CPC  COOPERATIVE PATENT CLASSIFICATION

H  ELECTRICITY
   (NOTE omitted)

H03  BASIC ELECTRONIC CIRCUITRY

H03K  PULSE TECHNIQUE (measuring pulse characteristics G01R; mechanical counters having an electrical input G06M; information storage devices in general G11; sample-and-hold arrangements in electric analogue stores G11C 27/02; construction of switches involving contact making and breaking for generation of pulses, e.g. by using a moving magnet, H01H; static conversion of electric power H02M; generation of oscillations by circuits employing active elements which operate in a non-switching manner H03B; modulating sinusoidal oscillations with pulses H03C, H04L; discriminator circuits involving pulse counting H03D; automatic control of generators H03L; starting, synchronisation or stabilisation of generators where the type of generator is irrelevant or unspecified H03L; coding, decoding or code conversion in general H03M)

NOTES
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 braking;
   • 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.

WARNINGS
1. The following IPC groups are not in the CPC scheme. The subject matter for these IPC groups is classified in the following CPC groups:
   H03K 17/695 covered by H03K 17/687
2. In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

3/00  Circuits for generating electric pulses; Monostable, bistable or multistable circuits (H03K 4/00 takes precedence; for digital computers G06F 1/025, [G06F 1/041])
   3/01  .  Details
   3/011  .  Modifications of generator to compensate for variations in physical values, e.g. voltage, temperature {to maintain energy constant H03K 3/015}
   3/012  .  Modifications of generator to improve response time or to decrease power consumption
   3/013  .  Modifications of generator to prevent operation by noise or interference
   3/014  .  Modifications of generator to ensure starting of oscillations
   3/015  .  Modifications of generator to maintain energy constant
   3/017  .  Adjustment of width or dutycycle of pulses (pulse width modulation H03K 7/08 {to maintain energy constant H03K 3/015})

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
   3/023  .  by the use of differential amplifiers or comparators, with internal or external positive feedback
   3/0231  .  .  Astable circuits {H03K 3/0315 takes precedence}
   3/02315  .  .  .  [Stabilisation of output, e.g. using crystal]
   3/0232  .  .  .  Monostable circuits
   3/0233  .  .  .  Bistable circuits
   3/02332  .  .  .  .  [of the master-slave type]
3/0235 . . . . [provided with means for increasing reliability; for protection; for ensuring a predetermined initial state when the supply voltage has been applied; for storing the actual state when the supply voltage fails (digital storage cells each combining volatile and non-volatile storage properties G11C 14/00)]

3/0237 . . . . [Bistables with hysteresis, e.g. Schmitt trigger (non-regenerative amplitude discriminators G01R 19/165)]

3/0234 . . . . Multistable circuits
3/027 . . . . by the use of logic circuits, with internal or external positive feedback
3/03 . . . . . . Astable circuits
3/0307 . . . . [Stabilisation of output, e.g. using crystal]
3/0315 . . . . [Ring oscillators]
3/0322 . . . . [with differential cells]
3/033 . . . . Monostable circuits
3/037 . . . . Bistable circuits
3/0372 . . . . [of the master-slave type]
3/0375 . . . . [provided with means for increasing reliability; for protection; for ensuring a predetermined initial state when the supply voltage has been applied; for storing the actual state when the supply voltage fails (digital storage cells each combining volatile and non-volatile storage properties G11C 14/00)]

3/0377 . . . . [Bistables with hysteresis, e.g. Schmitt trigger (non-regenerative amplitude discriminators G01R 19/165)]

3/038 . . . . Multistable circuits
3/04 . . . . by the use, as active elements, of vacuum tubes only, with positive feedback (H03K 3/023, H03K 3/027 take precedence)
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
3/10 . . . . . . . monostable
3/12 . . . . . . . bistable
3/13 . . . . . . . Bistables with hysteresis, e.g. Schmitt trigger
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)
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
3/2821 . . . . [Emitters connected to one another by using a capacitor]

3/2823 . . . . [using two active transistor of the same conductivity type (H03K 3/2821 takes precedence)]
3/2825 . . . . [in an asymmetrical circuit configuration]
3/2826 . . . . [using two active transistors of the complementary type (H03K 3/2821 take precedence)]
3/2828 . . . . [in an asymmetrical circuit configuration]
3/283 . . . . Stabilisation of output, e.g. using crystal
3/284 . . . . monostable
3/286 . . . . bistable
3/2865 . . . . [ensuring a predetermined initial state when the supply voltage has been applied; storing the actual state when the supply voltage fails (digital storage cells each combining volatile and non-volatile storage properties G11C 14/00)]

