

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](#))

Definition statement

This place covers:

- methods, circuits, devices, or apparatus using active elements operating in a discontinuous or switching manner for generating, shaping and manipulating pulse signals
- generating stepped pulses or pulses having an essentially finite slope
- producing pulses by distorting or combining sinusoidal waveforms
- shaping, amplifying and otherwise manipulating pulse signals
- modulating pulses with a continuously variable modulating signal, and demodulating pulses which have been so modulated
- transforming types of pulse modulation
- electronic switching not involving contact-making and breaking
- logic circuits handling electric pulses
- counting pulses, pulse counters and frequency dividers, pulse counters with step-by-step integration and static storage, pulse counters in which pulses are continuously circulated, pulse counters comprising multi-stable elements

Relationships with other classification places

The modulation and demodulation of pulse trains, for example in Pulse Width Modulation circuits, is covered in subclass [H03K](#).

The modulation and demodulation of sinusoidal signals, for example in AM and FM broadcasting, is covered in subclasses [H03C](#) and [H03D](#).

The modulation by digital signals of the frequency, phase or amplitude of sinusoidal carrier, or carriers, is covered in subclass [H04L](#). Quadrature (I-Q) modulation systems used for the transmission of digital information, e.g. QAM, the effect of which is to modulate a carrier in both amplitude and phase (often in discrete steps, which may be illustrated as a 'constellation' of points, each point representing a pair of carrier amplitude and phase values), are covered in subclass [H04L](#).

Analogue quadrature modulation used in the NTSC and PAL colour television systems (where the I and Q signals representing colour difference values are substantially continuously variable), is covered in [H04N](#).

References

Limiting references

This place does not cover:

measuring pulse characteristic	G01R
measuring electrical signals (to get a value)	G01R 17/00 - G01R 29/00
testing electrical circuits	G01R 31/00
Modulating sinusoidal oscillations with pulses	H03C

Demodulation or transference of signals modulated on a sinusoidal carrier	H03D
Automatic control, starting, synchronizing or stabilization 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
Transmission of digital information; modulated carrier systems	H04L , H04L 27/00

Informative references

Attention is drawn to the following places, which may be of interest for search:

Counting mechanisms	G06M
Information storage based on relative movement between record	G11B , G11C
Sample and hold arrangements in electric analogue stores	G11C 27/02
Electric Switches; Relays; Selectors; Emergency protective devices	H01H
Apparatus for conversion of electric power	H02M
Generation of oscillations by circuits employing active elements which operate in a non-switching manner	H03B

Special rules of classification

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 described in the described embodiment.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Differential	really means differential, not just complementary, i.e. two signals with an inverter in between are not differential
'continuously-variable' modulating signal	Analogue signals or signals that comprise a number of discrete levels, such as signals produced by counting circuits.

H03K 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](#))

Definition statement

This place covers:

- Latches and flip-flops;
- Non-linear (switching) oscillators;
- Latching level shifters.

References

Limiting references

This place does not cover:

Generating pulses having essentially a finite slope or stepped portions	H03K 4/00
Digital function generators	G06F 1/02
Generating or distributing clock signals or signals derived directly therefrom	G06F 1/04

Application-oriented references

Examples of places where the subject matter of this place is covered when specially adapted, used for a particular purpose, or incorporated in a larger system:

Latches used in scan test of integrated circuits	G01R 31/318541
Latches and flip-flops used as static stores in semiconductor memories	G11C 11/41
Power pulse generators for driving lasers	H01S 5/42
Voltage- and current controlled oscillators	H03L 7/0995

Special rules of classification

Latching level shifters should be classified in the corresponding bistable circuit subgroups of this main group.

H03K 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)

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

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

H03K 4/00

Generating pulses having essentially a finite slope or stepped portions

Definition statement

This place covers:

- Relaxation oscillators.
- Switched-capacitor oscillators
- Ramp and sawtooth generators.

Relationships with other classification places

Multivibrators generating pulse signals other than finite-sloped or staircase signals should be classified in [H03K 3/00](#).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Generation of supply voltages in combination with electron beam deflection in television scanning systems	H04N 3/18
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Special rules of classification

[H03K 4/026](#): Digital generators followed by a digital-to-analog converter to produce analogue output stepped signals.

H03K 4/14

using two tubes so coupled that the input of each one is derived from the output of the other, e.g. multivibrator

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Circuits for generating electric pulses	H03K 3/00
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H03K 4/16

using a single tube with positive feedback through transformer, e.g. blocking oscillator

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Circuits for generating electric pulses	H03K 3/00
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H03K 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

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Circuits for generating electric pulses	H03K 3/00
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H03K 4/54

using a single semiconductor device with positive feedback through a transformer, e.g. blocking oscillator

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Circuits for generating electric pulses	H03K 3/00
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H03K 4/90

Linearisation of ramp (modifying slopes of pulses [H03K 6/04](#); scanning distortion correction for television receivers [H04N 3/23](#)); Synchronisation of pulses

References**Limiting references**

This place does not cover:

Modifying slopes of pulses	H03K 6/04
Scanning distortion correction for television receivers	H04N 3/23

Informative references

Attention is drawn to the following places, which may be of interest for search:

Synchronising arrangements in time division multiplex systems using pulse stuffing for systems with different or fluctuating information rates	H04J 3/07
Arrangements for synchronizing receiver with transmitter	H04L 7/00
Circuits for synchronizing transmitter and receiver in the transmission or reproduction of documents	H04N 1/36
Synchronisation in television systems	H04N 5/00
Colour synchronisation in television systems	H04N 9/44
Synchronisation arrangements in wireless communication networks	H04W 56/00

Synonyms and Keywords

In patent documents, the word/expression in the first column is often used instead of the word/expression in the second column, which is used in the classification scheme of this place:

colour synchronisation	sub carrier lock
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H03K 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](#))

References

Limiting references

This place does not cover:

circuits with regenerative action	H03K 3/00 , H03K 4/00
by the use of non-linear magnetic or dielectric devices	H03K 3/45

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Regenerative action	internal or external positive feed-back.
Delay line	transmission line

H03K 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](#))}

Definition statement

This place covers:

Mostly pulse rate multiply by 2 circuits based on delaying and combining.

References

Limiting references

This place does not cover:

Pulse frequency multipliers	G06F 7/68
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H03K 5/003

Changing the DC level (reinsertion of DC component of a television signal [H04N 5/16](#))

References

Limiting references

This place does not cover:

reinsertion of DC component of a television signal	H04N 5/16
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H03K 5/01**Shaping pulses (discrimination against noise or interference [H03K 5/125](#))****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

For reducing generated interference	H03K 17/16 , H03K 19/00346
For impedance matching	H03K 19/00 , H04L 25/00
For reducing power consumption	H03K 19/0008
For baseband data transmission	H04L 25/0286 , H04L 25/03834

H03K 5/02**by amplifying ([H03K 5/04](#) takes precedence)****References****Limiting references***This place does not cover:*

By increasing duration; by decreasing duration	H03K 5/04
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Informative references*Attention is drawn to the following places, which may be of interest for search:*

Arrangements for measuring phase angle between a voltage and a current or between voltage or currents	G01R 25/00
Amplifiers in general	H03F
High frequency amplifiers	H03F 3/189

H03K 5/04**by increasing duration; by decreasing duration****Definition statement***This place covers:*

Also used for slew rate control circuits.

H03K 5/06**by the use of delay lines or other analogue delay elements****Definition statement***This place covers:*

For instance circuits for staggering turn on signals.

H03K 5/065**{using dispersive delay lines}****Definition statement***This place covers:*

Delay lines having propagation speed depending on input frequency.

H03K 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)****Definition statement***This place covers:*

Clamping circuits in general

References**Informative references***Attention is drawn to the following places, which may be of interest for search:*

Clamping for ESD protection	H10D 89/601
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H03K 5/084**{modified by switching, e.g. by a periodic signal or by a signal in synchronism with the transitions of the output signal}****Definition statement***This place covers:*

The value of the threshold is generated by feedback AND the value is modified by switching.

