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 1/04})

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}

3/02335 . . . . {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)}
3/02337 . . . . {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

3/356 . . . Bistable circuits
3/356008 . . . . {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)}
3/356017 . . . . {using additional transistors in the input circuit (H03K 3/356104, H03K 3/3562 take precedence)}
3/356026 . . . . . {with synchronous operation (H03K 3/356034, H03K 3/356052 take precedence)}
3/356034 . . . . . {the input circuit having a differential configuration}
3/356043 . . . . . {with synchronous operation}
3/356052 . . . . . {using pass gates}
3/35606 . . . . . {with synchronous operation}
3/356069 . . . . {using additional transistors in the feedback circuit (H03K 3/356104, H03K 3/3562 take precedence)}
3/356078 . . . . . {with synchronous operation}
3/356086 . . . . {with additional means for controlling the main nodes (H03K 3/356104, H03K 3/3562 take precedence)}
3/356095 . . . . . {with synchronous operation}
3/356104 . . . . {using complementary field-effect transistors (H03K 3/35625 takes precedence)}
3/356113 . . . . . {using additional transistors in the input circuit}
3/356121 . . . . . {with synchronous operation (H03K 3/35613, H03K 3/356147 take precedence)}
3/35613 . . . . . {the input circuit having a differential configuration}
3/356139 . . . . . {with synchronous operation}
3/356147 . . . . . {using pass gates}
3/356156 . . . . . {with synchronous operation}
3/356165 . . . . . {using additional transistors in the feedback circuit}
3/356173 . . . . . {with synchronous operation}
3/356182 . . . . . {with additional means for controlling the main nodes}
3/356191 . . . . . {with synchronous operation}
3/3562 . . . . of the master-slave type
3/35625 . . . . . {using complementary field-effect transistors}
3/3565 . . . . Bistables with hysteresis, e.g. Schmitt trigger
3/3568 . . . Multistable circuits
3/357 . . by the use, as active elements, of bulk negative resistance devices, e.g. Gunn-effect devices
3/36 . . by the use, as active elements, of semiconductors, not otherwise provided for
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
3/40 . . 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
3/455 . . . {using thin films}
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 {; 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})
3/537 . . . the switching device being a spark gap
3/543 . . . the switching device being a vacuum tube
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
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 interrupting H03C, H04L)
3/84 . Generating pulses having a predetermined statistical distribution of a parameter, e.g. random pulse generators
3/86 . Generating pulses by means of delay lines and not covered by the preceding subgroups

4/00 Generating pulses having essentially a finite slope or stepped portions (generation of supply voltages from deflection waveforms H04N 3/18)
4/02 . having stepped portions, e.g. staircase waveform
4/023 . . {by repetitive charge or discharge of a capacitor, analogue generators}
4/026 . . {using digital techniques}
4/04 . having parabolic shape
4/06 . having triangular shape
4/063 . . {high voltage - or current generators}
4/066 . . {using a Miller-integrator (H03K 4/08 takes precedence)}
4/08 . . having sawtooth shape
4/085 . . . {Protection of sawtooth generators}
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 {(multivibrator generating other pulses H03K 3/00)}

4/16 . . . . . using a single tube with positive feedback through transformer, e.g. blocking oscillator {(blocking oscillators generating other pulses H03K 3/00)}

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

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

4/41 . . . . . with negative feedback through a capacitor, e.g. Miller-integrator

4/43 . . . . . combined with means for generating the driving pulses

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

4/502 . . . . . the capacitor being charged from a constant-current source

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 {(multivibrators generating other pulses H03K 3/00)}

4/54 . . . . . using a single semiconductor device with positive feedback through a transformer, e.g. blocking oscillator {(blocking oscillators generating other pulses H03K 3/00)}

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

4/625 . . . . . {using pulse-modulation techniques for the generation of the sawtooth wave, e.g. class D, switched mode}

4/64 . . . . . combined with means for generating the driving pulses {(H03K 4/625 takes precedence)}

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

4/693 . . . . . {operating in push-pull, e.g. class B (H03K 4/696 takes precedence)}

4/696 . . . . . {using means for reducing power dissipation or for shortening the flyback time, e.g. applying a higher voltage during flyback time}

4/71 . . . . . with negative feedback through a capacitor, e.g. Miller-integrator

4/72 . . . . . combined with means for generating the driving pulses

4/725 . . . . . {Push-pull amplifier circuits}

4/787 . . . using as active elements semiconductor devices with two electrodes and exhibiting a negative resistance characteristic

4/793 . . . . using tunnel diodes

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

4/835 . . . . {using pulse-modulation techniques for the generation of the sawtooth wave, e.g. class D, switched mode}

4/84 . . . . Generators in which the semiconductor device is conducting during the fly-back part of the cycle {(H03K 4/835 takes precedence)}

4/86 . . . using as active elements gas-filled tubes {or spark-gaps}

4/88 . . . using as active elements electrochemical cells {or galvano-magnetic or photo-electric elements}

4/90 . . . 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)

4/92 . having a waveform comprising a portion of a sinusoid (generating sinusoidal oscillations H03B)

4/94 . having trapezoidal shape

5/00 **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.

