

CPC COOPERATIVE PATENT CLASSIFICATION

H ELECTRICITY

(NOTE omitted)

H03 BASIC ELECTRONIC CIRCUITRY

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

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 function generators in computers G06F 1/02)	3/023	. . by the use of differential amplifiers or comparators, with internal or external positive feedback
3/01	. Details	3/0231	. . . Astable circuits {(H03K 3/0315 takes precedence)}
3/011	. . Modifications of generator to compensate for variations in physical values, e.g. voltage, temperature {(to maintain energy constant H03K 3/015)}	3/02315	. . . . {Stabilisation of output, e.g. using crystal}
		3/0232	. . . Monostable circuits
3/012	. . Modifications of generator to improve response time or to decrease power consumption	3/0233	. . . Bistable circuits
3/013	. . Modifications of generator to prevent operation by noise or interference	3/02332	. . . . {of the master-slave type}
3/014	. . Modifications of generator to ensure starting of oscillations	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)}
3/015	. . 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)	3/02337	. . . . {Bistables with hysteresis, e.g. Schmitt trigger (non-regenerative amplitude discriminators G01R 19/165)}
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)	3/0234	. . . Multistable circuits
		3/027	. . by the use of logic circuits, with internal or external positive feedback
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	3/03	. . . 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)
- 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 keying or interruption of sinusoidal oscillations [H03C](#); for transmission of digital information [H04L](#))
- 3/84 Generating pulses having a predetermined statistical distribution of a parameter, e.g. random pulse generators
- 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**
- 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
- 4/16 using a single tube with positive feedback through transformer, e.g. blocking oscillator
- 4/18 using a single tube exhibiting negative resistance between two of its electrodes, e.g. transitron, dynatron
- 4/20 using a tube with negative feedback by capacitor, e.g. Miller integrator
- 4/22 combined with transitron, e.g. phantastron, sanatron
- 4/24 Boot-strap generators
- 4/26 in which a sawtooth current is produced through an inductor
- 4/28 using a tube operating as a switching device
- 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
- 4/54 using a single semiconductor device with positive feedback through a transformer, e.g. blocking oscillator
- 4/56 using a semiconductor device with negative feedback through a capacitor, e.g. Miller integrator
- 4/58 Boot-strap generators
- 4/60 in which a sawtooth current is produced through an inductor
- 4/62 using a semiconductor device operating as a switching device
- 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 distortion correction for television receivers [H04N 3/23](#)); Synchronisation of pulses
- 4/92 . . . having a waveform comprising a portion of a sinusoid (generating sinusoidal oscillations [H03B](#))
- 4/94 . . . having trapezoidal shape
- 5/00** **Manipulating of pulses not covered by one of the other main groups of this subclass** (circuits with regenerative action [H03K 3/00](#), [H03K 4/00](#); by the use of non-linear magnetic or dielectric devices [H03K 3/45](#))
- NOTE**
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 ([reinsertion of dc component of a television signal H04N 5/16](#))
- 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](#))
- 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 characteristics of individual pulses G01R 29/02](#); [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
- 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 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](#))
- 5/1532 . . Peak detectors ([measuring characteristics of individual pulses G01R 29/02](#))
- 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
- 6/04 . Modifying slopes of pulses, e.g. S-correction ([S-correction in television H04N 3/23](#))
- 7/00 Modulating pulses with a continuously-variable modulating signal**
- 7/02 . Amplitude modulation, i.e. PAM
- 7/04 . Position modulation, i.e. PPM
- 7/06 . Frequency or rate modulation, i.e. PFM or PRM
- 7/08 . Duration or width modulation {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 ([shaping pulses H03K 5/01; combining sinewaves using elements operating in a non-switching manner H03B 21/00](#))**