H03K 5/086**{generated by feedback}****Definition statement***This place covers:*

i.e. the value of the threshold is generated by feedback.

H03K 5/088**{modified by switching, e.g. by a periodic signal or by a signal in synchronism with the transitions of the output signal}****Definition statement***This place covers:*

The switching only relating to the switching instants.

H03K 5/12**by steepening leading or trailing edges****Definition statement***This place covers:*

Mostly used for pulse compression circuits using non-linear transmission lines having propagation speed depending on input amplitude, such as diode loaded transmission lines, to steepen one of the pulse edges and slow the other.

References**Limiting references***This place does not cover:*

Changing the slew rate of leading and/or falling pulses in general	H03K 5/01 , H03K 5/04 , H03K 5/06
Accelerating switching	H03K 17/04 , H03K 19/01

H03K 5/125

**Discriminating pulses (measuring characteristics of individual pulses
[G01R 29/02](#); separation of synchronising signals in television systems
[H04N 5/08](#))**

References**Limiting references***This place does not cover:*

Measuring characteristics of individual pulses	G01R 29/02
Separation of synchronising signals in television systems	H04N 5/08

Informative references*Attention is drawn to the following places, which may be of interest for search:*

Arrangements for measuring currents or voltages or for indicating presence or sign thereof	G01R 19/00
Arrangements for measuring frequencies; arrangements for analysing frequency spectra	G01R 23/00
Arrangements for measuring phase angle between a voltage and a current or between voltage or currents	G01R 25/00

H03K 5/1252

Suppression or limitation of noise or interference (specially adapted for transmission systems [H04B 15/00](#), [H04L 25/08](#))

Definition statement

This place covers:

Mostly suppression of glitches in binary signals by delay and subsequent logic combination with the original signal.

Some documents (often also classified in [H03K 5/156](#) or [H03K 5/1565](#)) relate to phase noise suppression in (interpolated) clock signals.

References

Limiting references

This place does not cover:

Suppressing noise by slew rate control	H03K 5/04 , H03K 17/16 , H03K 19/00346
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Special rules of classification

For glitches produced when switching from one clock signal to another [G06F 1/08](#) takes precedence.

H03K 5/13

Arrangements having a single output and transforming input signals into pulses delivered at desired time intervals

Definition statement

This place covers:

- Mainly used for delay circuits but also for some generic pulse circuits having multiple inputs and a single output
- Phase interpolation

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Measuring time intervals using electronic timing, e.g. counting means	G04F 1/00
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Special rules of classification

Additional aspects are classified as follows

Delay [H03K 2005/00013](#)

Phase [H03K 2005/00286](#)

Pulse [H03K 2005/00293](#)

Phase interpolation circuits [H03K 2005/00052](#)

H03K 5/131

Digitally controlled

Special rules of classification

Also classify in: [H03K 2005/00058](#) (controlled by a digital setting)

H03K 5/135

by the use of time reference signals, e.g. clock signals

Definition statement

This place covers:

- Synchronising a signal to a clock signal
- Using a clock signal as a reference for controlling a delay, e.g. synchronous mirror delay circuits (SMDs), in which a detected number of gates in a first delay line - through which a signal edge propagates in a predetermined time defined by the reference clock - is used for controlling the number of delay elements in a second delay line for compensation.

References

Limiting references

This place does not cover:

Synchronisation of pulses generated from circuits classified in H03K 4/00	H03K 4/90
Synchronisation of clock signals in data processing equipment	G06F 1/12
Clocked shift registers	G11C 19/00
PLL, DLL	H03L 7/08
Synchronisation in TDM systems	H04J 3/00
Synchronising data receiver with transmitter, e.g. using clock data recovery	H04L 7/00

H03K 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](#))

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Distributing clock signals in data processing equipment:	G06F 1/10 .
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H03K 5/15026**{with asynchronously driven series connected output stages}****Definition statement***This place covers:*

Tapped arrangement

References**Informative references***Attention is drawn to the following places, which may be of interest for search:*

using a chain of active delay devices	H03K 5/133
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H03K 5/1506**{with parallel driven output stages; with synchronously driven series connected output stages}****Definition statement***This place covers:*

Pulse distributor with output stages driven more or less synchronously either in parallel in a tree-like structure OR sequentially with shift register like structure.

References**Limiting references***This place does not cover:*

Distributing clock signals in data processing equipment	G06F 1/10
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H03K 5/15093**{using devices arranged in a shift register}****References****Limiting references***This place does not cover:*

Shift registers per se	G11C 19/00
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H03K 5/151**with two complementary outputs****Definition statement***This place covers:*

Providing simultaneous switching of two complementary signals.

H03K 5/1515**{non-overlapping}****Definition statement***This place covers:*

In particular suitable for preventing simultaneous conduction in push pull stages.

References**Limiting references***This place does not cover:*

Protecting switching stages against overload by arrangements in the control circuit	H03K 17/0812
Complementarily driven MOS switches	H03K 17/6871
Preventing simultaneous conduction in DC/DC converters	H02M 1/38

H03K 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](#))

References**Limiting references***This place does not cover:*

Switching at zero crossing	H03K 17/13
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Informative references*Attention is drawn to the following places, which may be of interest for search:*

indicating of signal events	G01R
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H03K 5/1532**Peak detectors (measuring characteristics of individual pulses [G01R 29/02](#))****Definition statement***This place covers:*

Peak instant detectors only

References**Limiting references***This place does not cover:*

Measuring characteristics of individual pulses	G01R 29/02
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H03K 5/1565**{the output pulses having a constant duty cycle}****Definition statement***This place covers:*

Also contains ccts for suppressing jitter and phase noise in pulse signals.

References**Limiting references***This place does not cover:*

Generators (i.e. circuits not having a signal input) with duty cycle adjustment	H03K 3/017
Duty cycle modulation schemes	H03K 7/08

H03K 5/159**Applications of delay lines not covered by the preceding subgroups****References****Limiting references***This place does not cover:*

Transversal filters	H03H 15/00
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H03K 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](#))****Definition statement***This place covers:*

Detecting presence of valid pulse signal, e.g monitoring amplitude and/or frequency of pulse signal.

References**Informative references***Attention is drawn to the following places, which may be of interest for search:*

Distribution of clock signals	G01F 1/10
Measuring electrical variables	G01R

H03K 5/24**the characteristic being amplitude****Definition statement***This place covers:*

Pulse comparators.

References**Limiting references***This place does not cover:*

Comparators using latches or having hysteresis	H03K 3/00 , H03F 1/38
Thresholding or clamping	H03K 5/08
DC comparators	G01R 19/0038
Indicating signal level	G01R 19/165
Current (mirror) comparators: Only the ones giving full swing outputs classified here	G05F 3/26
Circuits comparing digital numbers	G06F 7/02
Sense amplifiers	G11C

H03K 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](#))****Definition statement***This place covers:*

Slew rate correction in ramp or triangular waveform generators..

References**Limiting references***This place does not cover:*

Slew rate limiting	H03K 5/04 , H03K 17/16 , H03K 19/017581
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H03K 6/02**Amplifying pulses****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Generation of a sawtooth current through an inductor by amplification	H03K 4/26 , H03K 4/60
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H03K 6/04**Modifying slopes of pulses, e.g. S-correction (S-correction in television
[H04N 3/23](#))****References****Limiting references***This place does not cover:*

S-correction in television	H04N 3/23
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Informative references*Attention is drawn to the following places, which may be of interest for search:*

Arrangements for measuring currents or voltages or for indicating presence or sign thereof	G01R 19/00
Arrangements for measuring frequencies; arrangements for analysing frequency spectra	G01R 23/00
Arrangements for measuring phase angle between a voltage and a current or between voltage or currents	G01R 25/00

H03K 7/00**Modulating pulses with a continuously-variable modulating signal****Definition statement***This place covers:*

Continuous modulating signal meaning (quasi-)analog.

