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.

<table>
<thead>
<tr>
<th>3/00</th>
<th>Circuits for generating electric pulses; Monostable, bistable or multistable circuits (H03K 4/00 takes precedence; for digital function generators in computers G06F 1/02)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3/01</td>
<td>Details</td>
</tr>
<tr>
<td>3/011</td>
<td>Modifications of generator to compensate for variations in physical values, e.g. voltage, temperature {(to maintain energy constant H03K 3/015)}</td>
</tr>
<tr>
<td>3/012</td>
<td>Modifications of generator to improve response time or to decrease power consumption</td>
</tr>
<tr>
<td>3/013</td>
<td>Modifications of generator to prevent operation by noise or interference</td>
</tr>
<tr>
<td>3/014</td>
<td>Modifications of generator to ensure starting of oscillations</td>
</tr>
<tr>
<td>3/015</td>
<td>Modifications of generator to maintain energy constant</td>
</tr>
<tr>
<td>3/017</td>
<td>Adjustment of width or dutycycle of pulses (pulse width modulation H03K 7/08 {(to maintain energy constant H03K 3/015)})</td>
</tr>
<tr>
<td>3/02</td>
<td>Generators characterised by the type of circuit or by the means used for producing pulses (H03K 3/64 - H03K 3/84 take precedence)</td>
</tr>
<tr>
<td>3/021</td>
<td>by the use, as active elements, of more than one type of element or means, e.g. BIMOS, composite devices such as IGBT</td>
</tr>
</tbody>
</table>

| 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. Multivari
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}
magnetic or dielectric devices
by the use, as active elements, of beam deflection devices electrically- or optically-coupled
by the use, as active elements, of opto-electronic cells
by the use, as active elements, of electrochemical devices

precedence )

e.g. astable trigger circuits ( H03K 3/55
by the use, as active elements, of gas-filled tubes,
takes not otherwise provided for
by the use, as active elements, of semiconductors,
resistance devices, e.g. Gunn-effect devices
by the use, as active elements, of bulk negative cores, e.g. transfluxors
the devices being multi-aperture magnetic
the devices being parametrons
{ using thin films }

Bistables with hysteresis, e.g. Schmitt trigger
Multistable circuits

by the use, as active elements, of bulk negative resistance devices, e.g. Gunn-effect devices
by the use, as active elements, of semiconductors, not otherwise provided for
by the use, as active elements, of gas-filled tubes, e.g. astable trigger circuits ( H03K 3/55 takes precedence)
by the use, as active elements, of superconductive devices
by the use, as active elements, of electrochemical cells
by the use, as active elements, of opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled
by the use, as active elements, of beam deflection tubes
by the use, as active elements, of non-linear magnetic or dielectric devices

[using thin films]

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

by the use of an energy-accumulating element discharged through the load by a switching device controlled by an external signal and not incorporating positive feedback ( H03K 3/335 takes precedence ; working of metal by electro-erosion with spark discharge B23H ; for internal combustion engine ignition systems F02P 3/08; electronic lighters F23Q 2/285, F23Q 3/00; flash lamps H05B 41/30 )}

the switching device being a spark gap
the switching device being a vacuum tube
the switching device being a gas-filled tube having a control electrode
the switching device being a semiconductor device
by the use of galvano-magnetic devices, e.g. Hall effect devices
Generators producing trains of pulses, i.e. finite sequences of pulses
by interrupting the output of a generator
time intervals between all adjacent pulses of one train being equal
with means for varying repetition rate of trains
Generating a single train of pulses having a predetermined pattern, e.g. a predetermined number
Generating trains of sinusoidal oscillations ( by keying or interruption of sinusoidal oscillations H03C; for transmission of digital information H04L )
Generating pulses having a predetermined statistical distribution of a parameter, e.g. random pulse generators
Generating pulses by means of delay lines and not covered by the preceding subgroups