- 17/00 Electronic switching or gating, i.e. not by contact-making and –breaking ([gated amplifiers H03F 3/72; switching arrangements for exchange systems using static devices H04Q 3/52](#))**
- 17/002 . {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 transistor 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 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 5/1536](#))
- 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 ([modifications to provide a choice of time-intervals for executing more than one switching action H03K 17/296](#))
- 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](#))
- 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 . . by the use, as active elements, of gas-filled tubes
- 17/54 . . by the use, as active elements of vacuum tubes ([using diodes H03K 17/74](#))
- 17/545 . . . {using microengineered devices, e.g. field emission devices}
- 17/56 . . by the use, as active elements, of 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 . . . the devices being tunnel diodes
- 17/60 . . . the devices being bipolar transistors ([bipolar transistors having four or more electrodes H03K 17/72](#))
- 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- output-terminals, e.g. multiplexers, distributors ([logic circuits H03K 19/00; 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
- 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 the devices being 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, e.g. multiplexers, distributors ([logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00](#))
- 17/70 the devices having only two electrodes and exhibiting negative resistance ([the devices being 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, e.g. multiplexers, distributors ([H03K 17/722 takes precedence; logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00](#))
- 17/74 by the use, as active elements, of diodes ([by the use of more than one type of semiconductor device H03K 17/567; by the use of tunnel diodes H03K 17/58; by the use of negative resistance diodes H03K 17/70](#))
- 17/76 Switching arrangements with several input- or output-terminals, e.g. multiplexers, distributors ([logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00](#))
- 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, e.g. multiplexers, distributors ([logic circuits H03K 19/00; code converters H03M 5/00, H03M 7/00](#))
- 17/82 the devices being transfluxors
- 17/84 the devices being thin-film devices
- 17/86 the devices being twistors
- 17/88 By the use, as active elements, of beam-deflection tubes
- 17/90 by the use, as active elements, of galvano-magnetic devices, e.g. Hall-effect devices ([H03K 17/95, H03K 17/97 take precedence](#))
- 17/92 by the use, as active elements, of superconductive devices
- 17/94 characterised by the way in which the control signals are generated
- 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](#))
- 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}	19/00	Logic circuits, i.e. having at least two inputs acting on one output (circuits for computer systems using fuzzy logic G06N 7/02); Inverting circuits
17/953	. . . . .	{forming part of an oscillator (H03K 17/9537 takes precedence)}	19/0002	. {Multistate logic (H03K 19/02 takes precedence)}
17/9532	. . . . .	{with variable frequency}	19/0005	. {Modifications of input or output impedance}
17/9535	. . . . .	{with variable amplitude}	19/0008	. {Arrangements for reducing power consumption}
17/9537	. . . . .	{in a resonant circuit}	19/001	. . {in bipolar transistor circuits}
17/954	. . . . .	{controlled by an oscillatory signal}	19/0013	. . {in field effect transistor circuits}
17/9542	. . . . .	{forming part of an oscillator}	19/0016	. . {by using a control or a clock signal, e.g. in order to apply power supply}
17/9545	. . . . .	{with variable frequency}	19/0019	. . {by energy recovery or adiabatic operation}
17/9547	. . . . .	{with variable amplitude}	19/0021	. {Modifications of threshold (for electronic switching or gating H03K 17/30)}
17/955	. . .	using a capacitive detector	19/0024	. . {in bipolar transistor circuits}
17/96	. .	Touch switches (specially adapted for electronic time-pieces with no moving parts G04G 21/08)	19/0027	. . {in field effect transistor circuits}
2017/9602	. . .	{characterised by the type or shape of the sensing electrodes}	19/003	. Modifications for increasing the reliability {for protection}
2017/9604	. . . .	{characterised by the number of electrodes}	19/00307	. . {in bipolar transistor circuits}
2017/9606	. . . . .	{using one electrode only per touch switch}	19/00315	. . {in field-effect transistor circuits}
2017/9609	. . . . .	{where the electrode is the object to be switched}	19/00323	. . {Delay compensation}
