

H03K

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

Definition statement

This place 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.

In general, it should be noted that the word 'Pulse' in the title description is a clear limiting feature for this subclass.

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

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
--------------	--

H03K 3/00

Circuits for generating electric pulses; Monostable, bistable or multistable circuits ([H03K 4/00](#) takes precedence; for digital computers [G06F 1/025](#), {[G06F 1/04](#)})

Definition statement

This place covers:

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

References

Limiting references

This place does not cover:

Duty cycle correction circuits	H03K 5/1565
Pulse width modulation	H03K 7/08
Random number generators	G06F 7/58
Linear (non-switching) oscillators	H03B

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 4/00

Generating pulses having essentially a finite slope or stepped portions (generation of supply voltages from deflection waveforms [H04N 3/18](#))

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

Limiting references

This place does not cover:

Modifying slopes of pulses	H03K 6/04
Direct-digital frequency synthesizers	G06F 1/025
Generation of supply voltages from deflection waveforms	H04N 3/18

Special rules of classification

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

H03K 5/00

Manipulating pulses not covered by one of the other main groups in this subclass (circuits with regenerative action [H03K 3/00](#), [H03K 4/00](#); by the use of non-linear magnetic or dielectric devices [H03K 3/45](#))

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
-----------------------------	---------------------------

H03K 5/003**Changing the DC level (television signals [H04N 3/00](#))****References****Limiting references***This place does not cover:*

Level shifters interfacing between logic families or coupling logic circuit stages	H03K 19/0175
--	------------------------------

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 5/04**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**Limiting references***This place does not cover:*

For details of threshold comparators	H03K 5/24 , G01R 19/165 , H03F 3/45
Clamping for ESD protection	H01L 27/0251

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.

References

Limiting references

This place does not cover:

If the value of the threshold being switched is generated by feedback	H03K 5/086
If the value is generated by feedback AND modified by switching	H03K 5/088

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 5/1252

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
--	---

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 {(measuring time intervals using electronic timing, e.g. counting means [G04F 1/005](#))}

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

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 .
--	-----------------------------

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	H03K5/132
---------------------------------------	------------------

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
---	---------------------------

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
------------------------	----------------------------

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](#); {measuring characteristics of individual pulses [G01R 29/02](#)})

References

Informative references

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

indicating of signal events	G01R
-----------------------------	----------------------

H03K 5/1532

Peak detectors

Definition statement

This place covers:

Peak instant detectors only

References

Limiting references

This place does not cover:

Peak level detectors	G01R 19/04
AM demodulators and envelope detectors	H03D 1/00

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
---------------------	----------------------------

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
--------------------	--

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.

\

References

Limiting references

This place does not cover:

Discrete pulse modulation	H04L 25/00 , G06F 1/025
---------------------------	---

H03K 7/04

Position modulation, i.e. PPM

References

Limiting references

This place does not cover:

Impulse radio, UWB signals	H04B 1/69
----------------------------	---------------------------

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 or -braking (selection of the stylus or auxiliary electrode in electric printing [B41J 2/405](#); sample-and-hold arrangements [G11C 27/02](#); switching or interrupting devices in waveguides [H01P](#); gated amplifiers [H03F 3/72](#); switching arrangements for exchange systems using static devices [H04Q 3/52](#))

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

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
---	----------------------------

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
----------------------------	----------------------------

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
---	-----------------------------

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
---	----------------------------

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	H01L
--	----------------------

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	H01L
--	----------------------

H03K 17/13**Modifications for switching at zero crossing (generating an impulse at zero crossing [H03K 5/153](#))****References*****Informative references****Attention is drawn to the following places, which may be of interest for search:*

zero crossing detectors	H03K 5/1536
-------------------------	-----------------------------

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
--	---

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...
------------	--

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](#); {for logic circuits [H03K 19/0021](#)})

Definition statement

This place covers:

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

Special rules of classification

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

H03K 17/687

using field-effect transistors

References

Limiting references

This place does not cover:

IGBTs	H03K 17/56
-------	----------------------------

H03K 17/94

characterised by the way in which the control signal is generated (mechanical structural details of control members of switches or keyboards, such as keys, push-buttons, levers or other mechanisms for transferring force to the activated elements, not directly producing electronic effects [H01H](#); keyboards for special applications, see the relevant places, e.g. [B41J](#), [G06F 3/023](#), [H04L 15/00](#), [H04L 17/00](#), [H04M 1/00](#))

