impedances (H03M 1/76 takes precedence) **[4]**
1/82 • • with intermediate conversion to time interval **[4]**
1/84 • • • Non-linear conversion **[4]**
1/86 • • with intermediate conversion to frequency of pulses **[4]**
1/88 • • • Non-linear conversion **[4]**

3/00 Conversion of analogue values to or from differential modulation [4]
3/02 • Delta modulation, i.e. one-bit differential modulation **[4]**
3/04 • Differential modulation with several bits **[4]**

5/00 Conversion of the form of the representation of individual digits [4]

Note(s)

In groups H03M 5/02-H03M 5/22, in the absence of an indication to the contrary, classification is made in the last appropriate place.

5/02 • Conversion to or from representation by pulses **[4]**
5/04 • • the pulses having two levels **[4]**
5/06 • • • Code representation, e.g. transition, for a given bit cell depending only on the information in that bit cell **[4]**
5/08 • • • • Code representation by pulse width **[4]**
5/10 • • • • Code representation by pulse frequency **[4]**
5/12 • • • • Biphase level code, e.g. split phase code, Manchester code; Biphase space or mark code, e.g. double frequency code **[4]**
5/14 • • • Code representation, e.g. transition, for a given bit cell depending on the information in one or more adjacent bit cells, e.g. delay modulation code, double density code **[4]**
5/16 • • the pulses having three levels **[4]**
5/18 • • • two levels being symmetrical with respect to the third level, i.e. balanced bipolar ternary code **[4]**
5/20 • • the pulses having more than three levels **[4]**
5/22 • Conversion to or from representation by sinusoidal signals **[4]**

7/00 Conversion of a code where information is represented by a given sequence or number of digits to a code where the same information is represented by a different sequence or number of digits [4]

Note(s)

In groups H03M 7/02-H03M 7/30, in the absence of an indication to the contrary, classification is made in the last appropriate place.

7/02 • Conversion to or from weighted codes, i.e. the weight given to a digit depending on the position of the digit within the block or code word **[4]**
7/04 • • the radix thereof being two **[4]**
7/06 • • the radix thereof being a positive integer different from two **[4]**
7/08 • • • the radix being ten, i.e. pure decimal code **[4]**
7/10 • • the radix thereof being negative **[4]**
7/12 • • having two radices, e.g. binary-coded-decimal code **[4]**
7/14 • Conversion to or from non-weighted codes **[4]**
7/16 • • Conversion to or from unit-distance codes, e.g. Gray code, reflected binary code **[4]**
7/18 • • Conversion to or from residue codes **[4]**
7/20 • • Conversion to or from n-out-of-m codes **[4]**
7/22 • • • to or from one-out-of-m codes **[4]**
7/24 • • Conversion to or from floating-point codes **[4]**
7/26 • Conversion to or from stochastic codes **[4]**
7/28 • Programmable structures, i.e. where the code converter contains apparatus which is operator-changeable to modify the conversion process **[4]**
7/30 • Compression (speech analysis-synthesis for redundancy reduction G10L 19/00; for image communication H04N); Expansion; Suppression of unnecessary data, e.g. redundancy reduction **[4]**
7/32 • • Conversion to or from delta modulation, i.e. one-bit differential modulation **[4]**
7/34 • • • adaptive **[4]**
7/36 • • Conversion to or from differential modulation with several bits, i.e. the difference between successive samples being coded by more than one bit **[4]**
7/38 • • • adaptive **[4]**
7/40 • • Conversion to or from variable length codes, e.g. Shannon-Fano code, Huffman code, Morse code **[4]**
7/42 • • • using table look-up for the coding or decoding process, e.g. using read-only memory **[4]**
7/44 • • • Suppression of irrelevant zeroes **[4]**
7/46 • • Conversion to or from run-length codes, i.e. by representing the number of consecutive digits, or groups of digits, of the same kind by a code word and a digit indicative of that kind **[4]**
7/48 • • • alternating with other codes during the code conversion process, e.g. run-length coding being performed only as long as sufficiently long runs of digits of the same kind are present **[4]**
7/50 • • Conversion to or from non-linear codes, e.g. companding **[4]**

9/00 Parallel/series conversion or <u>vice versa</u> (digital stores in which the information is moved stepwise G11C 19/00) **[4]**

11/00 Coding in connection with keyboards or like devices, i.e. coding of the position of operated keys (keyboard switch arrangements, structural association of coders and keyboards H01H 13/70, H03K 17/94) **[4]**