5/00006 . {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)}

2005/00013 . {Delay, i.e. output pulse is delayed after input pulse and pulse length of output pulse is dependent on pulse length of input pulse}
2005/00019 . . {Variable delay}
2005/00026 . . . {controlled by an analog electrical signal, e.g. obtained after conversion by a D/A converter}
2005/00032 . . . . {Dc control of switching transistors}
2005/00039 . . . . . {having four transistors serially}
2005/00045 . . . . {Dc voltage control of a capacitor or of the coupling of a capacitor as a load}
2005/00052 . . . . {by mixing the outputs of fixed delayed signals with each other or with the input signal}
2005/00058 . . . {controlled by a digital setting}
2005/00065 . . . . {by current control, e.g. by parallel current control transistors}
2005/00071 . . . . {by adding capacitance as a load}
2005/00078 . . {Fixed delay}
2005/00084 . . . {by trimming or adjusting the delay}
2005/00091 . . . . {using fuse links}
2005/00097 . . . {Avoiding variations of delay using feedback, e.g. controlled by a PLL}
2005/00104 . . . . {using a reference signal, e.g. a reference clock}
2005/0011 . . . . {using a separate time interval to calibrate the delay}
2005/00117 . . . {Avoiding variations of delay due to line termination}
2005/00123 . . . {Avoiding variations of delay due to integration tolerances}
2005/0013 . . . {Avoiding variations of delay due to power supply}
2005/00136 . . . {Avoiding asymmetry of delay for leading or trailing edge; Avoiding variations of delay due to threshold}
2005/00143 . . . {Avoiding variations of delay due to temperature}
2005/0015 . . {Layout of the delay element}
2005/00156 . . . {using opamps, comparators, voltage multipliers or other analog building blocks}
2005/00163 . . . {using bipolar transistors}
2005/00169 . . . . {using current mirrors}
2005/00176 . . . . {using differential stages}
2005/00182 . . . . {using constant current sources}
2005/00189 . . . {in BiCMOS technology}
2005/00195 . . . {using FET's}
2005/00202 . . . . {using current mirrors}
2005/00208 . . . . {using differential stages}
2005/00215 . . . . {where the conduction path of multiple FET's is in parallel or in series, all having the same gate control}
2005/00221 . . . . {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}
2005/00228 . . . {having complementary input and output signals}
2005/00234 . . . {using circuits having two logic levels}
2005/00241 . . . . {using shift registers}
2005/00247 . . . . {using counters}
2005/00254 . . . . {using microprocessors}
2005/0026 . . . . {using memories or FIFO's}
2005/00267 . . . . {using D/A or A/D converters}
2005/00273 . . . . {using digital comparators}
2005/0028 . . . {using varicaps, e.g. gate capacity of a FET with specially defined threshold, as delaying capacitors}
2005/00286 . {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}
2005/00293 . {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}
5/003 . Changing the DC level (television signals H04N 3/00)
5/007 . . Base line stabilisation (thresholding H03K 5/08)
5/01 . Shaping pulses (discrimination against noise or interference H03K 5/125)
5/02 . . by amplifying (H03K 5/04 takes precedence; wide-band amplifiers in general H03F)
5/023 . . . {using field effect transistors}
5/026 . . . {with a bidirectional operation}
5/04 . . by increasing duration; by decreasing duration
5/05 . . . by the use of clock signals or other time reference signals
5/06 . . . by the use of delay lines or other analogue delay elements
5/065 . . . . {using dispersive delay lines}
5/07 . . . by the use of resonant circuits
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)
5/082 . . . {with an adaptive threshold}
5/084 . . . . {modified by switching, e.g. by a periodic signal or by a signal in synchronism with the transitions of the output signal}
5/086 . . . . {generated by feedback}
5/088 . . . . . {modified by switching, e.g. by a periodic signal or by a signal in synchronism with the transitions of the output signal}
5/12 . . by steepening leading or trailing edges
5/125 . Discriminating pulses (measuring or indicating G01R 19/00, G01R 23/00, G01R 25/00, G01R 29/00; separation of synchronising signals in television systems H04N 5/08)
5/1252 . . Suppression or limitation of noise or interference (specially adapted for transmission systems H04B 15/00, H04L 25/08)
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)
5/13 . 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)}
5/131 . . Digitally controlled
5/133 . . using a chain of active delay devices
5/134 . . . with field-effect transistors
5/135 . . by the use of time reference signals, e.g. clock signals