Generating pulses having essentially a finite slope or stepped portions
having stepped portions, e.g. staircase waveform
(by repetitive charge or discharge of a capacitor, analogue generators)
[using digital techniques]
having parabolic shape
having triangular shape
[high voltage - or current generators]
[using a Miller-integrator ( H03K 4/08 takes precedence )]
having sawtooth shape
[Protection of sawtooth generators]
using as active elements vacuum tubes only
in which a sawtooth voltage is produced across a capacitor
using two tubes so coupled that the input of each one is derived from the output of the other, e.g. multivibrator
{ (multivibrator generating other pulses H03K 3/00) }
using a single tube with positive feedback through transformer, e.g. blocking oscillator { (blocking oscillators generating other pulses H03K 3/00) }
using a single tube exhibiting negative resistance between two of its electrodes, e.g. transitron, dynatron
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 60/4; 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 300; H03K 400; 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 7/681)}
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 FETs]
2005/00202 . . . . [using current mirrors]
2005/00208 . . . . [using differential stages]
2005/00215 . . . . [where the conduction path of multiple FETs is in parallel or in series, all having the same gate control]
2005/00221 . . . . [where the conduction path of the different output FETs 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]
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)

6/00

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 \{ (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) \}

17/004

Modifications for accelerating switching

17/003

\{ (thyristor switches) \}

17/006

\{ (in composite switches) \}

17/0041

\{ (without feedback from the output circuit to the control circuit \{ (H03K 17/0403, H03K 17/0406 \}) \}

