

## H03L

### AUTOMATIC CONTROL, STARTING, SYNCHRONISATION, OR STABILISATION OF GENERATORS OF ELECTRONIC OSCILLATIONS OR PULSES (of dynamo-electric generators [H02P](#))

#### Definition statement

*This place covers:*

Automatic control circuits for generators of electronic oscillations or pulses; starting, synchronization, or stabilization circuits for generators where the type of generator is irrelevant or unspecified.

#### References

##### Limiting references

*This place does not cover:*

This subclass does not cover stabilisation or starting circuits specially adapted to only one specific type of generator, which are covered by subclasses [H03B](#), [H03K](#).

#### Glossary of terms

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

automatic control	covers only closed loop systems
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## H03L 1/00

### Stabilisation of generator output against variations of physical values, e.g. power supply (automatic control [H03L 5/00](#), [H03L 7/00](#))

#### Definition statement

*This place covers:*

Stabilisation of generator output against variations caused by environmental variations such as temperature, process variations when the generator is (partly) integrated on an electronic chip, aging of the components constituting the generator.

#### References

##### Informative references

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

Against variations of temperature only	<a href="#">H03L 1/02</a>
Modifications of generator, of oscillations using amplifier with regenerative feedback from output to input, to compensate for variations in physical values.	<a href="#">H03B 5/04</a>
Modifications of generator, for generating electric pulses, to compensate for variations in physical values.	<a href="#">H03K 3/011</a>

#### Special rules of classification

Documents disclosing compensation against temperature variations and against another physical parameter are classified in the subgroup [H03L 1/02](#) in addition to [H03L 1/00](#).

**H03L 1/021****{of generators comprising distributed capacitance and inductance}****Definition statement***This place covers:*

Said distributed capacitances and inductances could be also delay lines, micro-strips, and the like.

**H03L 1/023****{by using voltage variable capacitance diodes}****Definition statement***This place covers:*

All devices having a variable capacitance e.g. Junction capacitors, MOS-capacitors, and the like.

**H03L 1/04****Constructional details for maintaining temperature constant****Definition statement***This place covers:*

also ovens for maintaining temperature constant

**H03L 5/00****Automatic control of voltage, current, or power****Definition statement***This place covers:*

Arrangements for automatic controlling the output level/amplitude of the generator. The output of the generator could be a voltage, current or power.

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

Control of voltage, current or power wherein the generators are not generators for electronic oscillations or pulses e.g. level shifts, power management, power supply regulators, automatic transmission power control, etc.

**H03L 5/02****of power****Definition statement***This place covers:*

Arrangements for automatic controlling the output power level of the generator.

## H03L 7/00

Automatic control of frequency or phase; Synchronisation (tuning of resonant circuits in general [H03J](#); synchronising in digital communication systems, see the relevant groups in class [H04](#))

### Definition statement

*This place covers:*

All documents for automatic controlling the frequency or phase of the output of the generator.

## H03L 7/02

using a frequency discriminator comprising a passive frequency-determining element

### Definition statement

*This place covers:*

All means for converting the frequency to any of voltage, current or digital signal e.g. frequency-to-voltage converter, frequency-to-current converter, frequency-to-digital converter.

## H03L 7/04

wherein the frequency-determining element comprises distributed inductance and capacitance

### Definition statement

*This place covers:*

Distributed capacitances and inductances could be also delay lines, micro-strips, and the like.

## H03L 7/06

using a reference signal applied to a frequency- or phase-locked loop

### Definition statement

*This place covers:*

The reference signal is a frequency reference signal including constant frequency signal, data signal, and the like.

### References

#### Limiting references

*This place does not cover:*

Modulation signal (e.g. US2008032649)	<a href="#">H03C 3/0908</a>
Modulated signal (e.g. US5625319)	<a href="#">H03D 3/241</a>

## H03L 7/07

using several loops, e.g. for redundant clock signal generation (for indirect frequency synthesis [H03L 7/22](#))

### Definition statement

*This place covers:*

More than loop having each its own controlled oscillator and/or phase shifter.