5/14 . . by the use of delay lines (H03K 5/133 takes precedence)
5/145 . . by the use of resonant circuits
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)
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 monostables 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 . . Peak detectors
5/1534 . . Transition or edge detectors
5/1536 . . Zero-crossing detectors (in measuring circuits G01R 19/175)
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 . . the characteristic being amplitude
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-mudulated 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 11/00})

17/00 **Electronic switching or gating, i.e. not by contact-making or -braking** (selection of the stylus or auxiliary electrode in electric printing B41J 2/405; sample-and-hold arrangements G11C 27/02; switching or interrupting devices in waveguides H01P; gated amplifiers H03F 3/72; switching arrangements for exchange systems using static devices H04Q 3/52)
17/002 . {Switching arrangements with several input- or output terminals (code converters H03M 5/00, H03M 7/00)}
17/005 . . {with several inputs only}
17/007 . . {with several outputs only}
17/04 . Modifications for accelerating switching
17/0403 . . {in thyristor switches}
17/0406 . . {in composite switches}
17/041 . . without feedback from the output circuit to the control circuit {(H03K 17/0403, H03K 17/0406 take precedence)}
17/04106 . . . {in field-effect transistor switches (H03K 17/0412, H03K 17/0416 take precedence)}
17/04113 . . . {in bipolar transistor switches (H03K 17/0412, H03K 17/0416 take precedence)}
17/0412 . . . by measures taken in the control circuit

17/04123 . . . . {in field-effect transistor switches}
17/04126 . . . . {in bipolar transistor switches}
17/0414 . . . . Anti-saturation measures
17/0416 . . . by measures taken in the output circuit
17/04163 . . . . {in field-effect transistor switches}
17/04166 . . . . {in bipolar transistor switches}
17/042 . . by feedback from the output circuit to the control circuit {(H03K 17/0403, H03K 17/0406 take precedence)}
17/04206 . . . {in field-effect transistor switches}
17/04213 . . . {in bipolar transistor switches}
17/0422 . . . Anti-saturation measures
17/0424 . . . by the use of a transformer
17/06 . Modifications for ensuring a fully conducting state
17/063 . . {in field-effect transistor switches}
2017/066 . . {Maximizing the OFF-resistance instead of minimizing the ON-resistance}
17/08 . Modifications for protecting switching circuit against overcurrent or overvoltage
2017/0803 . . {against radiation hardening}
2017/0806 . . {against excessive temperature}
17/081 . . without feedback from the output circuit to the control circuit
17/08104 . . . {in field-effect transistor switches (H03K 17/0812, H03K 17/0814 take precedence)}
17/08108 . . . {in thyristor switches (H03K 17/0812, H03K 17/0814 take precedence)}
17/08112 . . . {in bipolar transistor switches (H03K 17/0812, H03K 17/0814 take precedence)}
17/08116 . . . {in composite switches (H03K 17/0812, H03K 17/0814 take precedence)}
17/0812 . . . by measures taken in the control circuit
17/08122 . . . . {in field-effect transistor switches}
17/08124 . . . . {in thyristor switches}
17/08126 . . . . {in bipolar transitor switches}
17/08128 . . . . {in composite switches}
17/0814 . . . by measures taken in the output circuit
17/08142 . . . . {in field-effect transistor switches}
17/08144 . . . . {in thyristor switches}
17/08146 . . . . {in bipolar transistor switches}
17/08148 . . . . {in composite switches}
17/082 . . by feedback from the output circuit to the control circuit
17/0822 . . . {in field-effect transistor switches}
17/0824 . . . {in thyristor switches}
17/0826 . . . {in bipolar transistor switches}
17/0828 . . . {in composite switches}
17/10 . Modifications for increasing the maximum permissible switched voltage
17/102 . . {in field-effect transistor switches}
17/105 . . {in thyristor switches}
17/107 . . {in composite switches}
17/12 . Modifications for increasing the maximum permissible switched current
17/122 . . {in field-effect transistor switches}
17/125 . . {in thyristor switches}
17/127 . . {in composite switches}
17/13 . Modifications for switching at zero crossing (generating an impulse at zero crossing H03K 5/153)
17/133 . . {in field-effect transistor switches}
17/136 . . {in thyristor switches}
17/14 . Modifications for compensating variations of physical values, e.g. of temperature
17/145 . . {in field-effect transistor switches}
17/16 . Modifications for eliminating interference voltages or currents
17/161 . . {in field-effect transistor switches}
17/162 . . . {without feedback from the output circuit to the control circuit}
17/163 . . . . {Soft switching}
17/164 . . . . . {using parallel switching arrangements}
17/165 . . . {by feedback from the output circuit to the control circuit}
17/166 . . . . {Soft switching}
17/167 . . . . . {using parallel switching arrangements}
17/168 . . {in composite switches}
17/18 . Modifications for indicating state of switch
17/20 . Modifications for resetting core switching units to a predetermined state
17/22 . Modifications for ensuring a predetermined initial state when the supply voltage has been applied (bi-stable generators H03K 3/12)
17/223 . . {in field-effect transistor switches}
2017/226 . . {in bipolar transistor switches}
17/24 . . Storing the actual state when the supply voltage fails
17/26 . Modifications for temporary blocking after receipt of control pulses
17/28 . Modifications for introducing a time delay before switching (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})
17/284 . . in field effect transistor switches
17/288 . . in tube switches
17/292 . . in thyristor, unijunction transistor or programmable unijunction transistor switches
17/296 . 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 at preselected times or after preselected time-intervals G04G 15/00)
17/30 . Modifications for providing a predetermined threshold before switching (shaping pulses by thresholding H03K 5/08 {; for logic circuits H03K 19/0021})
17/302 . . {in field-effect transistor switches}
17/305 . . {in thyristor switches}
2017/307 . . {circuits simulating a diode, e.g. threshold zero}
17/51 . characterised by the components used (H03K 17/04 - H03K 17/30, H03K 17/94 take precedence)
2017/515 . . {Mechanical switches; Electronic switches controlling mechanical switches, e.g. relais}
17/52 . . using gas-filled tubes
17/54 . . using vacuum tubes (using diodes H03K 17/74)
17/545 . . . {using microengineered devices, e.g. field emission devices}
17/56 . . using semiconductor devices (using diodes H03K 17/74)