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

Limiting references

This place does not cover:

Optical passive sensors	H03K 17/941
Doppler-effect microwave sensor	G01S 13/56)
Ultrasonic alarms	G08B 13/16
Alarms using Doppler-effect	G08B 13/1627
Pyroelectric alarms	G08B 13/19
Radio-controlled	G08C 17/02

Informative references

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

for reflection on object	G01S , G01V , G08B
for HF proximity sensors operating with electromagnetic waves (near field)	G01V 3/12
Circuit arrangements or systems for wireless supply or distribution of electric power	H02J 50/00

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
------------------	--

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 17/026
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 17/026
---	---

H03K 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](#)})

Definition statement

This place covers:

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

References

Informative references

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

Explicitly for magnetic proximity sensors	H03K 17/9505
Housings for sensors	G01D 11/245

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

Definition statement

This place covers:

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

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
-----------------------	------------------------------

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
--------------------------------	----------------------------

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
--------------------------	------------------------------

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
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
-------------------------------------	----------------------------

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
-------	-------------

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
------------------------------	----------------------------

H03K 17/968

using opto-electronic devices

References**Limiting references**

This place does not cover:

Optical rotary encoders per se	G01D 5/3473
--------------------------------	-----------------------------

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	H03M21 1/26
---	--------------------

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
--------------	----------------------------

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
---	---------------------------

H03K 19/00

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

Definition statement

This place covers:

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

Relationships with other classification places

When 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:

Inverting circuits used as delay element	H03K 5/13
Clock generation/distribution	G06F 1/04

Program control	G06F 9/00
Hot Plugging (device-to-bus)	G06F 13/4081
CAD, Layout and Routing	G06F 17/50
I/O data interface arrangement	G11C 7/10
ESD protection	H01L 27/0248
Emergency protective circuits	H02H
Baseband systems (for transmission): line drivers, impedance matching, termination	H04L 25/02

Informative references

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

Nano-technology logic	B82Y 10/00
-----------------------	----------------------------

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 21/00

Details of pulse counters or frequency dividers {(number-of-one counters [G06F 7/607](#))}

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

Limiting references

This place does not cover:

Changing Frequency	H03K 5/00006
High Security Counting	G01C 22/02
Measuring Pulse Width Time	G01R 29/00

Coincidence Detection	G01T1/72
Non-integer Counting and Performing Operations by counting	G06F 7/60
Member-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

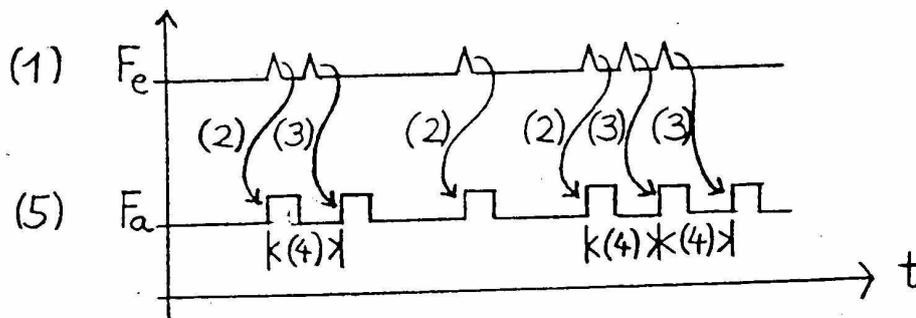
Input circuits

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:



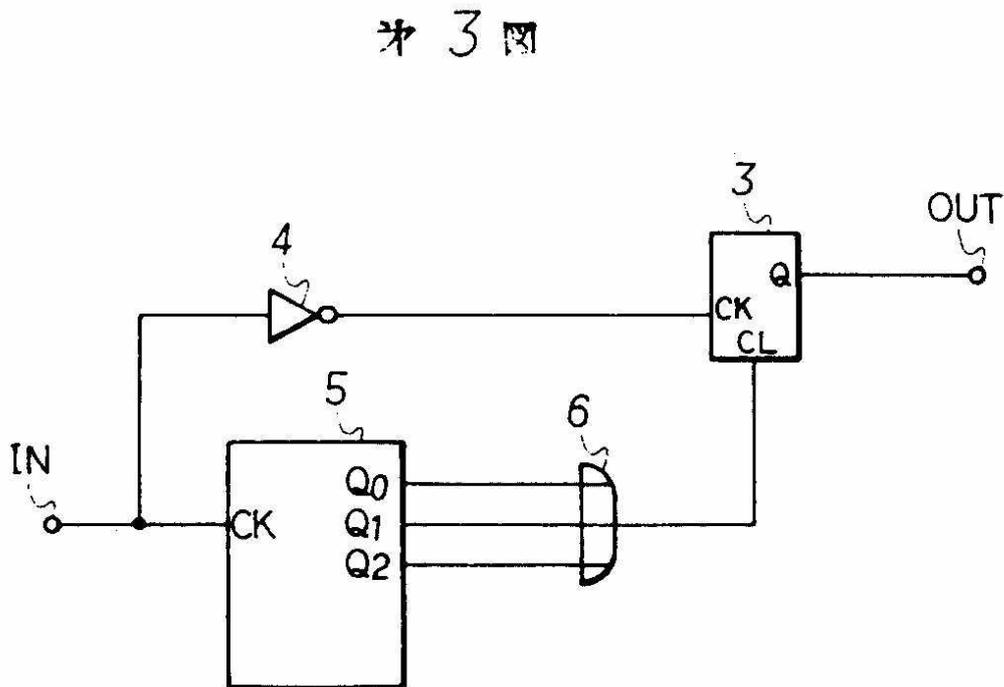
Figur 2

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.



* 2 *

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.

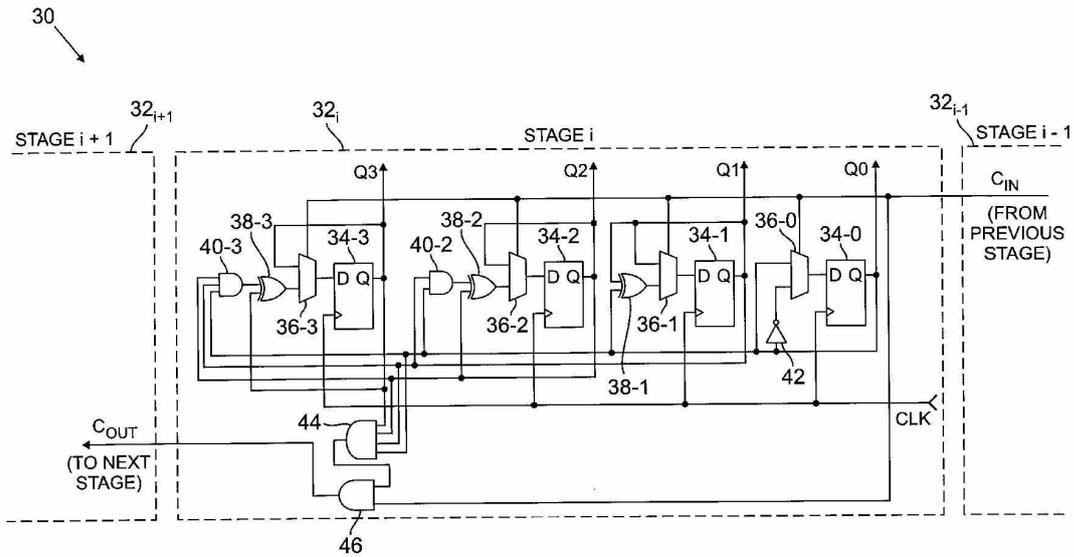


Figure taken from US5,946,369

H03K 21/18

Circuits for visual indication of the result

Definition statement

This place covers:

Logic for representing the result to a user.