2017/9611	. . . . .	{where the electrode is a plant}	19/0033	. . {Radiation hardening}
2017/9613	. . . . .	{using two electrodes per touch switch}	19/00338	. . . {In field effect transistor circuits}
2017/9615	. . . . .	{using three electrodes per touch switch}	19/00346	. . {Modifications for eliminating interference or parasitic voltages or currents}
17/9618	. . .	{using a plurality of detectors, e.g. keyboard}	19/00353	. . . {in bipolar transistor circuits}
17/962	. . .	{Capacitive touch switches}	19/00361	. . . {in field effect transistor circuits}
17/9622	. . . .	{using a plurality of detectors, e.g. keyboard}	19/00369	. . {Modifications for compensating variations of temperature, supply voltage or other physical parameters}
17/9625	. . .	{using a force resistance transducer}	19/00376	. . . {in bipolar transistor circuits}
17/9627	. . .	{Optical touch switches}	19/00384	. . . {in field effect transistor circuits}
17/9629	. . . .	{using a plurality of detectors, e.g. keyboard}	19/00392	. . {by circuit redundancy (H03K 19/0075 takes precedence)}
17/9631	. . . .	{using a light source as part of the switch}	19/007	. Fail-safe circuits
2017/9634	. . . . .	{using organic light emitting devices, e.g. light emitting polymer [OEP] or OLED}	19/0075	. . {by using two redundant chains}
17/9636	. . . . .	{using a pulsed light source}	19/01	. Modifications for accelerating switching
17/9638	. . . . .	{using a light guide}	19/013	. . in bipolar transistor circuits
17/964	. . .	{Piezo-electric touch switches}	19/0133	. . . {by bootstrapping, i.e. by positive feed-back}
17/9643	. . . .	{using a plurality of detectors, e.g. keyboard}	19/0136	. . . {by means of a pull-up or down element}
17/9645	. . .	{Resistive touch switches}	19/017	. . in field-effect transistor circuits
17/9647	. . . .	{using a plurality of detectors, e.g. keyboard}	19/01707	. . . {in asynchronous circuits}
17/965	. .	Switches controlled by moving an element forming part of the switch	19/01714	. . . . {by bootstrapping, i.e. by positive feed-back}
17/967	. . .	having a plurality of control members, e.g. keyboard (H03K 17/969 , H03K 17/972 , H03K 17/98 take precedence)	19/01721	. . . . {by means of a pull-up or down element}
17/968	. . .	using opto-electronic devices	19/01728	. . . {in synchronous circuits, i.e. by using clock signals}
17/969	. . . .	having a plurality of control members, e.g. keyboard	19/01735	. . . . {by bootstrapping, i.e. by positive feed-back}
17/97	. . .	using a magnetic movable element	19/01742	. . . . {by means of a pull-up or down element}
2017/9706	. . . .	{Inductive element}	19/0175	. Coupling arrangements; Interface arrangements (interface arrangements for digital computers G06F 3/00 , G06F 13/00)
2017/9713	. . . .	{Multiposition, e.g. involving comparison with different thresholds}	19/017509	. . {Interface arrangements}
17/972	. . . .	having a plurality of control members, e.g. keyboard	19/017518	. . . {using a combination of bipolar and field effect transistors [BIFET]}
17/975	. . .	using a capacitive movable element	19/017527	. . . . {with at least one differential stage}
2017/9755	. . . .	{Ohmic switch;}	19/017536	. . . {using opto-electronic devices}
17/98	. . . .	having a plurality of control members, e.g. keyboard	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
- 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 fulfilled 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
- 19/14 . . . using opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled ([optical logic elements](#)
[G02F 3/00](#))
- 19/16 . . . using saturable magnetic devices
- 19/162 . . . using parametrons
- 19/164 . . . using ferro-resonant devices
- 19/166 . . . using transfluxors
- 19/168 . . . using thin-film devices
- 19/17 . . . using twistors
- 19/173 . . . using elementary logic circuits as components
- 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 Macroblocks
- 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 partial
reconfiguration
- 19/17758 for speeding up configuration or
reconfiguration
- 19/1776 for memories
- 19/17764 for reliability
- 19/17768 for security
- 19/17772 for powering on or off
- 19/1778 Structural details for adapting physical
parameters
- 19/17784 for supply voltage
- 19/17788 for input/output [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**
- 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}	29/04	. using multi-cathode gas discharge tubes
23/507	. . . . {with a base which is a non-integer}	29/06	. using beam-type tubes, e.g. magnetrons, cathode-ray tubes
23/52	. . . using field-effect transistors		