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}
2017/6875 . . . . {using self-conductive, depletion FETs}
17/6877 . . . . {the control circuit comprising active elements different from those used in the output circuit}
2017/6878 . . . . {using multi-gate field-effect transistors}
17/689 . . . . with galvanic isolation between the control circuit and the output circuit (H03K 17/78 takes precedence)
17/6895 . . . . . {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)
17/7225 . . . . . {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 twistors
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

17/94 . 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 3/023, H04L 15/00, H04L 17/00, H04M 1/00)

17/941 . . {using an optical detector (H03K 17/968 takes precedence)}

17/943 . . . {using a plurality of optical emitters or detectors, e.g. keyboard}

17/945 . . 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})

2017/9455 . . . {constructional details (of proximity switches using a magnetic detector H03K 17/9505)}

17/95 . . . using a magnetic detector

17/9502 . . . . {Measures for increasing reliability}

17/9505 . . . . {Constructional details}

2017/9507 . . . . . {with illumination}

17/951 . . . . {Measures for supplying operating voltage to the detector circuit}

17/9512 . . . . {using digital techniques}

17/9515 . . . . {using non-linear magnetic devices}

17/9517 . . . . {using galvanomagnetic devices}

17/952 . . . . {using inductive coils}

17/9522 . . . . . {with a galvanically isolated probe}

17/9525 . . . . . {controlled by an oscillatory signal (H03K 17/9537 takes precedence)}

2017/9527 . . . . . {Details of coils in the emitter or receiver; Magnetic detector comprising emitting and receiving coils}