3/287 . . . . using additional transistors in the feedback circuit (H03K 3/289 takes precedence)
3/288 . . . . using additional transistors in the input circuit (H03K 3/289 takes precedence)
3/2885 . . . . the input circuit having a differential configuration
3/289 . . . . of the master-slave type
3/2893 . . . . Bistables with hysteresis, e.g. Schmitt trigger
3/2897 . . . . with an input circuit of differential configuration
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
3/315 . . . . 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)
3/351 . . . . the devices being unijunction transistors (H03K 3/352 takes precedence)
3/352 . . . . the devices being thyristors
3/3525 . . . . Anode gate thyristors or programmable unijunction transistors
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)
3/354 . . . . Astable circuits
3/3545 . . . . [Stabilisation of output, e.g. using crystal]
3/355 . . . . Monostable circuits
Bistable circuits

[ensuring a predetermined initial state when the supply voltage has been applied; storing the actual state when the supply voltage fails (digital storage cells each combining volatile and non-volatile storage properties G11C 14/00)]

[using additional transistors in the input circuit (H03K 3/356104, H03K 3/3562 take precedence)]

(with synchronous operation (H03K 3/356034, H03K 3/356052 take precedence))

[the input circuit having a differential configuration]

(with synchronous operation)

(using pass gates)

[using additional transistors in the feedback circuit (H03K 3/356104, H03K 3/3562 take precedence)]

(with synchronous operation)

[using complementary field-effect transistors (H03K 3/35625 takes precedence)]

[using additional transistors in the input circuit]

(with synchronous operation (H03K 3/35613, H03K 3/356147 take precedence))

[the input circuit having a differential configuration]

(with synchronous operation)

(using pass gates)

(with synchronous operation)

[using additional transistors in the feedback circuit]

(with synchronous operation)

[using additional means for controlling the main nodes (H03K 3/356104, H03K 3/3562 take precedence)]

[using pass gates]

[using additional means for controlling the main nodes]

(with synchronous operation)

of the master-slave type

[using complementary field-effect transistors]

Bistables with hysteresis, e.g. Schmitt trigger

Multistable circuits

by the use, as active elements, of bulk negative resistance devices, e.g. Gunn-effect devices

by the use, as active elements, of semiconductors, not otherwise provided for

by the use, as active elements, of gas-filled tubes, e.g. astable trigger circuits (H03K 3/55 takes precedence)

by the use, as active elements, of superconductive devices

by the use, as active elements, of electrochemical cells

by the use, as active elements, of opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled

by the use, as active elements, of beam deflection tubes

by the use, as active elements, of non-linear magnetic or dielectric devices

[using thin films]

the devices being parametrons

the devices being ferro-resonant

the devices being multi-aperture magnetic cores, e.g. transfluxors

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 ; working of metal by electro-erosion with spark discharge B23H; for internal combustion engine ignition systems F02P 3/08; electronic lighters F23Q 2/285, F23Q 3/00; flash lamps H05B 41/30)]

the switching device being a spark gap

the switching device being a vacuum tube

the switching device being a gas-filled tube having a control electrode

the switching device being a semiconductor device

by the use of galvano-magnetic devices, e.g. Hall effect devices

Generators producing trains of pulses, i.e. finite sequences of pulses

by interrupting the output of a generator

time intervals between all adjacent pulses of one train being equal

with means for varying repetition rate of trains

Generating a single train of pulses having a predetermined pattern, e.g. a predetermined number

Generating trains of sinusoidal oscillations (by interrupting H03C, H04L)

Generating pulses having a predetermined statistical distribution of a parameter, e.g. random pulse generators

Generating pulses by means of delay lines and not covered by the preceding subgroups

Generators producing trains of pulses, i.e. finite sequences of pulses from deflection waveforms H04N 3/18)

having stepped portions, e.g. staircase waveform

(by repetitive charge or discharge of a capacitor, analogue generators)

(using digital techniques)

having parabolic shape

having triangular shape

[high voltage - or current generators]

[using a Miller-integrator (H03K 4/08 takes precedence)]

having sawtooth shape

(Protection of sawtooth generators)

using as active elements vacuum tubes only

in which a sawtooth voltage is produced

(Protection of sawtooth generators)

using as active elements vacuum tubes only

in which a sawtooth voltage is produced across a capacitor

using two tubes so coupled that the input of each one is derived from the output of the other, e.g. multivibrator (multivibrator generating other pulses H03K 3/00)
through an inductor in which a sawtooth current is produced
across a capacitor in which a sawtooth voltage is produced
through an inductor in which a sawtooth current is produced
a switching device using a semiconductor device operating as
Boot-strap generators
Miller integrator
negative feedback through a capacitor, e.g. using a semiconductor device with
oscillators generating other pulses H03K 3/00
positive feedback through a transformer, e.g. using a single tube exhibiting negative resistance between two of its electrodes, e.g. transitron, dynatron combined with Miller integrator using as active elements semiconductor devices with two electrodes and exhibiting a negative resistance characteristic
using tunnel diodes
using as active elements multi-layer diodes
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
using as active elements gas-filled tubes (or spark-gaps)
using as active elements electrochemical cells (or galvano-magnetic or photo-electric elements)
Linearisation of ramp (modifying slopes of pulses H03K 6/04; scanning correction for television receivers H04N 3/16); Synchronisation of pulses (in pictorial communication systems H04N 1/36, H04N 5/04; colour synchronisation H04N 9/44)

Manipulating pulses not covered by one of the other main groups in 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
In this group, the input signals are of the pulse type.