23/54	. . . Ring counters, i.e. feedback shift register counters (H03K 23/52 takes precedence)	99/00	Subject matter not provided for in other groups of this subclass
23/542	. . . . {with crossed-couplings, i.e. Johnson counters}		
23/544	. . . . {with a base which is an odd number}	2217/00	Indexing scheme related to electronic switching or gating, i.e. not by contact-making or -breaking covered by H03K 17/00
23/546	. . . . {with a base which is a non-integer}		
23/548	. . . . {Reversible counters}	2217/0009	. AC switches, i.e. delivering AC power to a load
23/56	. . . Reversible counters (H03K 23/52 {and H03K 23/548 } take precedence)	2217/0018	. Special modifications or use of the back gate voltage of a FET
23/58	. Gating or clocking signals not applied to all stages, i.e. asynchronous counters (H03K 23/74 - H03K 23/84 take precedence)	2217/0027	. Measuring means of, e.g. currents through or voltages across the switch
23/582	. . {with a base or a radix different of a power of two}	2217/0036	. Means reducing energy consumption
23/584	. . . {with a base which is an odd number}	2217/0045	. Full bridges, determining the direction of the current through the load
23/586	. . . {with a base which is a non-integer}	2217/0054	. Gating switches, e.g. pass gates
23/588	. . {Combination of a synchronous and an asynchronous counter}	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
23/60	. . with field-effect transistors	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
23/62	. . reversible	2217/0081	. Power supply means, e.g. to the switch driver
23/64	. with a base or radix other than a power of two (H03K 23/40 - H03K 23/62 take precedence)	2217/009	. Resonant driver circuits
23/66	. . with a variable counting base, e.g. by presetting or by adding or suppressing pulses	2217/94	. characterised by the way in which the control signal is generated
23/662	. . . {by adding or suppressing pulses}	2217/94005	. . . activated by voice or sound
23/665	. . . {by presetting}	2217/9401	. . . Calibration techniques
23/667	. . . {by switching the base during a counting cycle}	2217/94015	. . . Mechanical, e.g. by displacement of a body, a shielding element, or a magnet, in or out of the sensing area
23/68	. . with a base which is a non-integer	2217/94021	. . . with human activation, e.g. processes requiring or being triggered by human intervention, user-input of digital word or analog voltage
23/70	. . with a base which is an odd number (H03K 23/66 takes precedence)	2217/94026	. . . Automatic threshold calibration; e.g. threshold automatically adapts to ambient conditions or follows variation of input
23/72	. . Decade counters (H03K 23/66 takes precedence)	2217/94031	. . . Calibration involving digital processing
23/74	. using relays	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
23/76	. using magnetic cores or ferro-electric capacitors	2217/94042	. . Means for reducing energy consumption
23/763	. . {using superconductive devices}	2217/94047	. . Cascode connected switches
23/766	. . {using thin-film devices}	2217/94052	. . with evaluation of actuation pattern or sequence, e.g. tapping
23/78	. using opto-electronic devices	2217/94057	. . Rotary switches
23/80	. using semiconductor devices having only two electrodes, e.g. tunnel diode, multi-layer diode	2217/94063	. . . with optical detection
23/82	. using gas-filled tubes	2217/94068	. . . with magnetic detection
23/825	. . {using vacuum tubes}	2217/94073	. . . with capacitive detection
23/84	. using thyristors or unijunction transistors	2217/94078	. . . with acoustic detection
23/86	. reversible (H03K 23/40 - H03K 23/84 take precedence)	2217/94084	. . Transmission of parameters among sensors or between sensor and remote station
25/00	Pulse counters with step-by-step integration and static storage; Analogous frequency dividers	2217/94089	. . . Wireless transmission
25/02	. comprising charge storage, e.g. capacitor without polarisation hysteresis	2217/94094	. . . Wired transmission, e.g. via bus connection or similar
25/04	. . using auxiliary pulse generator triggered by the incoming pulses	2217/941	. . using an optical detector
25/12	. comprising hysteresis storage	2217/94102	. . . characterised by the type of activation
27/00	Pulse counters in which pulses are continuously circulated in a closed loop; Analogous frequency dividers (feedback shift register counters H03K 23/54)	2217/94104	. . . . using a light barrier
29/00	Pulse counters comprising multi-stable elements, e.g. for ternary scale, for decimal scale; Analogous frequency dividers		

- 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