17/0406

\{ (in field-effect transistor switches \{ (H03K 17/0412, H03K 17/0416 \}) \}

17/0411

\{ (in bipolar transistor switches \{ (H03K 17/0412, H03K 17/0416 \}) \}

17/0412

\{ by measures taken in the control circuit \}

17/0423

\{ (in field-effect transistor switches) \}

17/0426

\{ (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 \}) \}

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 . . . [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 . . . [field-effect transistor switches (H03K 17/081, H03K 17/0814 take precedence)]
17/08108 . . . [thyristor switches (H03K 17/0812, H03K 17/0814 take precedence)]
17/08112 . . . [bipolar transistor switches (H03K 17/0812, H03K 17/0814 take precedence)]
17/08116 . . . [composite switches (H03K 17/0812, H03K 17/0814 take precedence)]
17/0812 . . . by measures taken in the control circuit
17/08122 . . . [field-effect transistor switches]
17/08124 . . . [thyristor switches]
17/08126 . . . [bipolar transistor switches]
17/08128 . . . [composite switches]
17/0814 . . . by measures taken in the output circuit
17/08142 . . . [field-effect transistor switches]
17/08144 . . . [thyristor switches]
17/08146 . . . [bipolar transistor switches]
17/08148 . . . [composite switches]
17/082 . . . by feedback from the output to the control circuit
17/0822 . . . [field-effect transistor switches]
17/0824 . . . [thyristor switches]
17/0826 . . . [bipolar transistor switches]
17/0828 . . . [composite switches]
17/10 . . . Modifications for increasing the maximum permissible switched voltage
17/102 . . . [field-effect transistor switches]
17/105 . . . [thyristor switches]
17/107 . . . [composite switches]
17/12 . . . Modifications for increasing the maximum permissible switched current
17/122 . . . [field-effect transistor switches]
17/125 . . . [thyristor switches]
17/127 . . . [composite switches]
17/13 . . . Modifications for switching at zero crossing (generating an impulse at zero crossing H03K 5/1536)
17/133 . . . [field-effect transistor switches]
17/136 . . . [thyristor switches]
17/14 . . . Modifications for compensating variations of physical values, e.g. of temperature
17/145 . . . [field-effect transistor switches]
17/16 . . . Modifications for eliminating interference voltages or currents
17/161 . . . [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 . . . [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 (bistable generators H03K 3/12)
17/223 . . . [field-effect transistor switches]
2017/226 . . . [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 (for logic circuits H03K 19/0021))
17/302 . . . [field-effect transistor switches]
17/305 . . . [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 . . . [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 17/900; code converters 17/900, 17/700)
17/6207 . . . . (without selecting means (17/9242 - 17/9285 take precedence))
17/6214 . . . . (using current steering means)
17/6221 . . . . (combined with selecting means (17/9242 - 17/9285 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 phototransistors)
17/628 . . . . (connected to both load terminals)
17/6292 . . . . (connected to one load terminal)
17/6295 . . . . (connected to one load terminal)
17/6297 . . . . (connected to both load terminals)
17/6320 . . . . (using field-effect transistors)
17/6325 . . . . (using field-effect transistors)
17/6327 . . . . (using field-effect transistors)
17/6328 . . . . (using field-effect transistors)
17/64 . . . . (using field-effect transistors)
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; 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 (specially adapted for electronic
time-pieces with no moving parts G04G 21/08)
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}
17/9611  . . . {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 17/978 take precedence)
17/968  . . . using opto-electronic devices
17/969  . . . having a plurality of control elements, 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;}
17/978  . . . having a plurality of control members, e.g.
keyboard
19/00  Logic circuits, i.e. having at least two inputs acting
on one output (circuits for computer systems using
fuzzy logic G06N 7/02); Inverting circuits
19/0002  . . . {Multistate logic (H03K 19/002 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
Coupling arrangements; Interface arrangements
(interface arrangements for digital computers)
using elementary logic circuits as components
using opto-electronic devices, i.e. light-emitting and photoelectric devices electrically- or optically-coupled (optical logic elements per se G02F 3/00)
using saturable magnetic devices
using parametrons
using thin-film devices
using twistors
using elementary logic circuits as components
{Optimisation thereof}
{by limitation or reduction of the pin/ gate ratio (for data-processing equipment G06F 1/22)"
{Controllable logic circuits (H03K 19/177 takes precedence)"
{by wiring, e.g. uncommitted logic arrays"
{in which the wiring can be modified"
{using multiplexers (H03K 19/1738 takes precedence)"
{using cascode switch logic [CSL] or cascade emitter coupled logic [CECL]"
arranged in matrix form
the logic functions being realised by the interconnection of rows and columns
{using an AND matrix followed by an OR matrix, i.e. programmable logic arrays"
{one of the matrices at least being reprogrammable"
{with synchronous operation, i.e. using clock signals, e.g. of I/O or coupling register (H03K 19/17712 takes precedence)"
{with synchronous operation of at least one of the logical matrices"
Structural details of logic blocks
Reconfigurable logic blocks, e.g. lookup tables
Macroblocks
Structural details of routing resources
{for global signals, e.g. clock, reset"
{for input/output signals"
Structural details of configuration resources
for hot reconfiguration
for partial configuration or partial reconfiguration
for speeding up configuration or reconfiguration
for memories
for reliability
for security
for powering on or off
Structural details for adapting physical parameters
for supply voltage
for input/output [I/O] voltages
for operating speed
for physical disposition of blocks
using galvano-magnetic devices, e.g. Hall-effect devices
using dielectric elements with variable dielectric constant, e.g. ferro-electric capacitors
using ferro-resonant devices
using superconductive devices
{with electro-magnetic coupling of the control current"
{with injection of the control current"
{using an inductorless circuit"
{Hybrid configuration, i.e. using electromagnetic coupling and injection of the control current"
characterised by logic function, e.g. AND, OR, NOR, NOT circuits (H03K 19/003 - H03K 19/01 take precedence"
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
{using bipolar transistors"
{field-effect transistors"
{using Schottky type FET [MESFET]"
Majority or minority circuits, i.e. giving output having the state of the majority or the minority of the inputs
Details of pulse counters or frequency dividers
{number-of-one counters G06F 7/0071"
Input circuits
{comprising pulse shaping or differentiating circuits"
{comprising logic circuits"
Output circuits
comprising logic circuits
with parallel read-out
with series read-out of number stored
Circuits for carrying over pulses between successive decades
with field effect transistors
Circuits for visual indication of the result
using glow discharge lamps
Starting, stopping or resetting the counter (counters with a base other than a power of two H03K 23/48, H03K 23/66)
Monitoring; Error detection; Preventing or correcting improper counter operation
{Arrangements for storing the counting state in case of power supply interruption"
{Synchronisation of counters"
Pulse counters comprising counting chains; Frequency dividers comprising counting chains

23/00 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 . Out-of-phase 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 23/48 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 take 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 23/54] 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 impending 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
H03K

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 . . . Cascade 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
2217/9445 . . . 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 . . . Re-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