{ Changing the frequency (modulating pulses H03K 7/00; frequency dividers H03K 21/00 - H03K 29/00; additive or subtractive mixing of two pulse rates into one G06F 7/605; pulse rate dividers G06F 7/68)
Delay, i.e. output pulse is delayed after input pulse and pulse length of output pulse is dependent on pulse length of input pulse

{ Variable delay }

{ Controlled by an analog electrical signal, e.g. obtained after conversion by a D/A converter }

{ Dc control of switching transistors }

{ Having four transistors serially }

{ Dc voltage control of a capacitor or of the coupling of a capacitor as a load }

{ By mixing the outputs of fixed delayed signals with each other or with the input signal }

{ Controlled by a digital setting }

{ By current control, e.g. by parallel current control transistors }

{ By adding capacitance as a load }

{ Fixed delay }

{ By trimming or adjusting the delay }

{ Using fuse links }

{ Avoiding variations of delay using feedback, e.g. controlled by a PLL }

{ Using a reference signal, e.g. a reference clock }

{ Using a separate time interval to calibrate the delay }

{ Avoiding variations of delay due to line termination }

{ Avoiding variations of delay due to integration tolerances }

{ Avoiding variations of delay due to power supply }

{ Avoiding asymmetry of delay for leading or trailing edge; Avoiding variations of delay due to threshold }

{ Avoiding variations of delay due to temperature }

{ Layout of the delay element }

{ Using opamps, comparators, voltage multipliers or other analog building blocks }

{ Using bipolar transistors }

{ Using current mirrors }

{ Using differential stages }

{ Using constant current sources }

{ In BiCMOS technology }

{ Using FET's }

{ Using current mirrors }

{ Using differential stages }

{ Where the conduction path of multiple FET's is in parallel or in series, all having the same gate control }

{ Where the conduction path of the different output FET's is connected in parallel with different gate control, e.g. having different sizes or thresholds, or coupled through different resistors }

{ Having complementary input and output signals }

{ Using circuits having two logic levels }

{ Using shift registers }

{ Using counters }

{ Using microprocessors }

{ Using memories or FIFO's }

{ Using D/A or A/D converters }

{ Using digital comparators }

{ Using varicaps, e.g. gate capacity of a FET with specially defined threshold, as delaying capacitors }

{ Phase shifter, i.e. the delay between the output and input pulse is dependent on the frequency, and such that a phase difference is obtained independent of the frequency }

{ Output pulse is a delayed pulse issued after a rising or a falling edge, the length of the output pulse not being in relation with the length of the input triggering pulse }

{ Changing the DC level (television signals H04N 3/00) }

{ Base line stabilisation (thresholding H03K 5/08) }

{ Shaping pulses (discrimination against noise or interference H03K 5/125) }

{ By amplifying (H03K 5/04 takes precedence; wide-band amplifiers in general H03P) }

{ Using field effect transistors }

{ With a bidirectional operation }

{ By increasing duration; by decreasing duration }

{ By the use of clock signals or other time reference signals }

{ By the use of delay lines or other analogue delay elements }

{ Using dispersive delay lines }

{ By the use of resonant circuits }

{ 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) }

{ With an adaptive threshold }

{ Modified by switching, e.g. by a periodic signal or by a signal in synchronism with the transitions of the output signal }

{ Generated by feedback }

{ Modified by switching, e.g. by a periodic signal or by a signal in synchronism with the transitions of the output signal }

{ By steepening leading or trailing edges }

{ Discriminating pulses (measuring or indicating G01R 23/00; G01R 25/00; G01R 29/00; separation of synchronising signals in television systems H04N 5/08) }

{ Suppression or limitation of noise or interference (specially adapted for transmission systems H04B 15/00; H04L 25/08) }

{ Specially adapted for pulses generated by closure of switches, i.e. anti-bouncing devices (debouncing circuits for electronic time-pieces G04G 5/00) }

{ Arrangements having a single output and transforming input signals into pulses delivered at desired time intervals (measuring time intervals using electronic timing, e.g. counting means G04F 1/005) }

{ Digitally controlled }

{ Using a chain of active delay devices }

{ With field-effect transistors }

{ By the use of time reference signals, e.g. clock signals }
Arrangements in which pulses are delivered at different times at several outputs, i.e. pulse distributors (distributing, switching or gating arrangements H03K 17/00)