17/953 . . . . . {forming part of an oscillator (H03K 17/9537 takes precedence)}

17/9532 . . . . . {with variable frequency}

17/9535 . . . . . {with variable amplitude}

17/9537 . . . . . {in a resonant circuit}

17/954 . . . . . {controlled by an oscillatory signal}

17/9542 . . . . . {forming part of an oscillator}

17/9545 . . . . . {with variable frequency}

17/9547 . . . . . {with variable amplitude}

17/955 . . . using a capacitive detector

17/96 . . Touch switches

2017/9602 . . . {characterised by the type or shape of the sensing electrodes}

2017/9604 . . . . {characterised by the number of electrodes}

2017/9606 . . . . . {using one electrode only per touch switch}

2017/9609 . . . . . {where the electrode is the object to be switched}

2017/9611 . . . . . {where the electrode is a plant}

2017/9613 . . . . . {using two electrodes per touch switch}

2017/9615 . . . . . {using three electrodes per touch switch}

17/9618 . . . {using a plurality of detectors, e.g. keyboard}

17/962 . . . {Capacitive touch switches}

17/9622 . . . . {using a plurality of detectors, e.g. keyboard}

17/9625 . . . {using a force resistance transducer}

17/9627 . . . {Optical touch switches}

17/9629 . . . . {using a plurality of detectors, e.g. keyboard}

17/9631 . . . . {using a light source as part of the switch}

2017/9634 . . . . . {using organic light emitting devices, e.g. light emitting polymer [OEP] or OLED}

17/9636 . . . . . {using a pulsed light source}

17/9638 . . . . {using a light guide}

17/964 . . . {Piezo-electric touch switches}

17/9643 . . . . {using a plurality of detectors, e.g. keyboard}

17/9645 . . . {Resistive touch switches}

17/9647 . . . . {using a plurality of detectors, e.g. keyboard}

17/965 . . Switches controlled by moving an element forming part of the switch

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

17/968 . . . using opto-electronic devices

17/969 . . . . having a plurality of control members, e.g. keyboard

17/97 . . . using a magnetic movable element

2017/9706 . . . . {Inductive element}

2017/9713 . . . . {Multiposition, e.g. involving comparison with different thresholds}

17/972 . . . . having a plurality of control members, e.g. keyboard

17/975 . . . using a capacitive movable element

2017/9755 . . . . {Ohmic switch;}

17/98 . . . . having a plurality of control members, e.g. keyboard

19/00 Logic circuits, i.e. having at least two inputs acting on one output; Inverting circuits {(inverting circuits used as delay elements H03K 5/13)}

19/0002 . {Multistate logic (H03K 19/02 takes precedence)}

19/0005 . {Modifications of input or output impedance}

19/0008 . {Arrangements for reducing power consumption}

19/001 . . {in bipolar transistor circuits}

19/0013 . . {in field effect transistor circuits}

19/0016 . . {by using a control or a clock signal, e.g. in order to apply power supply}

19/0019 . . {by energy recovery or adiabatic operation}

19/0021 . {Modifications of threshold (for electronic switching or gating H03K 17/30)}

19/0024 . . {in bipolar transistor circuits}

19/0027 . . {in field effect transistor circuits}

19/003 . Modifications for increasing the reliability {for protection}

19/00307 . . {in bipolar transistor circuits}

19/00315 . . {in field-effect transistor circuits}

19/00323 . . {Delay compensation}

19/0033 . . {Radiation hardening}

19/00338 . . . {In field effect transistor circuits}

19/00346 . . {Modifications for eliminating interference or parasitic voltages or currents}

19/00353 . . . {in bipolar transistor circuits}

19/00361 . . . {in field effect transistor circuits}

19/00369 . . {Modifications for compensating variations of temperature, supply voltage or other physical parameters}