Only basic schemes for modulating one or more pulse characteristics are classified here. See also application fields.

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References**Limiting references***This place does not cover:*

Discrete pulse modulation	H04L 25/00 , G06F 1/025
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H03K 7/04**Position modulation, i.e. PPM****References****Limiting references***This place does not cover:*

Impulse radio, UWB signals	H04B 1/69
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H03K 7/06**Frequency or rate modulation, i.e. PFM or PRM****References****Limiting references***This place does not cover:*

Random signal generators	H03K 3/84
Random number generators	G06F1/58R
Noise generators	H03B
For spread spectrum clock signals	H04B 15/04

H03K 7/08**Duration or width modulation {; Duty cycle modulation}****Definition statement***This place covers:*

Basic modulation concept such as comparing voltage to (quasi-)analog ramp signal.

References**Limiting references***This place does not cover:*

For signal generators	G06F 1/025
switch mode controllers	H02P
Class D amplifiers	H03F 3/217 , H02M
D/A converters	H03M
For data signals	H04L 25/4902

H03K 9/00**Demodulating pulses which have been modulated with a continuously-variable signal****Definition statement***This place covers:*

Only for documents not showing the modulator or where the demodulator is clearly the main aspect.

H03K 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](#))

Definition statement

This place covers:

- Composite switches: multiple types of transistors form a switching unit e.g. IGBT
- Output circuit: drain-source or collector-emitter path including load
- Input circuit: means connected to gate- or base-connection
- Feedback from the output to the input circuit: does not include e.g. common source or emitter connections as a voltage reference

References

Limiting references

This place does not cover:

gated amplifiers	H03F 3/72
switching arrangements for exchange systems using static devices	H04Q 3/52

Informative references

Attention is drawn to the following places, which may be of interest for search:

In electric printing, selection of a stylus or auxiliary electrode to be supplied with current for transfer to printing or impression transfer material	B41J 2/405
Switching or interrupting devices in waveguides	H01P

H03K 17/002

{Switching arrangements with several input- or output terminals (code converters [H03M 5/00](#), [H03M 7/00](#))}

Definition statement

This place covers:

General multiplexers (block diagrams)

Special rules of classification

More detailed structures are classified as follows:

bipolar transistor based mux circuits: [H03K 17/62](#) and subgroups

field-effect transistor based mux circuits: [H03K 17/693](#)

diode based mux circuits: [H03K 17/76](#)

H03K 17/04**Modifications for accelerating switching****Definition statement***This place covers:*

Acceleration means

References**Limiting references***This place does not cover:*

the mere speed gain one gets by using a different material, type of transistor, etc	H03K 17/51
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H03K 17/0406

{in composite switches}

Definition statement*This place covers:*

Composite switches -> mainly IGBTs

H03K 17/06**Modifications for ensuring a fully conducting state****References****Limiting references***This place does not cover:*

Diode replacement circuits	H03K 17/30
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H03K 17/08**Modifications for protecting switching circuit against overcurrent or overvoltage****References****Limiting references***This place does not cover:*

For testing etc. of semiconductors	G01R 31/26
Safety devices eventually	G05B 9/02 , F16P 3/00 , G05B 19/042

Special rules of classification

Protection circuits for protecting the switch go in here, those protecting the load go in [H02H 3/00](#) (remember to distribute it in classification). We will therefore in almost any case have to search in there as well.

Any document with a switch and a temperature detector is classified in [H03K 2017/0806](#).

H03K 17/0812

by measures taken in the control circuit

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Circuits whose output signals could be used for x-bar current prevention in a half-bridge, i.e. non-overlapping signals	H03K 5/1515
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H03K 17/0814

by measures taken in the output circuit

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

For solid state switches which are protected by having a mechanical switch (MEMS) in series	H01H 9/548
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H03K 17/10

Modifications for increasing the maximum permissible switched voltage

References

Limiting references

This place does not cover:

by merely different types of transistors	H10
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H03K 17/12

Modifications for increasing the maximum permissible switched current

References

Limiting references

This place does not cover:

by merely different types of transistors	H10
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H03K 17/13

Modifications for switching at zero crossing (generating an impulse at zero crossing [H03K 5/1536](#))

References

Limiting references

This place does not cover:

generating an impulse at zero crossing	H03K 5/1536
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H03K 17/16

Modifications for eliminating interference voltages or currents

Definition statement

This place covers:

Caused by the switching, e.g. reducing switching noise

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

means for preventing simultaneous conduction	H03K 5/1515 , H02M 1/38
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H03K 17/163

{Soft switching}

Special rules of classification

Soft switching aspects are also classified in [H02H 9/001](#)

H03K 17/166

{Soft switching}

Special rules of classification

Soft switching aspects are also classified in [H02H 9/001](#)

H03K 17/18

Modifications for indicating state of switch

Definition statement

This place covers:

Any kind of state, i.e. not only the switching state but also e.g. if short-circuited, how many times overloaded so far etc. etc.

indicating -> display or generation of feedback signals to higher entity etc.

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

Indicating	display or generation of feedback signals e.g. to a higher entity etc...
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H03K 17/22

Modifications for ensuring a predetermined initial state when the supply voltage has been applied (bi-stable generators [H03K 3/12](#))

Definition statement

This place covers:

Merely power-on-reset circuits of any kind

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Arrangements for measuring currents or voltages Indicating that current or voltage is either above or below a predetermined value	G01R 19/165
Resetting means	G06F 1/24 , G06F 1/26

H03K 17/24

Storing the actual state when the supply voltage fails

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

latches for opamps or comparator	H03K 3/02335
logic circuit	H03K 3/0375
bipolar transistor	H03K 3/2865
field-effect transistor	H03K 3/356008

H03K 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](#))

Definition statement

This place covers:

Also Christmas tree type pre-programmable plugs

H03K 17/30

Modifications for providing a predetermined threshold before switching (shaping pulses by thresholding [H03K 5/08](#))

Definition statement

This place covers:

Keeping an absolute switching threshold or switching at a threshold different from the threshold of the switching element

References

Limiting references

This place does not cover:

Shaping pulses by thresholding	H03K 5/08
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Informative references

Attention is drawn to the following places, which may be of interest for search:

For logic circuits	H03K 19/0021
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Special rules of classification

Diode replacement Transistors can also be classified in [H03K 17/06](#) or [H03K 17/063](#).

H03K 17/60

the devices being bipolar transistors (bipolar transistors having four or more electrodes [H03K 17/72](#))

References

Limiting references

This place does not cover:

bipolar transistors having four or more electrodes	H03K 17/72
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H03K 17/64

having inductive loads

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Driving circuits for electromagnets making use of a switching regulator	H01H 47/325
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H03K 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](#))

References**Limiting references**

This place does not cover:

logic circuits	H03K 19/00
Code converters	H03M 5/00 , H03M 7/00

H03K 17/94

characterised by the way in which the control signals are generated

Definition statement

This place covers:

Some detection methods which are not to be found elsewhere & details related to the operation of generic sensors.

This class contains different sensing principles:

microwave

RF energy sensor

ultrasonic

infrasonic

acoustically activated

temperature activated

Power supply related documents are found here and in [H03K 17/945](#) if for generic sensor. [H03K 17/951](#) is for power supply for non-generic sensor, even if not magnetic.