5/15006 . . . { with two programmable outputs }
5/15013 . . . { with more than two outputs }
5/1502 . . . { programmable }
5/15026 . . . { with asynchronously driven series connected output stages }
5/15033 . . . . { using a chain of bistable devices }
5/1504 . . . . . { using a chain of active delay devices (H03K 5/15053 takes precedence) }
5/15046 . . . . { using a tapped delay line }
5/15053 . . . . { using a chain of monostable devices }
5/1506 . . . . . { with parallel driven output stages; with synchronously driven series connected output stages }
5/15066 . . . . . { using bistable devices (H03K 5/15093 takes precedence) }
5/15073 . . . . . { using a plurality of comparators }
5/1508 . . . . . { using a plurality of delay lines }
5/15086 . . . . . { using a plurality of monostable devices }
5/15093 . . . . . { using devices arranged in a shift register }
5/151 . . . . . . { with two complementary outputs }
5/1515 . . . . { non-overlapping }
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 (measuring characteristics of individual pulses G01R 29/02))
5/1532 . . . . { combined modulation, e.g. rate modulation and frequency modulation }
5/1534 . . . . { utilizing bipolar transistors (H03K 5/2436 takes precedence) }
5/1536 . . . . . . { using technology for producing and combining sinusoidal waveforms (combining sinewaves using elements operating in a non-switching manner H03B; limiting or clipping, e.g. H03G 11/001) }
5/156 . . . Arrangements in which a continuous pulse train is transformed into a train having a desired pattern
5/1565 . . . . . . { the output pulses having a constant duty cycle }
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)
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)
5/24 . . . { combined modulation, e.g. rate modulation and frequency modulation }
5/2409 . . . . . { using bipolar transistors (H03K 5/2436 takes precedence) }
5/2418 . . . . . . . { with at least one differential stage }
5/2427 . . . . . . . { using clock signals }
5/2436 . . . . . . . { using a combination of bipolar and field-effect transistors }
5/2445 . . . . . . . . . . . { with at least one differential stage }
5/2454 . . . . . . . { using clock signals }
5/2463 . . . . { using diodes }
5/2472 . . . . . . . { using field effect transistors (H03K 5/2436 takes precedence) }
5/2481 . . . . . . { with at least one differential stage }
5/249 . . . . . . . { using clock signals }
5/26 . . . { the characteristic being duration, interval, position, frequency, or sequence }

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)

6/02 . Amplifying pulses { (generation of a sawtooth current through an inductor by amplification H03K 4/28, H03K 4/39, H03K 4/43, H03K 4/62, H03K 4/69) }
6/04 . Modifying slopes of pulses, { e.g. S-correction }

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 { Duty cycle 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 { or of duty-cycle modulated pulses }
9/10 . of pulses having combined modulation

11/00 Transforming types of modulations, e.g. position-modulated pulses into duration-modulated pulses
12/00 Producing pulses by distorting or combining sinusoidal waveforms (combining sinewaves using elements operating in a non-switching manner H03B; limiting or clipping, e.g. H03G 11/001)
Modifications for increasing the maximum permissible switched voltage

Modifications for protecting switching circuit against overcurrent or overvoltage

Modifications for ensuring a fully conducting state

Modifications for ensuring a predetermined initial state

Modifications for indicating state of switch

Modifications for providing a predetermined state

Modifications for ensuring a predetermined initial state when the supply voltage has been applied (bistable generators H03K 3/12)

Storing the actual state when the supply voltage fails

Modifications for temporary blocking after receipt of control pulses

Time-programme switches providing a choice of time-intervals for executing more than one switching action H03K 17/296; {measuring time intervals using electronic timing, e.g. counting means G04F 1/005)

in field effect transistor switches

tube switches

in thyristor, unijunction transistor or programmable unijunction transistor switches

Time-programme switches providing 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 against excessive temperature)

without feedback from the output circuit to the control circuit

by measures taken in the output circuit

by feedback from the output circuit to the control circuit

by feedback from the output circuit to the control circuit [H03K 17/0403, H03K 17/0406 take precedence]

by feedback from the output circuit to the control circuit

Modifications for ensuring a fully conducting state

Modifications for ensuring a predetermined initial state

Modifications for providing a predetermined state

Modifications for indicating state of switch

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Time-programme switches providing 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 against excessive temperature)

without feedback from the output circuit to the control circuit

by feedback from the output circuit to the control circuit

by feedback from the output circuit to the control circuit [H03K 17/0403, H03K 17/0406 take precedence]

by feedback from the output circuit to the control circuit

Modifications for ensuring a fully conducting state

Modifications for ensuring a predetermined initial state

Modifications for providing a predetermined state

Modifications for indicating state of switch

Modifications for ensuring a predetermined initial state when the supply voltage has been applied (bistable generators H03K 3/12)