19/00376 . . . {in bipolar transistor circuits}

19/00384 . . . {in field effect transistor circuits}

19/00392 . . {by circuit redundancy (H03K 19/0075 takes precedence)}
19/007 . Fail-safe circuits
19/0075 . . {by using two redundant chains}
19/01 . Modifications for accelerating switching
19/013 . . in bipolar transistor circuits
19/0133 . . . {by bootstrapping, i.e. by positive feed-back}
19/0136 . . . {by means of a pull-up or down element}
19/017 . . in field-effect transistor circuits
19/01707 . . . {in asynchronous circuits}
19/01714 . . . . {by bootstrapping, i.e. by positive feed-back}
19/01721 . . . . {by means of a pull-up or down element}
19/01728 . . . {in synchronous circuits, i.e. by using clock signals}
19/01735 . . . . {by bootstrapping, i.e. by positive feed-back}
19/01742 . . . . {by means of a pull-up or down element}
19/0175 . Coupling arrangements; Interface arrangements (interface arrangements for digital computers G06F 3/00, G06F 13/00)
19/017509 . . {Interface arrangements}
19/017518 . . . {using a combination of bipolar and field effect transistors [BIFET]}
19/017527 . . . . {with at least one differential stage}
19/017536 . . . {using opto-electronic devices}
19/017545 . . {Coupling arrangements; Impedance matching circuits}
19/017554 . . . {using a combination of bipolar and field effect transistors [BIFET]}
19/017563 . . . . {with at least one differential stage}
19/017572 . . . {using opto-electronic devices}
19/017581 . . {programmable}
19/01759 . . {with a bidirectional operation}
19/018 . . using bipolar transistors only
19/01806 . . . {Interface arrangements}
19/01812 . . . . {with at least one differential stage}
19/01818 . . . . {for integrated injection logic (I2L)}
19/01825 . . . {Coupling arrangements, impedance matching circuits}
19/01831 . . . . {with at least one differential stage}
19/01837 . . . {programmable}
19/01843 . . . {with a bidirectional operation}
19/0185 . . using field effect transistors only
19/018507 . . . {Interface arrangements}
19/018514 . . . . {with at least one differential stage (H03K 19/018528 and H03K 19/018542 take precedence)}
19/018521 . . . . {of complementary type, e.g. CMOS}
19/018528 . . . . . {with at least one differential stage}
19/018535 . . . . {of Schottky barrier type [MESFET]}
19/018542 . . . . . {with at least one differential stage}
19/01855 . . . . {synchronous, i.e. using clock signals}
19/018557 . . . {Coupling arrangements; Impedance matching circuits}
19/018564 . . . . {with at least one differential stage (H03K 19/018578 takes precedence)}
19/018571 . . . . {of complementary type, e.g. CMOS}
19/018578 . . . . . {with at least one differential stage}
19/018585 . . . {programmable}
19/018592 . . . {with a bidirectional operation}
19/02 . using specified components ({H03K 19/0005 - H03K 19/0021}, H03K 19/003 - H03K 19/0175 take precedence)
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)
19/0806 . . . {using charge transfer devices (DTC, CCD)}
19/0813 . . . {Threshold logic}
19/082 . . . using bipolar transistors {(in combination with field-effect transistor H03K 19/094)}
19/0823 . . . . {Multistate logic}
19/0826 . . . . . {one of the states being the high impedance or floating state}
19/084 . . . . Diode-transistor logic
19/0843 . . . . . {Complementary transistor logic [CTL]}
19/0846 . . . . . {Schottky transistor logic [STL]}
19/086 . . . . Emitter coupled logic
19/0863 . . . . . {Emitter function logic [EFL]; Base coupled logic [BCL]}
19/0866 . . . . . {Stacked emitter coupled logic (H03K 19/1738 takes precedence)}
19/088 . . . . Transistor-transistor logic
19/09 . . . . Resistor-transistor logic
19/091 . . . . Integrated injection logic or merged transistor logic
19/0912 . . . . . {Static induction logic [STIL] (when the logic function is fullfilled by a fet H03K 19/09414)}
19/0915 . . . . . {Integrated schottky logic [ISL]}
19/0917 . . . . . {Multistate logic}
19/094 . . . using field-effect transistors
19/09403 . . . . {using junction field-effect transistors (H03K 19/096 takes precedence)}
19/09407 . . . . . {of the same canal type}
19/0941 . . . . . {of complementary type}
19/09414 . . . . . {with gate injection or static induction [STIL] (H03K 19/0912 takes precedence)}
19/09418 . . . . . {in combination with bipolar transistors [BIFET]}
19/09421 . . . . {Diode field-effect transistor logic (H03K 19/0956, H03K 19/096 take precedence)}
19/09425 . . . . {Multistate logic (H03K 19/096 takes precedence)}
19/09429 . . . . . {one of the states being the high impedance or floating state}
19/09432 . . . . {with coupled sources or source coupled logic (H03K 19/096 takes precedence)}
19/09436 . . . . . {Source coupled field-effect logic [SCFL]}
19/0944 . . . . using MOSFET {or insulated gate field-effect transistors, i.e. IGFET} (H03K 19/096 takes precedence)
19/09441 . . . . . {of the same canal type}
19/09443 . . . . . {using a combination of enhancement and depletion transistors}
19/09445 . . . . . {with active depletion transistors}
19/09446 . . . . . {using only depletion transistors}
19/09448 . . . . . {in combination with bipolar transistors [BIMOS]}