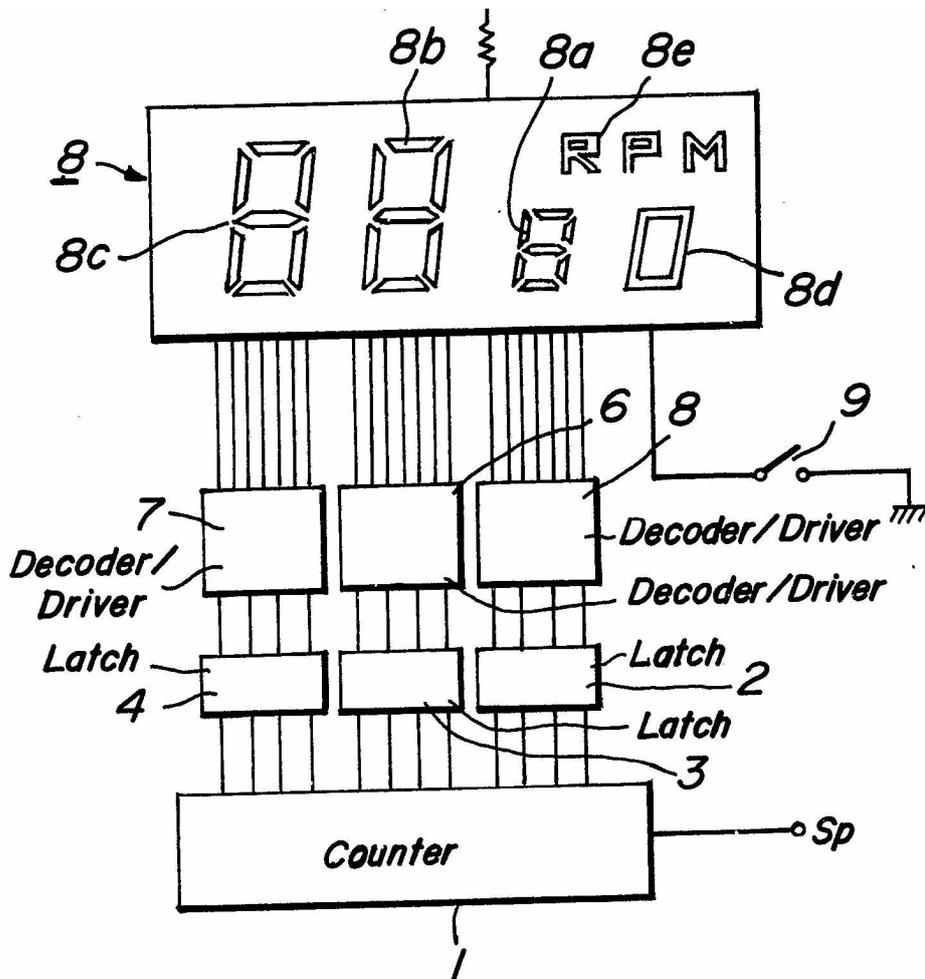


Figure taken from DE3031612

H03K 21/40

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)

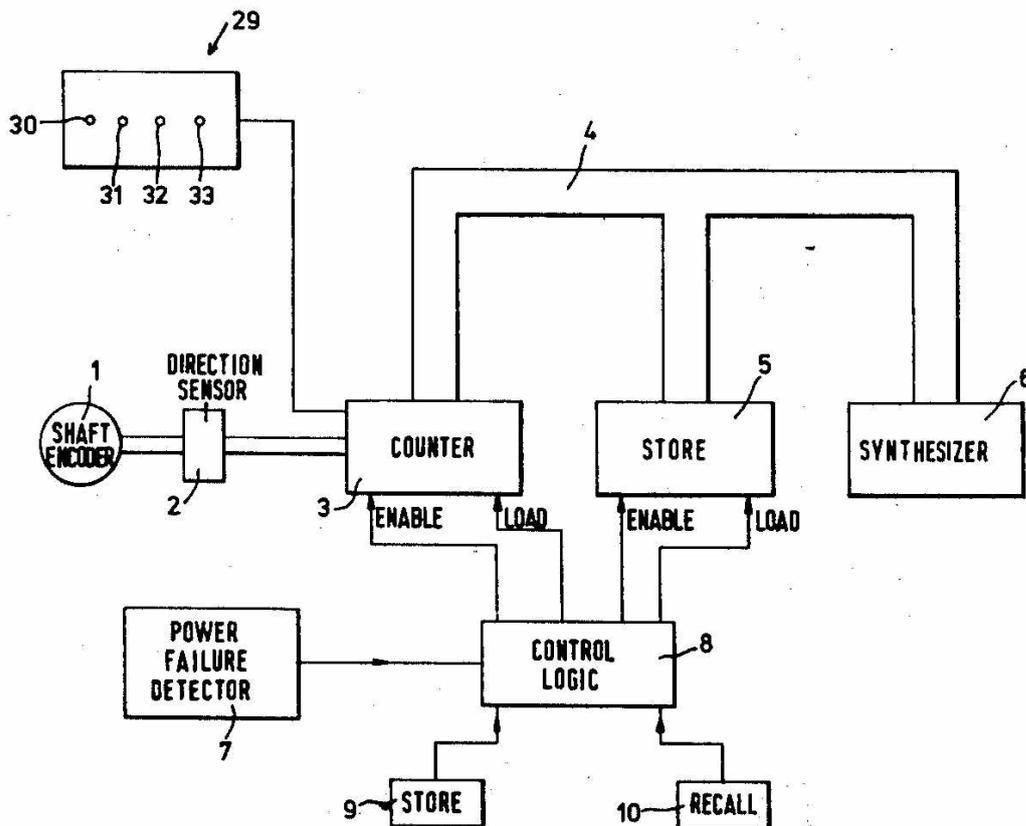


Figure taken from DE2550177

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 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