Storing the actual state when the supply voltage fails

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in field effect transistor switches

tube switches

in thyristor, unijunction transistor or programmable unijunction transistor switches

Time-programme switches providing 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 against excessive temperature)
CPC - 2019.05

17/567 . . . Circuits characterised by the use of more than one type of semiconductor device, e.g. BIMOS, composite devices such as IGBT

17/58 . . . using tunnel diodes

17/60 . . . using bipolar transistors

17/601 . . . [using transformer coupling (H03K 17/61 takes precedence)]

17/602 . . . [in integrated circuits]

17/603 . . . [with coupled emitters]

17/605 . . . with galvanic isolation between the control circuit and the output circuit (H03K 17/78 takes precedence)

17/61 . . . using transformer coupling

17/615 . . . in a Darlington configuration

17/62 . . . Switching arrangements with several input- or output-terminals (code converters H03M 5/00, H03M 7/00)

17/6207 . . . { without selecting means (H03K 17/6242 - H03K 17/6285 take precedence) }

17/6214 . . . { using current steering means }

17/6221 . . . { combined with selecting means (H03K 17/6242 - H03K 17/6285 take precedence) }

17/6228 . . . { using current steering means }

17/6235 . . . [ with storage of control signal ]

17/6242 . . . [ with several inputs only and without selecting means ]

17/625 . . . { using current steering means }

17/6257 . . . { with several inputs only combined with selecting means }

17/6264 . . . { using current steering means }

17/6271 . . . { with several outputs only and without selecting means }

17/6278 . . . { using current steering means }

17/6285 . . . { with several outputs only combined with selecting means }

17/6292 . . . { using current steering means }

17/64 . . . having inductive loads { (driving circuits for electromagnets making use of a switching regulator provisionally in H01H 47/325) }

17/66 . . . Switching arrangements for passing the current in either direction at will; Switching arrangements for reversing the current at will

17/661 . . . { connected to both load terminals }

17/662 . . . { each output circuit comprising more than one controlled bipolar transistor }

17/663 . . . { using complementary bipolar transistors }

17/664 . . . [ in a symmetrical configuration ]

17/665 . . . { connected to one load terminal only }

17/666 . . . { the output circuit comprising more than one controlled bipolar transistor }

17/667 . . . { using complementary bipolar transistors }

17/668 . . . [ in a symmetrical configuration ]

17/68 . . . specially adapted for switching ac currents or voltages

17/687 . . . using field-effect transistors

17/6871 . . . [ the output circuit comprising more than one controlled field-effect transistor ]

17/6872 . . . [ using complementary field-effect transistors ]

17/6874 . . . { in a symmetrical configuration }

17/6875 . . . { using self-conductive, depletion FETs }

17/6877 . . . { the control circuit comprising active elements different from those used in the output circuit }

17/6878 . . . { using multi-gate field-effect transistors }

17/689 . . . { with galvanic isolation between the control circuit and the output circuit (H03K 17/78 takes precedence) }

17/695 . . . { using acoustic means }

17/691 . . . { using transformer coupling }

17/693 . . . Switching arrangements with several input- or output-terminals (code converters H03M 5/00, H03M 7/00)

17/70 . . . having two electrodes and exhibiting negative resistance (using tunnel diodes H03K 17/58)

17/72 . . . having more than two PN junctions; having more than three electrodes; having more than one electrode connected to the same conductivity region

17/722 . . . { with galvanic isolation between the control circuit and the output circuit (H03K 17/78 takes precedence) }

17/725 . . . { using acoustic means }

17/723 . . . { using transformer coupling }

17/725 . . . { for ac voltages or currents (H03K 17/722, H03K 17/735 take precedence) }

17/73 . . . { for dc voltages or currents (H03K 17/722, H03K 17/735 take precedence) }

17/731 . . . { with inductive load }

17/732 . . . Measures for enabling turn-off

17/735 . . . Switching arrangements with several input- or output-terminals (H03K 17/722 takes precedence)

17/74 . . . using diodes { (using a combination of diodes and other devices H03K 17/567; using tunnel diodes H03K 17/58) }

17/76 . . . Switching arrangements with several input- or output-terminals (code converters H03M 5/00, H03M 7/00)

17/78 . . . using opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled

17/785 . . . controlling field-effect transistor switches

17/79 . . . controlling (bipolar) semiconductor switches with more than two PN-junctions, or more than three electrodes, or more than one electrode connected to the same conductivity region

17/795 . . . controlling bipolar transistors

17/7955 . . . { using phototransistors }

17/80 . . . { using non-linear magnetic devices; using non-linear dielectric devices (H03K 17/95, H03K 17/97 take precedence) }

17/81 . . . Switching arrangements with several input- or output-terminals (code converters H03M 5/00, H03M 7/00)