19/0948 . . . . . using CMOS {or complementary insulated gate field-effect transistors}
19/09482 . . . . . {using a combination of enhancement and depletion transistors}
19/09485 . . . . . {with active depletion transistors}
19/09487 . . . . . {using only depletion transistors}
19/0952 . . . . using Schottky type FET {MESFET} ({H03K 19/09421, H03K 19/09432}, H03K 19/096 take precedence)
19/0956 . . . . Schottky diode FET logic (H03K 19/096 takes precedence)
19/096 . . . . Synchronous circuits, i.e. using clock signals {(H03K 19/01728, H03K 19/01855 take precedence)}
19/0963 . . . . . {using transistors of complementary type (H03K 19/0966 takes precedence)}
19/0966 . . . . . {Self-timed logic}
19/098 . . . using thyristors
19/10 . . . using tunnel diodes
19/12 . . using diode rectifiers {(diode-transistor logic H03K 19/084)}
19/14 . . using opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled (optical logic elements per se 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
19/1731 . . . {Optimisation thereof}
19/1732 . . . . {by limitation or reduction of the pin/gate ratio (for data-processing equipment G06F 1/22)}
19/1733 . . . {Controllable logic circuits (H03K 19/177 takes precedence)}
19/1735 . . . . {by wiring, e.g. uncommitted logic arrays}
19/1736 . . . . . {in which the wiring can be modified}
19/1737 . . . . {using multiplexers (H03K 19/1738 takes precedence)}
19/1738 . . . . {using cascode switch logic [CSL] or cascode emitter coupled logic [CECL]}
19/177 . . . arranged in matrix form
19/17704 . . . . {the logic functions being realised by the interconnection of rows and columns}
19/17708 . . . . . {using an AND matrix followed by an OR matrix, i.e. programmable logic arrays}
19/17712 . . . . . {one of the matrices at least being reprogrammable}
19/17716 . . . . . {with synchronous operation, i.e. using clock signals, e.g. of I/O or coupling register (H03K 19/17712 takes precedence)}
19/1772 . . . . . {with synchronous operation of at least one of the logical matrixes}
19/17724 . . . . {Structural details of logic blocks}
19/17728 . . . . . {Reconfigurable logic blocks, e.g. lookup tables}
19/17732 . . . . . {Macro blocks}
19/17736 . . . . {Structural details of routing resources}
19/1774 . . . . . {for global signals, e.g. clock, reset}
19/17744 . . . . . {for input/output signals}
19/17748 . . . . {Structural details of configuration resources}
19/17752 . . . . . {for hot reconfiguration}
19/17756 . . . . . {for partial configuration or reconfiguration}
19/1776 . . . . . {for memories}
19/17764 . . . . . {for reliability}
19/17768 . . . . . {for security}
19/17772 . . . . . {for powering on or off}
19/17776 . . . . . {for speeding up configuration or reconfiguration}
19/1778 . . . . {Structural details for adapting physical parameters}
19/17784 . . . . . {for supply voltage}
19/17788 . . . . . {for I/O voltages}
19/17792 . . . . . {for operating speed}
19/17796 . . . . . {for physical disposition of blocks}
19/18 . . using galvano-magnetic devices, e.g. Hall-effect devices
19/185 . . using dielectric elements with variable dielectric constant, e.g. ferro-electric capacitors
19/19 . . . using ferro-resonant devices
19/195 . . using superconductive devices
19/1952 . . . {with electro-magnetic coupling of the control current}
19/1954 . . . {with injection of the control current}
19/1956 . . . . {using an inductorless circuit}
19/1958 . . . {Hybrid configuration, i.e. using electromagnetic coupling and injection of the control current}
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
19/212 . . . {using bipolar transistors}
19/215 . . . {using field-effect transistors}
19/217 . . . . {using Schottky type FET [MESFET]}
19/23 . . Majority or minority circuits, i.e. giving output having the state of the majority or the minority of the inputs

21/00 Details of pulse counters or frequency dividers {(number-of-one counters G06F 7/607)}
21/02 . Input circuits
21/023 . . {comprising pulse shaping or differentiating circuits}
21/026 . . {comprising logic circuits}
21/08 . Output circuits
21/10 . . comprising logic circuits
21/12 . . with parallel read-out
21/14 . . with series 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, H03K 23/66)

21/40 . Monitoring; Error detection; Preventing or correcting improper counter operation
21/403 . . {Arrangements for storing the counting state in case of power supply interruption}
21/406 . . {Synchronisation of counters}

23/00 Pulse counters comprising counting chains; Frequency dividers comprising counting chains (H03K 29/00 takes 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 biquinary code}
23/40 . Gating or clocking signals applied to all stages, i.e. synchronous 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}
23/486 . . . {with a base which is a non-integer}
23/50 . . using bi-stable regenerative trigger circuits (H03K 23/42 - H03K 23/48 take precedence)
23/502 . . . {with a base or a radix other than a power of two (H03K 23/54 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 23/548} 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 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