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Keyboards for special applications: see the relevant places	B41J , G06F 3/023 , H04L 15/00 , H04L 17/00 , H04M 1/00
Structural details of switches, relays or selectors and emergency protective devices, their contact and mechanical operating arrangements; operation by mechanical forces or by a change of physical condition; time programming switches and switches providing a selected number of operations of the contacts	H01H

Glossary of terms

In this place, the following terms or expressions are used with the meaning indicated:

RF energy sensor	e.g. to sense absorption of RF energy by a resonant tank circuit at predetermined frequencies, where the tank circuit corresponds to each keybutton. An emitter device emits energy in a path of tank circuit towards the RF energy sensor. A determination device determines a depression state of the keybuttons in accordance with absorption
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H03K 17/941

{using an optical detector ([H03K 17/968](#) takes precedence)}

References

Limiting references

This place does not cover:

Detection only, no switching	G01S 17/04
Optical scanner	G02B26/08M4B
Photocouplers	

Informative references

Attention is drawn to the following places, which may be of interest for search:

Light barriers and using reflection on object	G01V 8/00 , G01S 17/04
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H03K 17/945

Proximity switches ([H03K 17/96](#) takes precedence)

Definition statement

This place covers:

Constructional details, housings for sensors, network of proximity sensors, programming of proximity switches

References

Limiting references

This place does not cover:

Touch switches	H03K 17/96
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Explicitly for magnetic proximity sensors	H03K 17/9505
Proximity fuzes	F42C 13/00
Housings for sensors	G01D 11/245

Detecting masses or objects, e.g. using a magnetic or optical detector	G01V 3/00 , G01V
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H03K 2017/9455

{constructional details}

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Constructional details of proximity switches using a magnetic detector	H03K 17/9505
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H03K 17/9502

{Measures for increasing reliability}

Definition statement

This place covers:

Temperature compensation, self-test, redundant sensors, security switches (using codes), passive and active responders, protection against noise and interference

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Transponders in proximity switches	H03K 17/9522 , H03K 17/9525
Passive transponders,	G06K 7/086 , G01D 5/2066

H03K 17/951

{Measures for supplying operating voltage to the detector circuit}

Definition statement

This place covers:

For practical purposes also power supply details of non-magnetic touch sensors.

H03K 17/9515

{using non-linear magnetic devices}

Definition statement

This place covers:

Also bistable magnetic elements (Barkhausen effect, Wiegand effect, Matteucci effect).

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Electronic switching or gating using a magnetic movable element	H03K 17/97
Wiegand effect	G01P
Barkhausen effect	G01P 3/488

H03K 17/9517

{using galvanomagnetic devices}

Definition statement

This place covers:

Hall effect sensors, magnetoresistance.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

If target is magnetic:	H03K 17/97
Hall effect:	G01R 33/07 , G01D 5/145
Magnetoresistance:	G01R 33/09

H03K 17/952

{using inductive coils}

Special rules of classification

[H03K 17/9537](#) takes precedence.

H03K 17/9537

{in a resonant circuit}

Definition statement

This place covers:

LC-resonant circuit in general (e.g. signal is interrogation pulse, usually generating damped or decaying oscillations)

H03K 17/9542

{forming part of an oscillator}

Definition statement

This place covers:

LC-resonant circuit forming part of oscillator; the variable parameter is undetermined

H03K 17/9545**{with variable frequency}****Definition statement***This place covers:*

LC-resonant circuit forming part of oscillator; the variable parameter is oscillation frequency

H03K 17/9547**{with variable amplitude}****Definition statement***This place covers:*

LC-resonant circuit forming part of oscillator; the variable parameter is oscillation amplitude

H03K 17/955**using a capacitive detector****Definition statement***This place covers:*

Charge transfer, phase comparison, frequency shift, resistance-capacitance timing circuits

References**Limiting references***This place does not cover:*

Electrically operated windows or roofs	E05F 15/00
Distance measurement	G01D 5/24

Informative references*Attention is drawn to the following places, which may be of interest for search:*

Capacitive touch switches	H03K 17/962
Detection of varying capacitance	G01D 5/24
Housings for sensors	G01D 11/00
Measuring capacitance	G01R 27/2605

H03K 17/96**Touch switches (specially adapted for electronic time-pieces with no moving parts [G04G 21/08](#))****Definition statement***This place covers:*

Constructional details, detection principles, simulation of slider, key illumination details

References

Limiting references

This place does not cover:

specifically adapted for electronic time-pieces with no moving parts	G04G 21/08
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H03K 17/962

{Capacitive touch switches}

Definition statement

This place covers:

Detection principle

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Measuring capacitance	G01R 27/2605
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H03K 17/9622

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

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Digitisers by capacitive means	G06F 3/044
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H03K 17/9625

{using a force resistance transducer}

Definition statement

This place covers:

Means for interpreting an external force as a variable resistance (e.g. strain gauges)

References

Limiting references

This place does not cover:

Resistive touch switches	H03K 17/9645
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Measuring force or stress in general	G01L 1/20
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Measuring force or stress using distributed sensing elements	G01L 1/205
Digitisers using force sensing means	G06F 3/0414
Adjustable resistors adjustable by mechanical pressure of force	H01C 10/10
Adjustable resistors by using means responding to magnetic or electric fields, e.g. by addition of magnetisable or piezoelectric particles to the resistive material	H01C 10/103
Adjustable resistors on resistive material dispersed in an elastic material	H01C 10/106
Adjustable by changing surface pressure between resistive masses or resistive and conductive masses	H01C 10/12
Switches with contacts carried by or formed from layers in a multilayer structure, e.g. membrane switches	H01H 13/702
Switches characterised by the material of the contacts, e.g. conductive polymers	H01H 13/785

H03K 17/9627**{Optical touch switches}****Definition statement***This place covers:*

ONLY documents which disclose reflection on a permanent interface surface

H03K 17/9629**{using a plurality of detectors, e.g. keyboard}****Definition statement***This place covers:*

Simulation of slider, in combination with display

References**Informative references***Attention is drawn to the following places, which may be of interest for search:*

Digitisers by opto-electronic means	G06F 3/042
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H03K 17/9638**{using a light guide}****Definition statement***This place covers:*

With deformation of the light guide

Glossary of terms*In this place, the following terms or expressions are used with the meaning indicated:*

Touch	Deformation
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H03K 17/9645**{Resistive touch switches}****Definition statement***This place covers:*

An object (e.g. finger) provides path for current

H03K 17/965**Switches controlled by moving an element forming part of the switch****Definition statement***This place covers:*

Tactile feedback, illuminated, rotary, ...

References**Limiting references***This place does not cover:*

Joysticks with analog output	G05G 9/047
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H03K 17/968**using opto-electronic devices****References****Limiting references***This place does not cover:*

Optical rotary encoders per se	G01D 5/3473
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H03K 17/969**having a plurality of control members, e.g. keyboard****References****Informative references***Attention is drawn to the following places, which may be of interest for search:*

Coding in connection with keyboards or like devices using opto-electronic means	H03M211/26
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H03K 17/97**using a magnetic movable element****Definition statement***This place covers:*

Type of magnetic sensor: inductance, hall sensor, magnetoresistance

References**Informative references***Attention is drawn to the following places, which may be of interest for search:*

Hall sensors	G01D 5/145
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H03K 17/975**using a capacitive movable element****Definition statement***This place covers:*

The movable part is an electrode forming part of the switch or the dielectric

References**Informative references***Attention is drawn to the following places, which may be of interest for search:*

Mechanical means for transferring the output of a sensing member by varying capacitance	G01D 5/24
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H03K 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****Definition statement***This place covers:*

Circuits having at least two inputs acting on one output inverting circuits or buffers.