17/82 . . . { using transfluxors }

17/84 . . . using thin-film devices

17/86 . . . { using twisters }

17/88 . . . using beam-deflection tubes

17/90 . . . using galvano-magnetic devices, e.g. Hall effect devices (H03K 17/95, H03K 17/97 take precedence)

17/92 . . . { using superconductive devices }

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characterised by the way in which the control signal is generated (mechanical structural details of control members of switches or keyboards, such as keys, push-buttons, levers or other mechanisms for transferring force to the activated elements, not directly producing electronic effects H01H; keyboards for special applications, see the relevant places, e.g. B41J, G06F 30/23, H04L 15/00, H04L 17/00, H04M 10/00).

Proximity switches (H03K 17/96 takes precedence; proximity fuzes F42C 13/00; detecting masses or objects, e.g. by using a magnetic or optical detector G01V, e.g. G01V 3/00, G01V 8/10).

Constructional details (of proximity switches using a magnetic detector H03K 17/9505).

Using a magnetic detector

[Measures for increasing reliability]
[Constructional details]

[With illumination]

[Measures for supplying operating voltage to the detector circuit]

[Using digital techniques]

[Using non-linear magnetic devices]

[Using galvanomagnetic devices]

[Using inductive coils]

[With a galvanically isolated probe]

[Controlled by an oscillatory signal (H03K 17/9537 takes precedence)]

[Details of coils in the emitter or receiver; Magnetic detector comprising emitting and receiving coils]

[Forming part of an oscillator (H03K 17/9537 takes precedence)]

[With variable frequency]

[With variable amplitude]

[In a resonant circuit]

[Controlled by an oscillatory signal]

[Forming part of an oscillator]

[With variable frequency]

[With variable amplitude]

Using a capacitive detector

Touch switches

Characterised by the type or shape of the sensing electrodes

Characterised by the number of electrodes

[Using one electrode only per touch switch]

[Where the electrode is the object to be switched]

[Where the electrode is a plant]

[Using two electrodes per touch switch]

[Using three electrodes per touch switch]

[Using a plurality of detectors, e.g. keyboard]

[Capacitive touch switches]

[Using a plurality of detectors, e.g. keyboard]

[Using a force resistance transducer]

[Optical touch switches]

Logic circuits, i.e. having at least two inputs acting on one output; Inverting circuits (inverting circuits used as delay elements H03K 5/13).

[Multistate logic (H03K 19/02 takes precedence)]

[Modifications of input or output impedance]

[Arrangements for reducing power consumption]

[in bipolar transistor circuits]

[in field effect transistor circuits]

(by using a control or a clock signal, e.g. in order to apply power supply)

(by energy recovery or adiabatic operation)

[Modifications of threshold (for electronic switching or gating H03K 17/30)]

[in bipolar transistor circuits]

[in field effect transistor circuits]

[Modifications for increasing the reliability {for protection}]

[in bipolar transistor circuits]

[in field-effect transistor circuits]

[Delay compensation]

[Radiation hardening]

[in field effect transistor circuits]

[Modifications for eliminating interference or parasitic voltages or currents]

[in bipolar transistor circuits]

[in field effect transistor circuits]

[Modifications for compensating variations of temperature, supply voltage or other physical parameters]
fail-safe circuits

modifications for accelerating switching

in field-effect transistor circuits

in asynchronous circuits

{ by bootstrapping, i.e. by positive feedback }

[by means of a pull-up or down element]

using a combination of bipolar and field effect transistors [BIFET]

{ with at least one differential stage }

{ using opto-electronic devices }

{ Coupling arrangements; Impedance matching circuits }

{ using a combination of bipolar and field effect transistors [BIFET] }

{ with at least one differential stage }

{ using opto-electronic devices }

{ programmable }

{ with a bidirectional operation }

using bipolar transistors only

{ Interface arrangements }

{ with at least one differential stage }

{ for integrated injection logic (I2L) }

{ Coupling arrangements, Impedance matching circuits }

{ with at least one differential stage }

{ programmable }

{ with a bidirectional operation }

using field effect transistors only

{ Interface arrangements }

{ with at least one differential stage }

{ programmable }

{ with a bidirectional operation }

using field effect transistors

{ Coupling arrangements; Impedance matching circuits }

{ with at least one differential stage }

{ of complementary type, e.g. CMOS }

{ with at least one differential stage }

{ of Schottky barrier type [MESFET] }

{ with at least one differential stage }

{ synchronous, i.e. using clock signals }

{ Coupling arrangements; Impedance matching circuits }

{ with at least one differential stage }

{ of complementary type, e.g. CMOS }

{ with at least one differential stage }

{ programmable }

{ with a bidirectional operation }

using specified components

{ Diode transistor logic }

{ Complementary transistor logic [CTL] }

{ Schottky transistor logic [STL] }

Emitter coupled logic

Transistor-transistor logic

Resistor-transistor logic

Integrated injection logic or merged transistor logic

{ Static induction logic [STIL] (when the logic function is fullfilled by a fet }