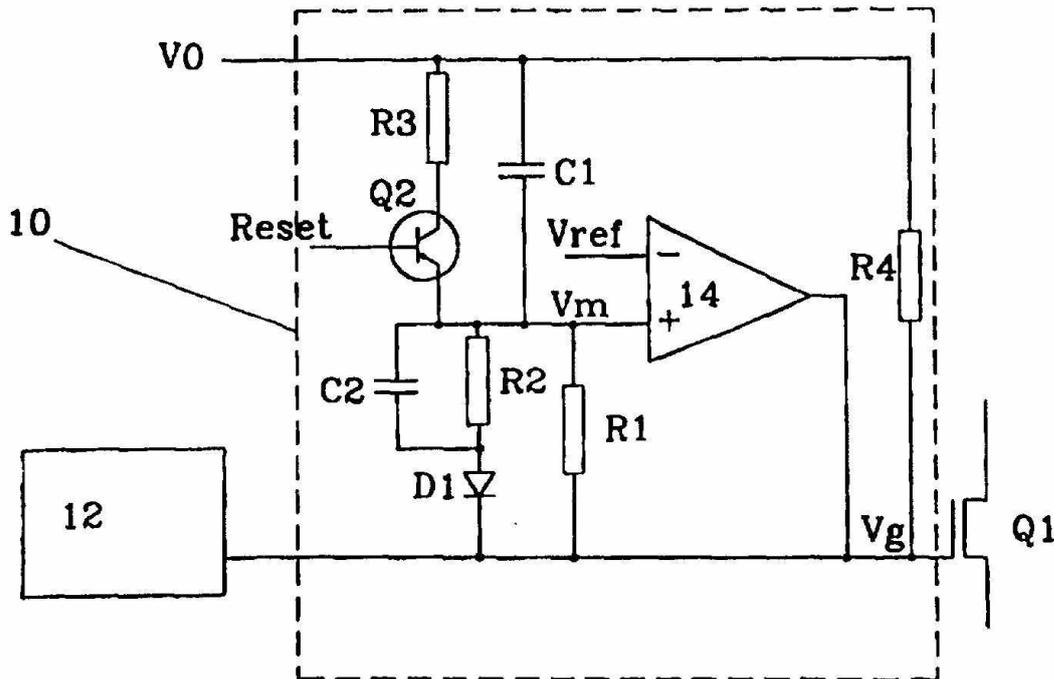


Figure taken from EP0916188

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:

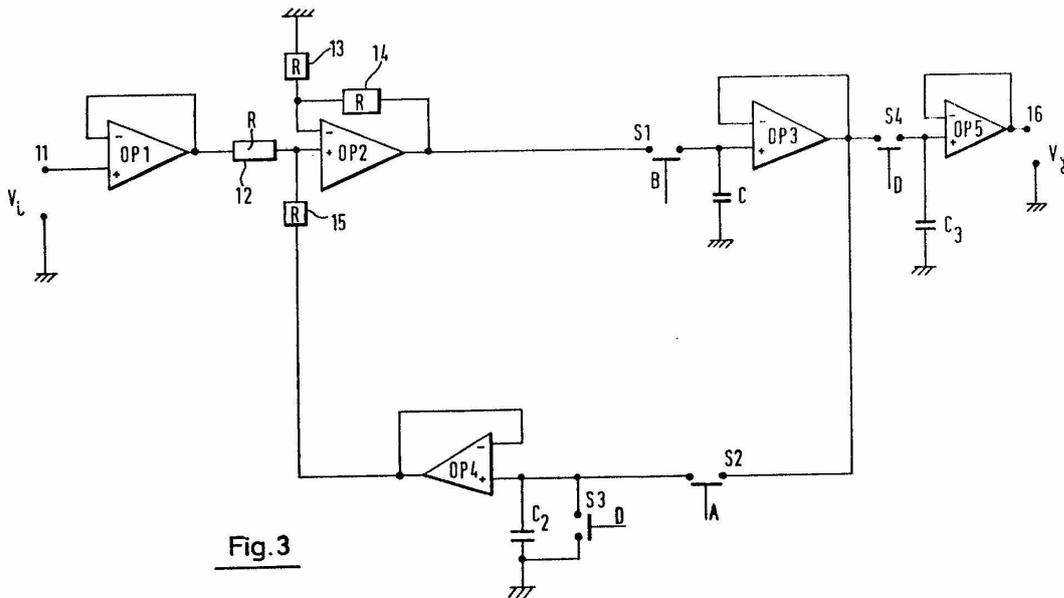


Figure taken from GB2008296.