Relationships with other classification placesWhen a circuit is used or adapted for switching a load, it is classified in [H03K 17/00](#). When it is used/ adapted for driving a logic circuit (e.g. output buffer), it goes to [H03K 19/00](#).**References****Limiting references***This place does not cover:*

circuits for computer systems using fuzzy logic	G06N 7/02
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Informative references

Attention is drawn to the following places, which may be of interest for search:

Nanotechnology logic	B82Y 10/00
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Special rules of classification

The groups [H03K 19/00369](#) take precedence over [H03K 19/0005](#)

[H03K 19/003](#): Circuits for increasing the reliability, not for notifying the user that a failure took place

[H03K 19/00323](#): Skew compensation

[H03K 19/00346](#): Slope control, slew rate adaptation

[H03K 19/007](#): Circuits in this class go, when they fail, to a safe state. They do not notify the user of a failure

[H03K 19/01](#) covers accelerating switching in logic circuits and should not be confused with [H03K 17/04](#) which covers accelerating the switching of a switch

[H03K 19/177](#): Field Programmable Gate Arrays (FPGA).

H03K 19/082

using bipolar transistors

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

In combination with field-effect transistor	H03K 19/094
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H03K 19/12

using diode rectifiers

References**Informative references**

Attention is drawn to the following places, which may be of interest for search:

Diode-transistor logic	H03K 19/084
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H03K 21/00

Details of pulse counters or frequency dividers

Definition statement

This place covers:

Details of logic circuits having electric(digital) pulses as input signals and either counting incoming pulses or producing an output pulse stream based on the incoming pulse stream having a modified pulse repeating period.

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Changing Frequency	H03K 5/00006
High Security Counting	G01C 22/02
Measuring Pulse Width Time	G01R 29/00
Non-integer Counting and Performing Operations by counting	G06F 7/60
Number-of-one (population) Counter	G06F 7/607
Binary Multiplication and Pulse rate divider	G06F 7/62 – G06F 7/68
PLLs including Dividers	H03B , H03L

H03K 21/02

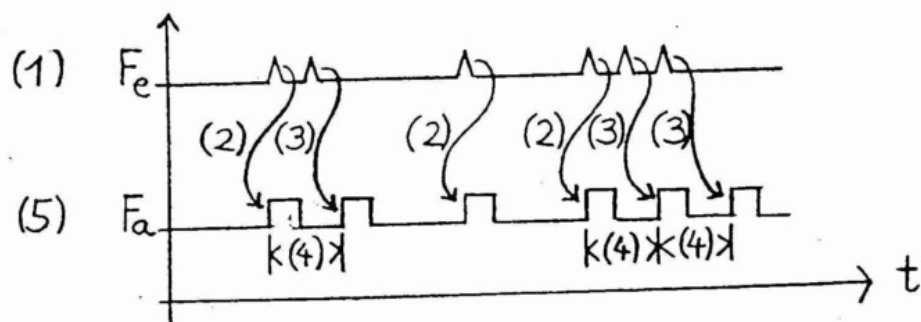
Input circuits

Definition statement

This place covers:

Special logic at input for pulse treatment e.g. pulse shaping

Illustrative examples of subject matter classified in this group:



Figur 2

Figure taken from DE3842874

H03K 21/08

Output circuits

Definition statement

This place covers:

Special logic at register outputs e.g. for a counter value dependent reset.

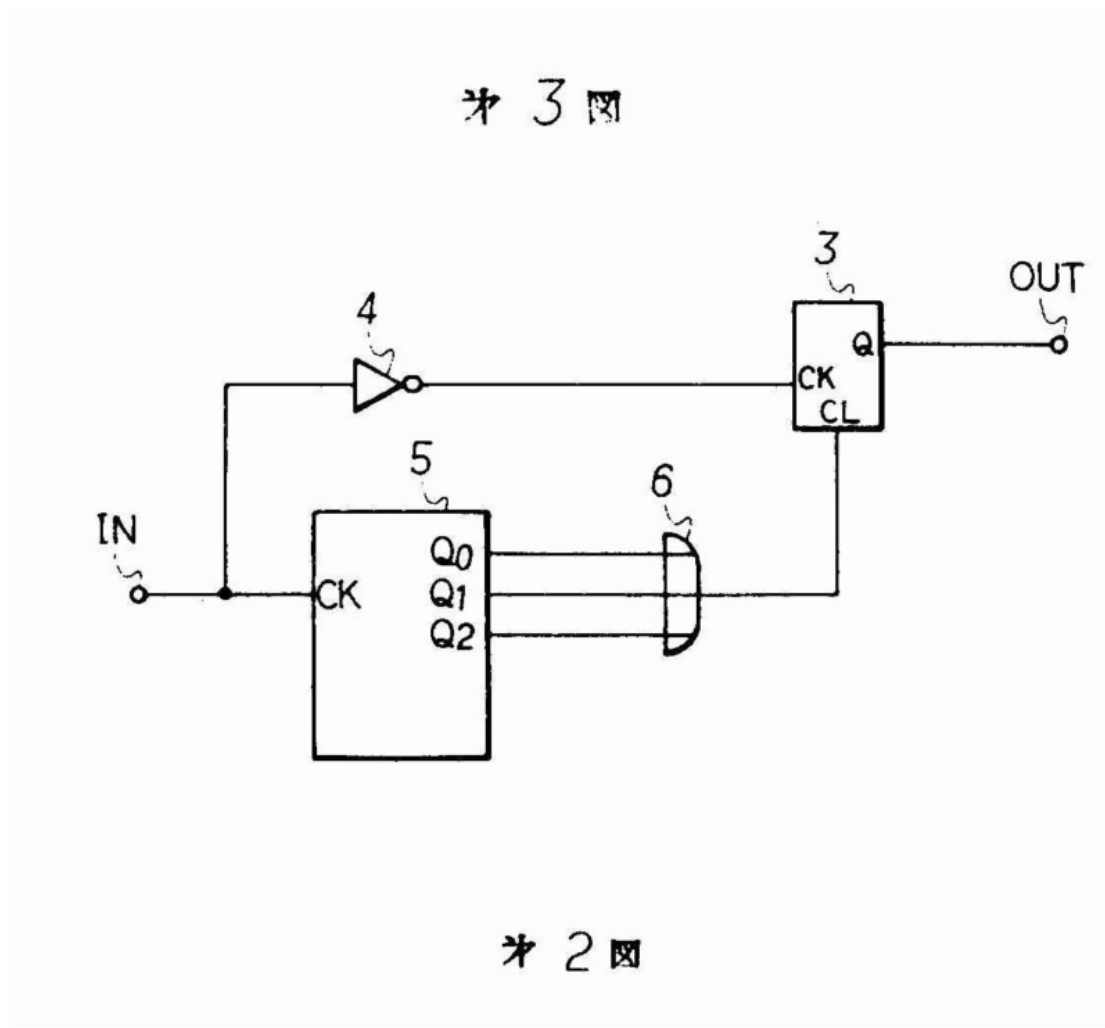


Figure taken from JP57199337

H03K 21/16

Circuits for carrying over pulses between successive decades

Definition statement

This place covers:

Logic counter having multiple counting stages including a carry over bit between stages.