{ of the same canal type }

{ of complementary type }

{ with gate injection or static induction }

{ in combination with bipolar transistors }

{ Diode field-effect transistor logic }

{ using field-effect transistors }

{ integrated injection field-effect transistors }

{ using junction field-effect transistors }

{ of the same canal type }

{ of complementary type }

{ with source coupled logic }

{ Source coupled field-effect logic [SCFL] }

using MOSFET { or insulated gate field-effect transistors, i.e. IGFET } }

{ Multistate logic }

{ one of the states being the high impedance or floating state }

{ of the states being the high impedance or floating state }

{ with coupled sources or source coupled logic }

{ Source coupled field-effect logic [SCFL] }

using MOSFET { insulated gate field-effect transistors, i.e. IGFET }

Multistate logic (H03K 19/096 takes precedence)

{ of the states being the high impedance or floating state }

{ using a combination of enhancement and depletion transistors }

{ using only depletion transistors }

{ in combination with bipolar transistors [BIMOS] }
Details of pulse counters or frequency dividers

21/00  [number-of-one counters G06F 7/007]

21/02  Input circuits
21/023  [comprising pulse shaping or differentiating circuits]
21/026  [comprising pulse shaping or differentiating circuits]
21/08  Output circuits
21/10  comprising logic circuits
21/12  with parallel read-out
21/14  with serial read-out of number stored
21/16  Circuits for carrying over pulses between successive decades
21/17  with field effect transistors
21/18  Circuits for visual indication of the result
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, 23/66)
Pulse counters comprising counting chains; Frequency dividers comprising counting chains (H03K 29/00) take precedence

23/001 . . . using elements not covered by groups H03K 23/002 and H03K 23/74 - H03K 23/84

23/002 . . . using semiconductor devices (H03K 23/78, H03K 23/80, H03K 23/84 take precedence)

23/004 . . . [Counters counting in a non-natural counting order, e.g. random counters]

23/005 . . . using minimum change code, e.g. Gray Code

23/007 . . . using excess three code

23/008 . . . using bi-quinary code

23/40 Gating or clocking signals applied to all stages, i.e. asynchronous counters (H03K 23/74 - H03K 23/84 take precedence)

23/42 . . . Out-of-phase gating or clocking signals applied to counter stages

23/425 . . . using bistables

23/44 . . . using field-effect transistors ([H03K 23/46 and H03K 23/425 take precedence])

23/46 . . . using charge transfer devices, i.e. bucket brigade or charge coupled devices

23/48 . . . with a base or radix other than a power of two (H03K 23/42 takes precedence)

23/483 . . . with a base which is an odd number

23/50 . . . using bi-stable regenerative trigger circuits (H03K 23/42 - H03K 23/484 takes precedence)

23/486 . . . with a base which is a non-integer

23/502 . . . with a base or a radix other than a power of two (H03K 23/42 takes precedence)

23/505 . . . with a base which is an odd number

23/507 . . . with a base which is a non-integer

23/52 . . . using field-effect transistors

23/54 . . . Ring counters, i.e. feedback shift register counters (H03K 23/52 takes precedence)

23/542 . . . [with crossed-couplings, i.e. Johnson counters]

23/544 . . . with a base which is an odd number

23/546 . . . with a base which is a non-integer

23/548 . . . Reversible counters

23/56 . . . Reversible counters (H03K 23/52 (and H03K 23/458) take precedence)

23/58 . . . Gating or clocking signals not applied to all stages, i.e. asynchronous counters (H03K 23/74 - H03K 23/84 take precedence)

23/582 . . . [with a base or a radix different of a power of two]

23/584 . . . [with a base which is an odd number]

23/586 . . . [with a base which is a non-integer]

23/588 . . . [Combination of a synchronous and an asynchronous counter]

23/60 . . . with field-effect transistors

23/62 . . . reversible

23/64 . . . with a base or radix other than a power of two (H03K 23/40 - H03K 23/62 take precedence)

23/66 with a variable counting base, e.g. by presetting or by adding or suppressing pulses

23/662 . . . [by adding or suppressing pulses]

23/665 . . . [by presetting]

23/667 . . . [by switching the base during a counting cycle]

23/68 . . . with a base which is a non-integer

23/70 . . . with a base which is an odd number (H03K 23/66 takes precedence)

23/72 . . . Decade counters (H03K 23/66 takes precedence)