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.

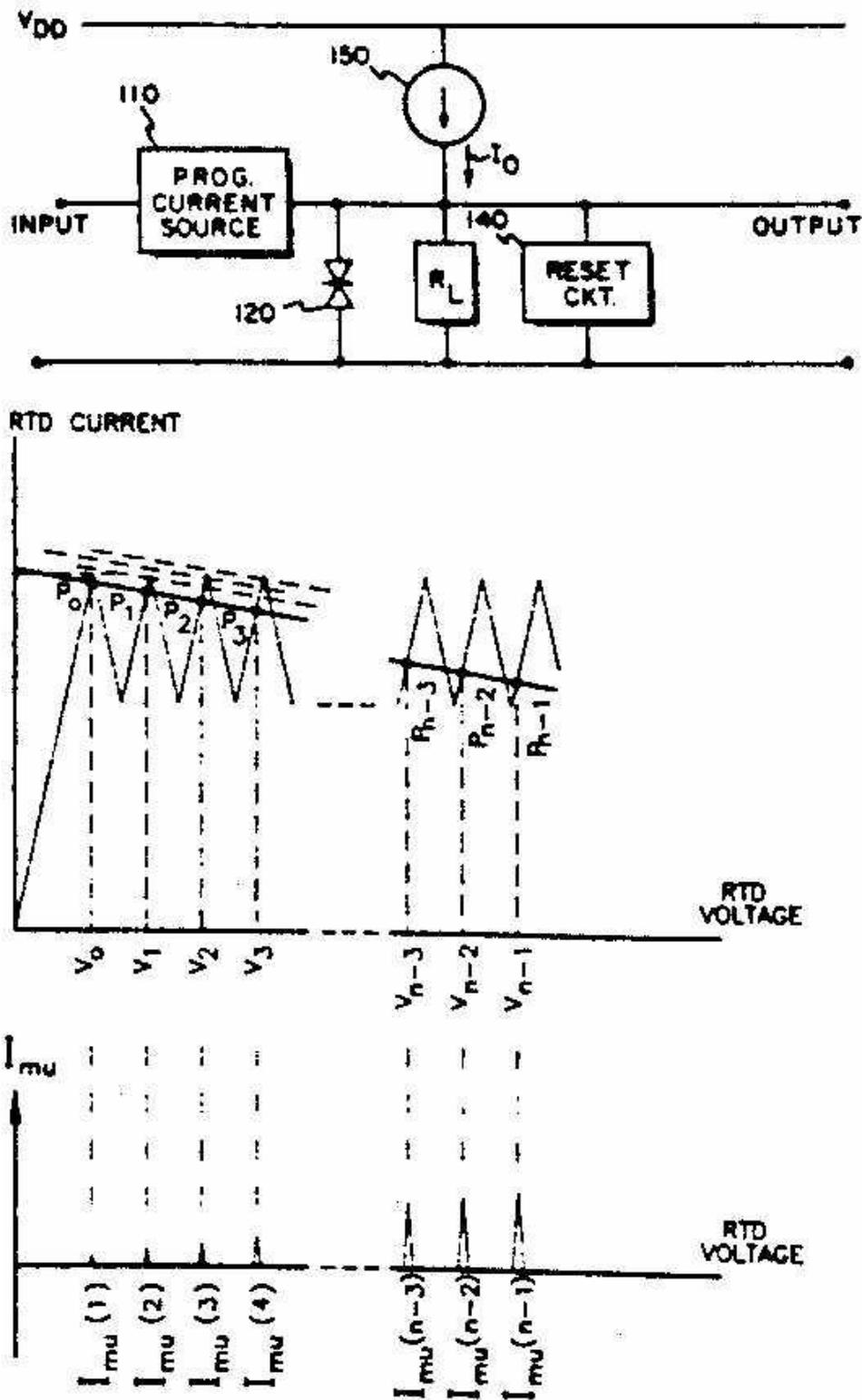


Figure taken from US 5,033,069