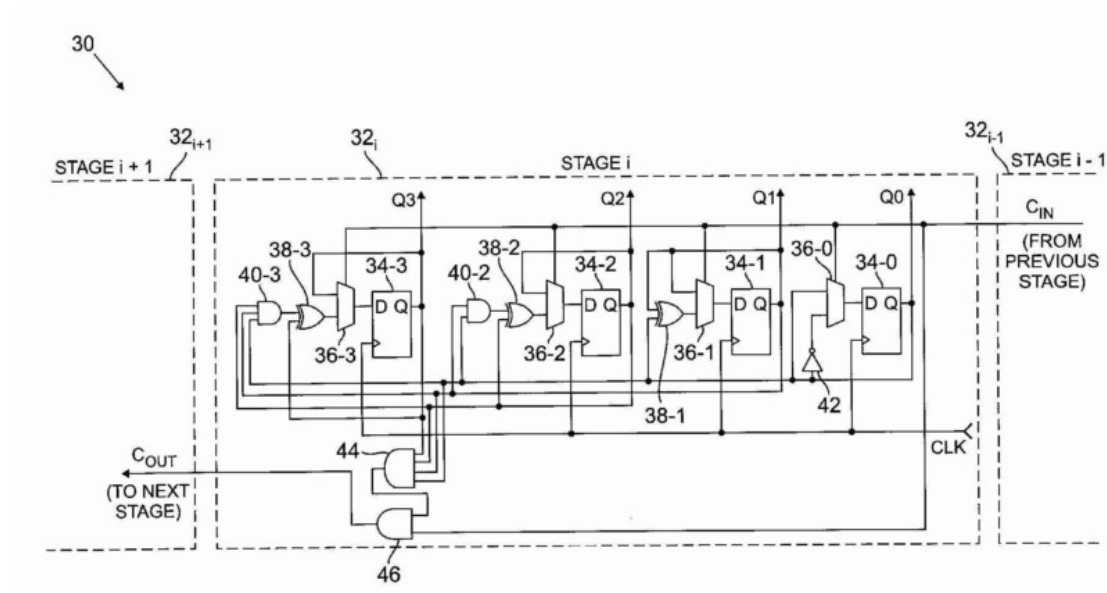


Figure taken from US5,946,369

H03K 21/18**Circuits for visual indication of the result****Definition statement**

This place covers:

Logic for representing the result to a user.

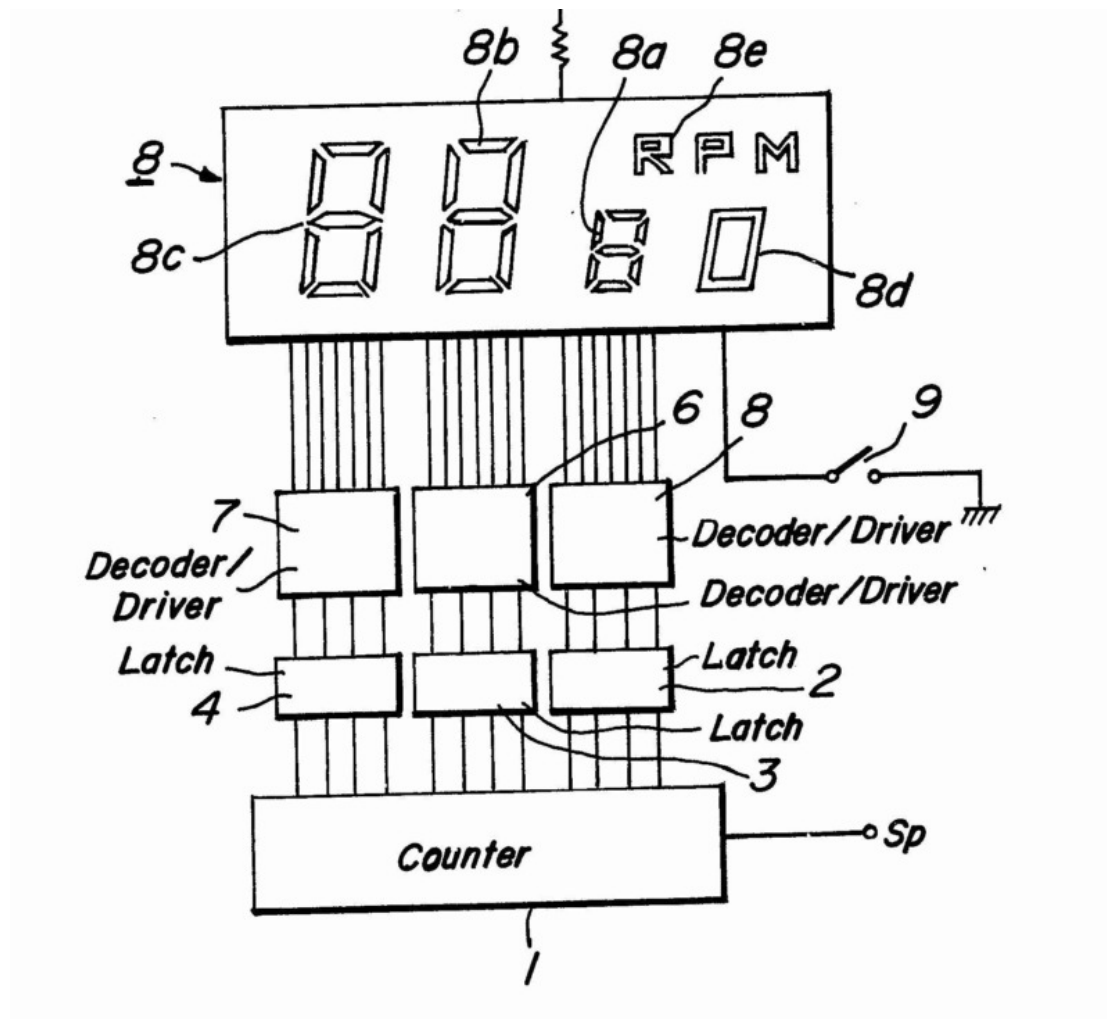


Figure taken from DE3031612

H03K 21/38

Starting, stopping or resetting the counter (counters with a base other than a power of two [H03K 23/48](#), [H03K 23/66](#))

Definition statement

This place covers:

Logic for influencing the counter status.

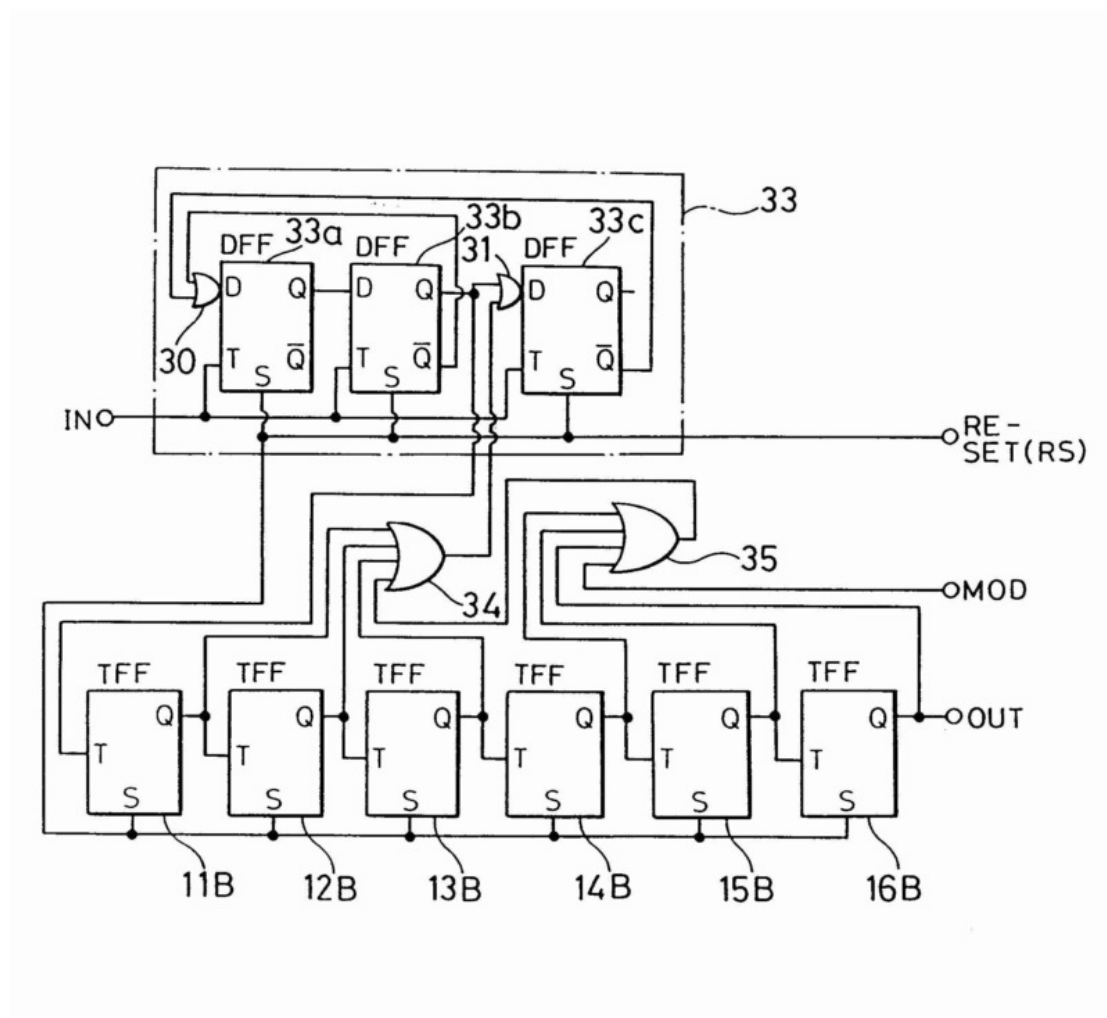


Figure taken from EP0471390.