23/74 . . . using relays

23/76 . . . using magnetic cores or ferro-electric capacitors

23/763 . . . using superconductive devices

23/766 . . . using thin-film devices

23/78 . . . using opto-electronic devices

23/80 . . . using semiconductor devices having two only two electrodes, e.g. tunnel diode, multi-layer diode (e.g. with a negative resistance characteristic (unijunction transistors H03K 23/84)

23/82 . . . using gas-filled tubes

23/825 . . . using vacuum tubes

23/84 . . . using thyristors or unijunction transistors

23/86 . . . reversible (H03K 23/40 - H03K 23/84 take precedence)

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

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)

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

29/06 . . . using beam-type tubes, e.g. magnetrons, cathode-ray tubes

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

2217/00 Indexing scheme related to electronic switching or gating, i.e. not by contact-making or -breaking covered by H03K 17/00

2217/0009 AC switches, i.e. delivering AC power to a load

2217/0018 Special modifications or use of the back gate voltage of a FET

2217/0027 Measuring means of, e.g. currents through or voltages across the switch

2217/0036 Means reducing energy consumption

2217/0045 Full bridges, determining the direction of the current through the load

2217/0054 Gating switches, e.g. pass gates

2217/0063 High side switches, i.e. the higher potential [DC] or life wire [AC] being directly connected to the switch and not via the load

2217/0072 Low side switches, i.e. the lower potential [DC] or neutral wire [AC] being directly connected to the switch and not via the load

2217/0081 Power supply means, e.g. to the switch driver

2217/009 Resonant driver circuits
Switches controlled by moving an element forming part of the switch

Characterised by the way in which the control signal is generated

Activated by voice or sound

Calibration techniques

Mechanical, e.g. by displacement of a body, a shielding element, or a magnet, in or out of the sensing area

With human activation, e.g. processes requiring or being triggered by human intervention, user-input of digital word or analog voltage

Automatic threshold calibration; e.g. threshold automatically adapts to ambient conditions or follows variation of input

Calibration involving digital processing

Multiple detection, i.e. where different switching signals are generated after operation of the user is detected at different time instants at different locations during the actuation movement by two or more sensors of the same or different kinds

Means for reducing energy consumption

Cascode connected switches

with evaluation of actuation pattern or sequence, e.g. tapping

 Rotary switches

 with optical detection

 with magnetic detection

 with capacitive detection

 with acoustic detection

 Transmission of parameters among sensors or between sensor and remote station

 Wireless transmission

 Wired transmission, e.g. via bus connection or similar

 using an optical detector

 characterised by the type of activation

 using a light barrier

 Passive activation of light sensor, e.g. by ambient light

 making use of reflection

 having more than one emitter

 having more than one receiver

 Optical multi axis

 increasing reliability, fail-safe

 Proximity switches

 using a magnetic detector

 Detection of ferromagnetic and non-magnetic conductive targets

 Ferromagnetic case

 Negative resistance, e.g. LC inductive proximity switches

 involving transponders

 Touch switches

 using acoustic waves, e.g. ultrasound

 by reflection

 with propagation, SAW or BAW

 Constructional details for touch switches

 (for capacitive touch switches see H03K 22/9607)

 using conductive paint

 Details of electro-mechanic connections between different elements, e.g.: sensing plate and integrated circuit containing electronics

Piezoelectric snap spring

Combination of touch switch and LC display

by temperature detection, i.e. body heat

Inductive touch switches

with illumination

Key-pad combined with display, back-lit

Detection of leakage or discharge current across the touching body to ground

Double function: touch detection combined with detection of a movable element

Fail-safe touch switches, where switching takes place only after repeated touch

with tactile or haptic feedback

Thumbwheel, potentiometer, scrollbar or slider simulation by touch switch

Capacitive touch switches

Safety of capacitive touch and proximity switches, e.g. increasing reliability, fail-safe

characterised by the detection principle

Re-timing; e.g. measurement of variation of charge time or discharge time of the sensor

Phase comparison, i.e. where a phase comparator receives at one input the signal directly from the oscillator, at a second input the same signal but delayed, with a delay depending on a sensing capacitance

Charge-transfer

Amplitude comparison

characterised by circuit details

Switched capacitor

Capacitive differential; e.g. comparison with reference capacitance

involving bridge circuit

Constructional details of capacitive touch and proximity switches

with spring electrode

Details of shielding arrangements

comprising an electrode which is floating

Emitter-receiver or "fringe" type detection, i.e. one or more field emitting electrodes and corresponding one or more receiving electrodes

Sensor being a wire or a strip, e.g. used in automobile door handles or bumpers

with illumination

using a single or more light guides

using organic light emitting devices, e.g. light emitting polymer [OEP] or OLED

Switches controlled by moving an element forming part of the switch

the moving element acting on a force, e.g. pressure sensitive element

with illumination

using a single or more light guides

using organic light emitting devices, e.g. light emitting polymer [OEP] or OLED

Safety, e.g. fail-safe switching requiring a sequence of movements