### References

#### Limiting references

*This place does not cover:*

More than loop sharing a controlled oscillator and/or phase shifter with or without use of a switching means.	<a href="#">H03L 7/087</a>
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## H03L 7/0802

{the loop being adapted for reducing power consumption ([H03L 7/14](#) takes precedence)}

### Definition statement

*This place covers:*

the "loop" meaning a Phase-locked loop (PLL) or a Delay-locked loop (DLL).

## H03L 7/0807

{concerning mainly a recovery circuit for the reference signal}

### Definition statement

*This place covers:*

Recovery circuit for recovering the reference signal from the input signal, e.g. data signal.

### References

#### Informative references

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

Synchronisation of receiver with transmitter using the transitions of the received signal to control the phase of the synchronising-signal-generating means, e.g. using a phase-locked loop	<a href="#">H04L 7/033</a>
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### Synonyms and Keywords

DCR or CDR	data/clock or clock/data recovery
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## H03L 7/081

provided with an additional controlled phase shifter {(H03L 7/0998 takes precedence)}

### Definition statement

*This place covers:*

Controlled phase shifter in the loop e.g. delay element, phase selector, phase interpolator, and the like.

### Special rules of classification

This subgroup does not include additional phase shifter outside the loop e.g. in the reference path or in the output path.

## H03L 7/0812

{and where no voltage or current controlled oscillator is used}

### Definition statement

*This place covers:*

Delay-locked loops.

## H03L 7/0814

{the phase shifting device being digitally controlled}

### Definition statement

*This place covers:*

Controlled phase shifter which is digitally controlled e.g. by a register and/or an up-down counter.

## H03L 7/083

the reference signal being additionally directly applied to the generator (direct frequency synchronisation without loop [H03L 7/24](#))

### Definition statement

*This place covers:*

Reference signal being additionally directly applied to the controlled oscillator in the loop.

## H03L 7/085

concerning mainly the frequency- or phase-detection arrangement including the filtering or amplification of its output signal ([H03L 7/10](#) takes precedence; frequency or phase detection comparison in general [H03D 3/00](#), [H03D 13/00](#))

### Definition statement

*This place covers:*

- Frequency or phase detectors generating an up-down output pulse signal at a single terminal, e.g. an EXOR gate.
- Frequency or phase detectors comprising a time-to-digital converter (TDC).

**H03L 7/089**

**the phase or frequency detector generating up-down pulses ([H03L 7/087](#) takes precedence)**

**Definition statement**

*This place covers:*

Phase or frequency detector generating up-down pulses at separate terminals of the detector.

**H03L 7/0893**

**{the up-down pulses controlling at least two source current generators or at least two sink current generators connected to different points in the loop}**

**Definition statement**

*This place covers:*

The up-down pulses being generated by the same phase or frequency detector.

**H03L 7/0898**

**{the source or sink current values being variable ([H03L 7/0896](#) takes precedence)}**

**Definition statement**

*This place covers:*

Means for adjusting or tuning the value of the source or sink current.

the phase or frequency detector using a sampling device ([H03L 7/087](#) takes precedence)

**H03L 7/091**

**the phase or frequency detector using a sampling device ([H03L 7/087](#) takes precedence)**

**Definition statement**

*This place covers:*

Phase or frequency detectors comprising sampling devices such as flip-flops, A/D converters, or the like.

**H03L 7/093**

**using special filtering or amplification characteristics in the loop ([H03L 7/087](#) - [H03L 7/091](#) take precedence)**

**Definition statement**

*This place covers:*

Loop filtering, amplification, or any other manipulation of the signal provided by the phase/frequency detector which results in a control signal for the controlled oscillator of the loop.

## H03L 7/095

using a lock detector ([H03L 7/087](#) takes precedence)

### Definition statement

*This place covers:*

Details of the lock detector.

### References

#### Limiting references

*This place does not cover:*

Lock detectors without any detailed features. The lock detectors without detailed features are classified in other subgroups according to the purpose/use of the said lock detector.

## H03L 7/097

using a comparator for comparing the voltages obtained from two frequency to voltage converters

### Definition statement

*This place covers:*

Frequency to voltage converters converting the frequency of the reference signal and the frequency of the feedback signal to a voltage, current or digital signal. The voltage, current or digital signal is used by the comparator.