H03K 21/40

Monitoring; Error detection; Preventing or correcting improper counter operation

Definition statement

This place covers:

Monitoring whether an error occurred during the counting process (not the process producing the pulses)

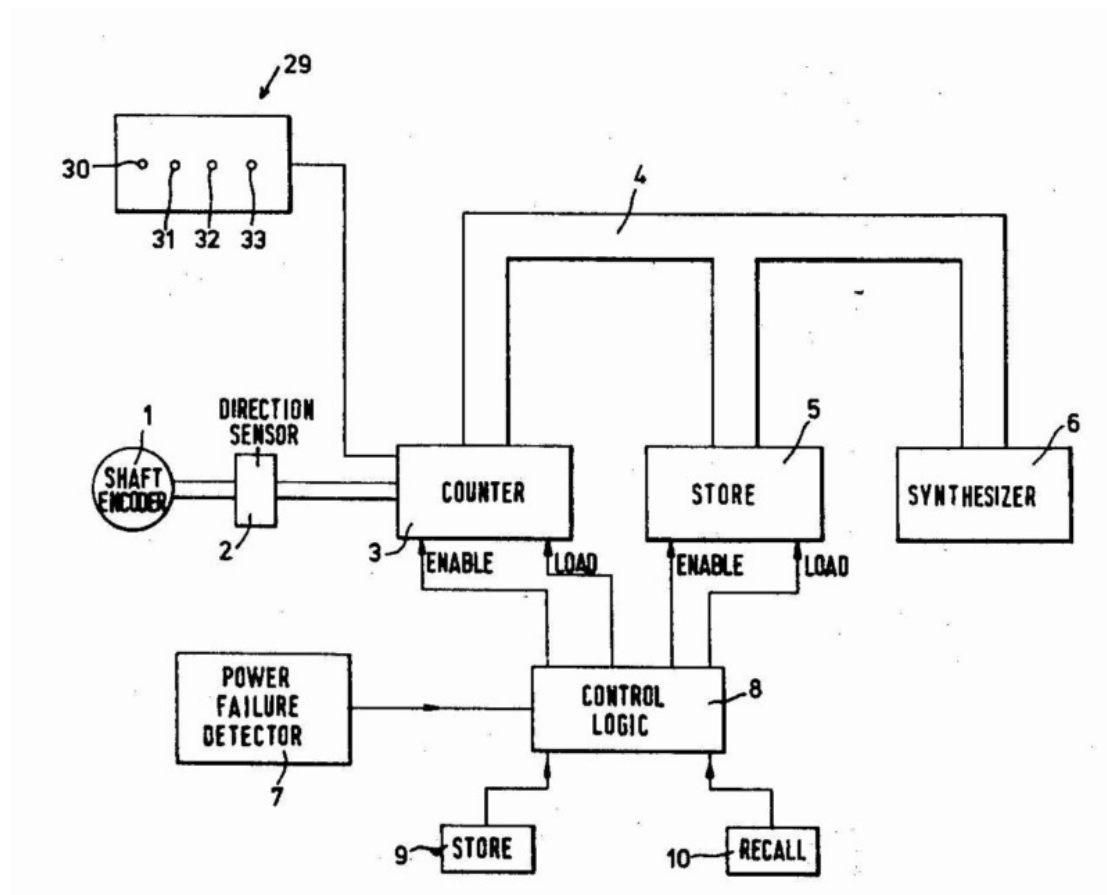


Figure taken from DE2550177

H03K 23/00

Pulse counters comprising counting chains; Frequency dividers comprising counting chains ([H03K 29/00](#) takes precedence)

Definition statement

This place covers:

Logic for digital counting chains used in pulse counters or frequency dividers

H03K 23/001

{using elements not covered by groups [H03K 23/002](#) and [H03K 23/74](#) - [H03K 23/84](#)}

Definition statement

This place covers:

Other elements as complementary IGFET's, electrically-ignited compounds e.g. pyrotechnical static relays

H03K 23/004

{Counters counting in a non-natural counting order, e.g. random counters}

Definition statement

This place covers:

Detailed counting encoding scheme.

H03K 23/40

Gating or clocking signals applied to all stages, i.e. synchronous counters
{([H03K 23/74](#) - [H03K 23/84](#) take precedence)}

Definition statement

This place covers:

Details regarding the clock used for triggering the counting of incoming pulses

H03K 23/58

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

Definition statement

This place covers:

Counter with a "rippling" trigger pulse form stage to stage - asynchronous counters.

H03K 23/64

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

Definition statement

This place covers:

Variable counting base, non-integer or odd-number counters.

H03K 23/80

using semiconductor devices having only two electrodes, e.g. tunnel diode, multi-layer diode

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Unijunction transistors	H03K 23/84
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H03K 25/00

Pulse counters with step-by-step integration and static storage; Analogous frequency dividers

Definition statement

This place covers:

Static storage type counters - e.g. capacitive type

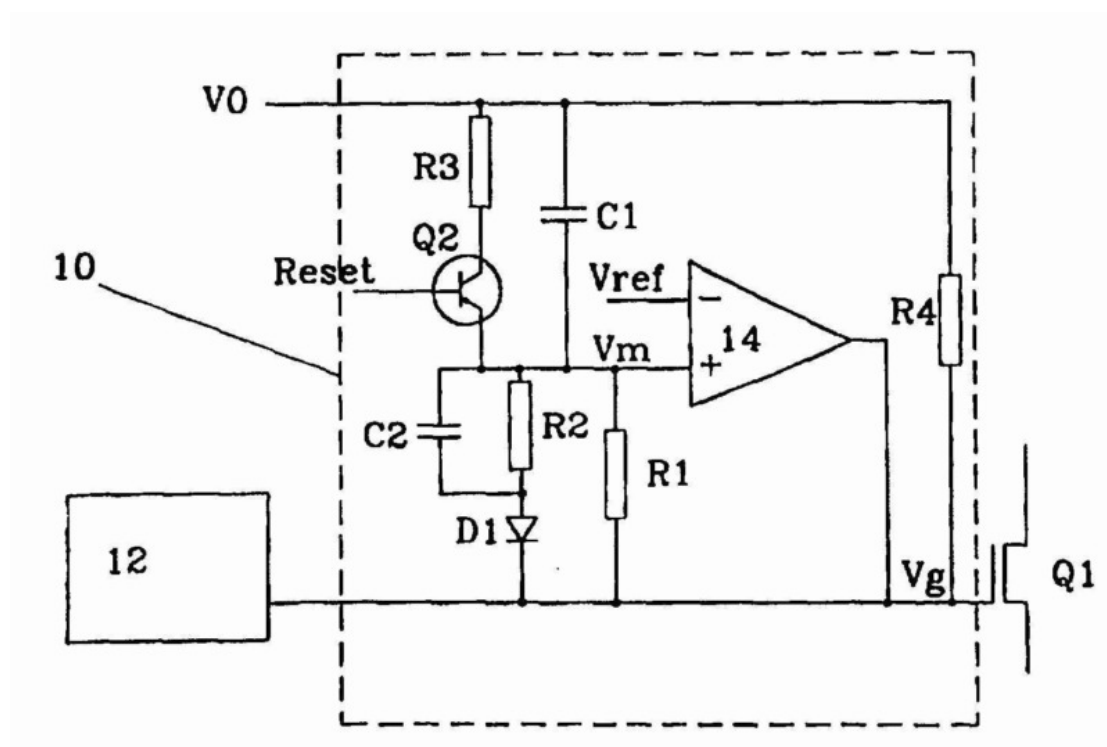


Figure taken from EP0916188

H03K 27/00

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

Definition statement

This place covers:

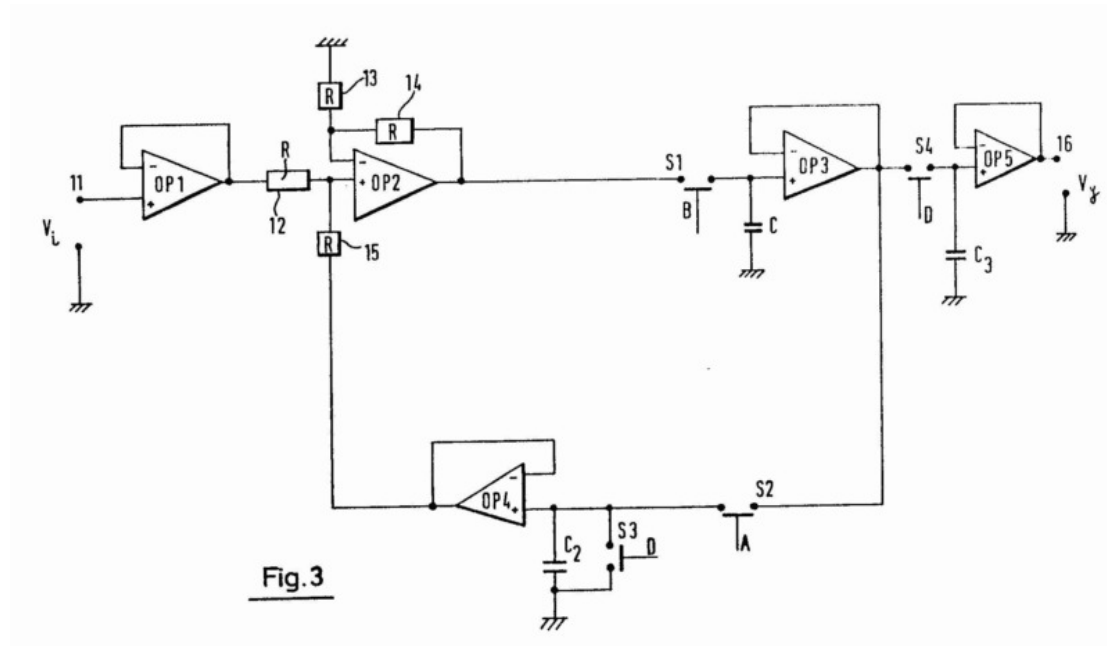


Figure taken from GB2008296.

H03K 29/00

Pulse counters comprising multi-stable elements, e.g. for ternary scale, for decimal scale; Analogous frequency dividers

Definition statement

This place covers:

A triggering pulse is generated in response to each input signal to be counted. The triggering pulse is applied to the device to change the voltage across the device. The voltage across the device is output as an indication of the number of received input signals. The device may be a resonant tunnelling

diode with multiple peaks in its current versus voltage characteristic. The device may be a resonant tunnelling diode with multiple peaks in its current versus voltage characteristic.

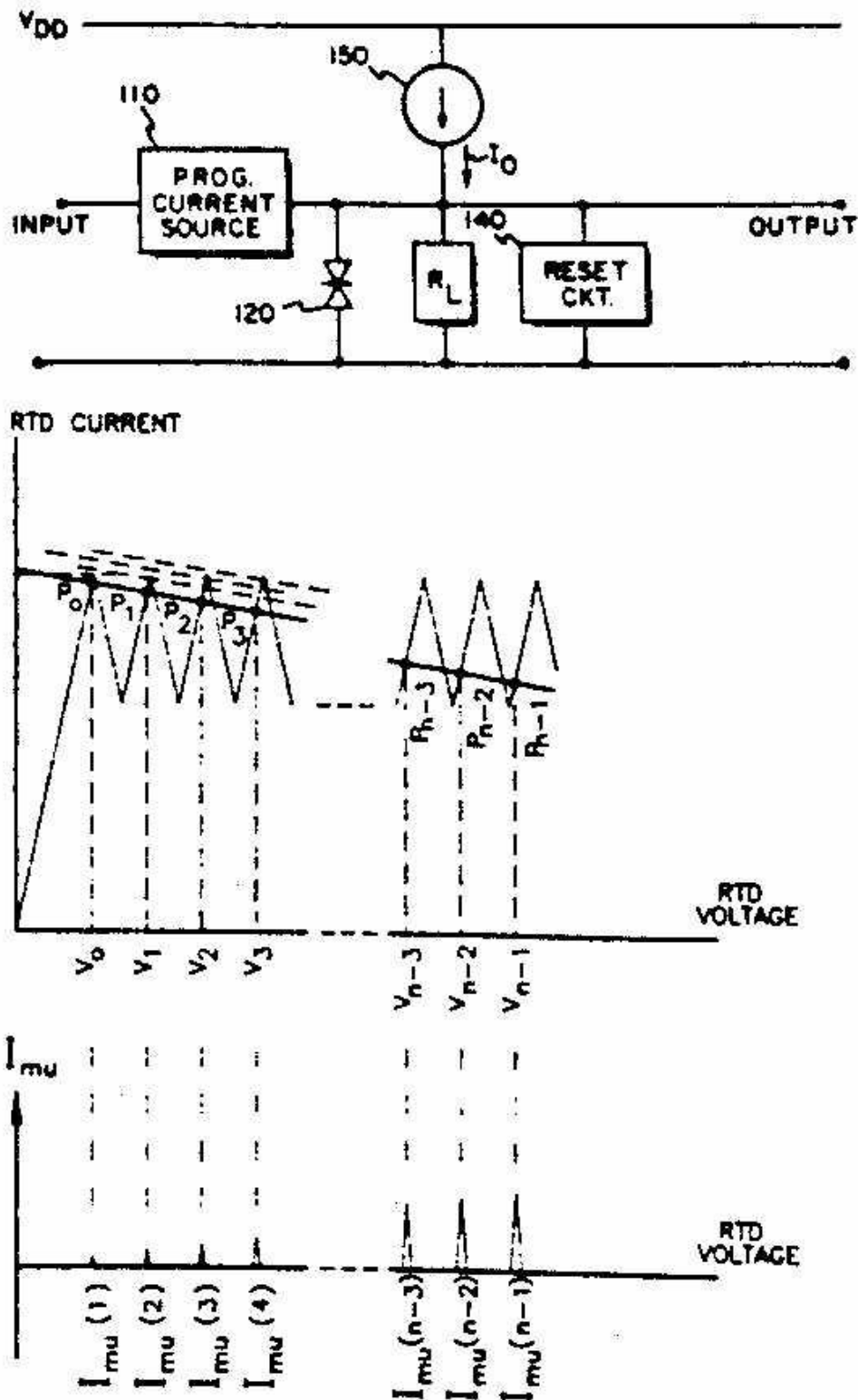


Figure taken from US 5,033,069

H03K 2217/96015

Constructional details for touch switches

References

Informative references

Attention is drawn to the following places, which may be of interest for search:

Capacitive touch switches	H03K 2217/9607
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