11/02 • Details **[5]**
11/04 • • Coding of multifunction keys **[5]**
11/06 • • • by operating the multifunction key itself in different ways **[5]**
11/08 • • • • by operating selected combinations of multifunction keys **[5]**
11/10 • • • • by methods based on duration or pressure detection of keystrokes **[5]**
11/12 • • • • by operating a key a selected number of consecutive times whereafter a separate enter key is used which marks the end of the series **[5]**
11/14 • • • by using additional keys, e.g. shift keys, which determine the function performed by the multifunction key **[5]**
11/16 • • • • wherein the shift keys are operated after the operation of the multifunction keys **[5]**
11/18 • • • • wherein the shift keys are operated before the operation of the multifunction keys **[5]**
11/20 • Dynamic coding, i.e. by key scanning (H03M 11/26 takes precedence) **[5]**
11/22 • Static coding (H03M 11/26 takes precedence) **[5]**
11/24 • • using analogue means **[5]**
11/26 • using opto-electronic means **[5]**

13/00 Coding, decoding or code conversion, for error detection or error correction; Coding theory basic assumptions; Coding bounds; Error probability evaluation methods; Channel models; Simulation or testing of codes (error detection or error correction for analogue/digital, digital/analogue or code conversion H03M 1/00-H03M 11/00; specially adapted for digital computers G06F 11/08, for information storage based on relative movement between record carrier and transducer G11B, e.g. G11B 20/18, for static stores G11C) **[4, 7]**

13/01 • Coding theory basic assumptions; Coding bounds; Error probability evaluation methods; Channel models; Simulation or testing of codes **[7]**

13/03 • Error detection or forward error correction by redundancy in data representation, i.e. code words containing more digits than the source words **[7]**

13/05 • • using block codes, i.e. a predetermined number of check bits joined to a predetermined number of information bits **[7]**

13/07 • • • Arithmetic codes **[7]**

13/09 • • • Error detection only, e.g. using cyclic redundancy check (CRC) codes or single parity bit **[7]**

13/11 • • • using multiple parity bits **[7]**

13/13 • • • Linear codes **[7]**

13/15 • • • • Cyclic codes, i.e. cyclic shifts of codewords produce other codewords, e.g. codes defined by a generator polynomial, Bose-Chaudhuri-Hocquenghem (BCH) codes (H03M 13/17 takes precedence) **[7]**

13/17 • • • • Burst error correction, e.g. error trapping, Fire codes **[7]**

13/19 • • • • Single error correction without using particular properties of the cyclic codes, e.g. Hamming codes, extended or generalised Hamming codes **[7]**

13/21 • • • Non-linear codes, e.g. m-bit data word to n-bit code word (mBnB) conversion with error detection or error correction **[7]**

13/23 • • using convolutional codes, e.g. unit memory codes **[7]**

13/25 • Error detection or forward error correction by signal space coding, i.e. adding redundancy in the signal constellation, e.g. Trellis Coded Modulation (TCM) **[7]**

13/27 • using interleaving techniques **[7]**

13/29 • combining two or more codes or code structures, e.g. product codes, generalised product codes, concatenated codes, inner and outer codes **[7]**

13/31 • combining coding for error detection or correction and efficient use of the spectrum (without error detection or correction H03M 5/14) **[7]**

13/33 • Synchronisation based on error coding or decoding **[7]**

13/35 • Unequal or adaptive error protection, e.g. by providing a different level of protection according to significance of source information or by adapting the coding according to the change of transmission channel characteristics **[7]**

13/37 • Decoding methods or techniques, not specific to the particular type of coding provided for in groups H03M 13/03-H03M 13/35 **[7]**

13/39 • • Sequence estimation, i.e using statistical methods for the reconstruction of the original codes **[7]**

13/41 • • • using the Viterbi algorithm or Viterbi processors **[7]**

13/43 • • Majority logic or threshold decoding **[7]**

13/45 • • Soft decoding, i.e. using symbol reliability information (H03M 13/41 takes precedence) **[7]**

13/47 • Error detection, forward error correction or error protection, not provided for in groups H03M 13/01-H03M 13/37 **[7]**

13/49 • • Unidirectional error detection or correction **[7]**

13/51 • • Constant weight codes; n-out-of-m codes; Berger codes **[7]**

13/53 • • Codes using Fibonacci numbers series **[7]**

99/00 Subject matter not provided for in other groups of this subclass [2006.01]