## H03L 7/0991

{the oscillator being a digital oscillator, e.g. composed of a fixed oscillator followed by a variable frequency divider ([H03L 7/0995](#) takes precedence; fixed oscillators with means for selecting among various phases [H03L 7/0814](#))}

### Definition statement

*This place covers:*

Digital oscillators which are analogly or digitally controlled.

### References

#### Limiting references

*This place does not cover:*

Analog oscillators which are digitally or numerically controlled (DCO, NCO)	<a href="#">H03L 7/099</a>
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## H03L 7/0992

{comprising a counter or a frequency divider}

### Definition statement

*This place covers:*

Counter or frequency divider being part of the controlled digital oscillator.

## References

### Limiting references

*This place does not cover:*

Counters or frequency dividers which are part of the feedback path or output path outside the loop.	<a href="#">H03L 7/18</a>
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## H03L 7/0994

{comprising an accumulator}

### Definition statement

*This place covers:*

Digital oscillators comprising an accumulator e.g. Direct Digital Synthesizers (DDS).

## References

### Limiting references

*This place does not cover:*

Direct Digital Synthesizers DDS per se, which are not part of a PLL.	<a href="#">G06F 1/0321</a>
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## H03L 7/10

for assuring initial synchronisation or for broadening the capture range

### Definition statement

*This place covers:*

Means for speeding up the lock-in of the loop in general.

## H03L 7/107

using a variable transfer function for the loop, e.g. low pass filter having a variable bandwidth

### Definition statement

*This place covers:*

Low pass loop filter having a variable bandwidth for the purpose of assuring synchronisation or broadening the capture range of the PLL.

## References

### Limiting references

*This place does not cover:*

Low pass loop filter having a variable bandwidth for other purposes.	<a href="#">H03L 7/093</a>
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## H03L 7/14

for assuring constant frequency when supply or correction voltages fail {or are interrupted}

### Definition statement

*This place covers:*

Arrangements and methods for assuring constant output frequency of the generator when the reference signal fails or is interrupted, or when the control signal of the controlled oscillator of the PLL or the controlled delay of the DLL fails or is interrupted.

## H03L 7/185

using a mixer in the loop ([H03L 7/187](#) - [H03L 7/195](#) take precedence)

### Definition statement

*This place covers:*

Mixer in addition to the frequency divider or counter.

### References

#### Limiting references

*This place does not cover:*

Mixer without a frequency divider or counter.	<a href="#">H03L 2207/12</a>
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## H03L 7/187

using means for coarse tuning the voltage controlled oscillator of the loop ([H03L 7/191](#) - [H03L 7/195](#) take precedence)

### Special rules of classification

When the means for coarse tuning the controlled oscillator is not specific for frequency synthesizers, the document would be (additionally) classified in the subgroup **H03L/10**.

## H03L 7/191

using at least two different signals from the frequency divider or the counter for determining the time difference ([H03L 7/193](#), [H03L 7/195](#) take precedence)

### Definition statement

*This place covers:*

At least two different signals generated by the frequency divider or the counter or derived from frequency divider or counter output are used by the phase/frequency detector.

**H03L 7/193**

the frequency divider/counter comprising a commutable pre-divider, e.g. a two modulus divider (pulse counters/frequency dividers [H03K 21/00](#) - [H03K 29/00](#))

**Definition statement**

*This place covers:*

Also multi-modulus dividers.

**H03L 7/1976**

{using a phase accumulator for controlling the counter or frequency divider}

**Definition statement**

*This place covers:*

Also Delta-Sigma modulators used for controlling the counter or frequency divider.

**H03L 7/22**

using more than one loop

**Definition statement**

*This place covers:*

More than loop having each its own controlled oscillator and/or phase shifter.

**References****Limiting references**

*This place does not cover:*

More than loop sharing a controlled oscillator and/or phase shifter with or without use of a switching means.	<a href="#">H03L 7/087</a>
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**H03L 7/24**

using a reference signal directly applied to the generator

**Definition statement**

*This place covers:*

e.g. injection-locked oscillators, oscillator arrays, mutually-coupled oscillators.

**H03L 7/26**

using energy levels of molecules, atoms, or subatomic particles as a frequency reference

**Definition statement**

*This place covers:*

e.g. atomic clocks.