2217/94 . characterised by the way in which the control signal is generated
2217/94005 . . activated by voice or sound
2217/9401 . . Calibration techniques
2217/94015 . . . Mechanical, e.g. by displacement of a body, a shielding element, or a magnet, in or out of the sensing area
2217/94021 . . . with human activation, e.g. processes requiring or being triggered by human intervention, user-input of digital word or analog voltage
2217/94026 . . . Automatic threshold calibration; e.g. threshold automatically adapts to ambient conditions or follows variation of input
2217/94031 . . . Calibration involving digital processing
2217/94036 . . 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
2217/94042 . . Means for reducing energy consumption
2217/94047 . . Cascode connected switches
2217/94052 . . with evaluation of actuation pattern or sequence, e.g. tapping
2217/94057 . . Rotary switches
2217/94063 . . . with optical detection
2217/94068 . . . with magnetic detection
2217/94073 . . . with capacitive detection
2217/94078 . . . with acoustic detection
2217/94084 . . Transmission of parameters among sensors or between sensor and remote station
2217/94089 . . . Wireless transmission
2217/94094 . . . Wired transmission, e.g. via bus connection or similar
2217/941 . . using an optical detector
2217/94102 . . . characterised by the type of activation
2217/94104 . . . . using a light barrier
2217/94106 . . . . Passive activation of light sensor, e.g. by ambient light
2217/94108 . . . . making use of reflection
2217/94111 . . . having more than one emitter
2217/94112 . . . having more than one receiver
2217/94114 . . . Optical multi axis
2217/94116 . . . increasing reliability, fail-safe
2217/945 . . Proximity switches
2217/95 . . . using a magnetic detector
2217/952 . . . . Detection of ferromagnetic and non-magnetic conductive targets
2217/954 . . . . Ferromagnetic case
2217/956 . . . . Negative resistance, e.g. LC inductive proximity switches
2217/958 . . . . involving transponders
2217/96 . . Touch switches
2217/96003 . . . using acoustic waves, e.g. ultrasound
2217/96007 . . . . by reflection
2217/96011 . . . . with propagation, SAW or BAW
2217/96015 . . . Constructional details for touch switches (for capacitive touch switches see H03K 2217/9607)
2217/96019 . . . . using conductive paint
2217/96023 . . . . Details of electro-mechanic connections between different elements, e.g.: sensing plate and integrated circuit containing electronics
2217/96027 . . . . Piezoelectric snap spring
2217/96031 . . . Combination of touch switch and LC display
2217/96035 . . . by temperature detection, i.e. body heat
2217/96038 . . . Inductive touch switches
2217/96042 . . . with illumination
2217/96046 . . . . Key-pad combined with display, back-lit
2217/9605 . . . Detection of leakage or discharge current across the touching body to ground
2217/96054 . . . Double function: touch detection combined with detection of a movable element
2217/96058 . . . Fail-safe touch switches, where switching takes place only after repeated touch
2217/96062 . . . with tactile or haptic feedback
2217/96066 . . . Thumbwheel, potentiometer, scrollbar or slider simulation by touch switch
2217/9607 . . . Capacitive touch switches
2217/960705 . . . . Safety of capacitive touch and proximity switches, e.g. increasing reliability, fail-safe
2217/96071 . . . . characterised by the detection principle
2217/960715 . . . . . Rc-timing; e.g. measurement of variation of charge time or discharge time of the sensor
2217/96072 . . . . . 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
2217/960725 . . . . . Charge-transfer
2217/96073 . . . . . Amplitude comparison
2217/960735 . . . . characterised by circuit details
2217/96074 . . . . . Switched capacitor
2217/960745 . . . . . Capacitive differential; e.g. comparison with reference capacitance
2217/96075 . . . . . involving bridge circuit
2217/960755 . . . . Constructional details of capacitive touch and proximity switches
2217/96076 . . . . . with spring electrode
2217/960765 . . . . . Details of shielding arrangements
2217/96077 . . . . . comprising an electrode which is floating
2217/960775 . . . . . Emitter-receiver or "fringe" type detection, i.e. one or more field emitting electrodes and corresponding one or more receiving electrodes
2217/96078 . . . . . Sensor being a wire or a strip, e.g. used in automobile door handles or bumpers
2217/960785 . . . . with illumination
2217/96079 . . . . . using a single or more light guides
2217/960795 . . . . . using organic light emitting devices, e.g. light emitting polymer [OEP] or OLED
2217/965 . . Switches controlled by moving an element forming part of the switch
2217/9651 . . . the moving element acting on a force, e.g. pressure sensitive element
2217/9653 . . . with illumination
2217/9655 . . . . using a single or more light guides
2217/9656 . . . . using organic light emitting devices, e.g. light emitting polymer [OEP] or OLED
2217/9658 . . . Safety, e.g. fail-safe switching requiring a sequence of movements