

**CPC****COOPERATIVE PATENT CLASSIFICATION****G04F**

**TIME-INTERVAL MEASURING** (measuring pulse characteristics [G01R](#), e.g. [G01R 29/02](#); in radar or like systems [G01S](#); masers [H01S 1/00](#); generation of oscillations [H03B](#); generation or counting of pulses, frequency dividing, analogue/digital conversion [H03K](#){ time fuzes [F42C 9/00](#)})

**NOTE**

This subclass covers:

- apparatus for measuring-off predetermined time intervals;
- apparatus for producing such intervals as timing standards, e.g. metronomes;
- apparatus for measuring unknown intervals, e.g. precision systems for short time interval measurement.

**WARNING**

The following IPC groups are not used in the CPC scheme. Subject matter covered by these groups is classified in the following CPC groups:

[G04F 10/08](#) covered by [G04F 5/16](#)

**G04F 1/00**

**Apparatus which can be set and started to measure-off predetermined or adjustably-fixed time intervals without driving mechanisms, e.g. egg timer** (electric time and time-programme switches [H01H 43/00](#))

**G04F 1/005**

- . {using electronic timing, e.g. counting means (pulse time delay arrangements [H03K 5/13](#); modifications of electronic switches for introducing a time delay before switching [H03K 17/28](#))}

**G04F 1/02**

- . by consuming prefixed quantities of materials, e.g. by burning candle

**G04F 1/04**

- . by movement or acceleration due to gravity

**G04F 1/06**

- .. by flowing-away of a prefixed quantity of fine-granular or liquid materials, e.g. sand-glass, water-clock

**G04F 1/063**

- ... {using acoustic signalling}

**G04F 1/066**

- ... {using electrical contact device}

**G04F 1/08**

- .. by a body falling a prefixed distance in air or in a viscous material

**G04F 3/00**

**Apparatus which can be set and started to measure-off predetermined or adjustably-fixed time intervals with driving mechanisms, e.g. dosimeter with clockwork** (electric time or time-programme switches [H01H 43/00](#))

**G04F 3/02**

- . with mechanical driving mechanisms

**G04F 3/022**

- .. {using mechanical signalling device}

**G04F 3/025**

- .. {mechanically actuated (cigar or cigarette receptacles or boxes with means for limiting the frequency of smoking [A24F 15/005](#))}

**G04F 3/027**

- .. {using electrical contacts, e.g. for actuating electro-acoustic device}

**G04F 3/04**

- .. Additional arrangements in connection with ordinary non-electric clocks for this purpose

**G04F 3/06**

- . with electric driving mechanisms

G04F 3/08 . . Additional arrangements in connection with ordinary electric clocks for this purpose

**G04F 5/00** **Apparatus for producing preselected time intervals for use as timing standards** (generating clock signals for electric digital computers [G06F 1/04](#); regulating frequency in general [H03C](#), [H03L](#))

- G04F 5/02 . Metronomes {(periodic signalisation by acoustic signals in general [G04B 21/005](#))}
- G04F 5/022 . . {Mechanic metronomes}
- G04F 5/025 . . {Electronic metronomes}{rhythm generation for electrophonic musical instruments [G10H 1/36](#)}
- G04F 5/027 . . {using electro-mechanical driving e.g. of optical scanned recordings (electrophonic musical instruments in which tones are generated by electromechanical means e.g. by using pick-up means for reading recorded waves [G10H 3/00](#))}
- G04F 5/04 . using oscillators with electromechanical resonators {producing electric oscillations or timing pulses}
- G04F 5/06 . . using piezoelectric resonators
- G04F 5/063 . . . {Constructional details} (details of resonators in general [H03H 9/02](#))
- G04F 5/066 . . . . {Trimmer condensators (capacitors in general [H01G](#))}
- G04F 5/08 . . using magnetostrictive resonators
- G04F 5/10 . using electric or electronic resonators ([G04F 5/14](#) takes precedence)
- G04F 5/12 . using fluidic devices
- G04F 5/14 . using atomic clocks
- G04F 5/145 . . {using Coherent Population Trapping}
- G04F 5/16 . using pulses produced by radioisotopes

**G04F 7/00** **Apparatus for measuring unknown time intervals by mechanical means**

- G04F 7/02 . by measuring the distance of fall or the final velocity of a falling body
- G04F 7/04 . using a mechanical oscillator

**WARNING**

The subgroups of [G04F 7/04](#) are not complete pending reclassification; see also this group

- G04F 7/06 . . running only during the time interval to be measured, e.g. stop-watch
- G04F 7/062 . . . {with reset mechanisms}
- G04F 7/065 . . . {with start-stop control arrangements}
- G04F 7/067 . . . . {with a single push-button or actuation member for start-stop and reset}
- G04F 7/08 . . Watches or clocks with stop devices, e.g. chronograph
- G04F 7/0804 . . . {with reset mechanisms}
- G04F 7/0809 . . . . {with single hammers, i.e. one hammer acts on each counter}
- G04F 7/0814 . . . . {with double hammer, i.e. one hammer acts on two counters}
- G04F 7/0819 . . . . {with triple hammer, i.e. one hammer acts on three counters}
- G04F 7/0823 . . . {with couplings between the chronograph mechanism and the base movement}
- G04F 7/0828 . . . . {acting in the plane of the movement}

- G04F 7/0833 . . . . {acting perpendicular to the plane of the movement}
- G04F 7/0838 . . . . {involving a tilting movement}
- G04F 7/0842 . . . {with start-stop control mechanisms}
- G04F 7/0847 . . . . {with column wheel}
- G04F 7/0852 . . . . {with member having a rotational two-way movement, e.g. navette}
- G04F 7/0857 . . . . {with single push-button or actuation member for start-stop and reset}
- G04F 7/0861 . . . . {actuated by other than push-buttons, e.g. bezel or lever}
- G04F 7/0866 . . . {Special arrangements}
- G04F 7/0871 . . . . {with multiple chronograph functions, i.e. to count multiple running times (alternate time counting [G07C](#))}
- G04F 7/0876 . . . . {Split-time function e.g. rattrapante}
- G04F 7/088 . . . . {with display of fraction of seconds, e.g. foudroyante}
- G04F 7/0885 . . . . {Modular constructions involving interchangeability with one or more chronograph modules on a single base movement}
- G04F 7/089 . . . . {indicating measured time by other than hands; e.g. numbered bands, drums, discs or sheet (current time indication other than by hand [G04B 19/20](#))}
- G04F 7/0895 . . . . {with a separate barrel for the chronograph functions (barrel in a separable module [G04F 7/0885](#))}
- G04F 7/10 . . Means used apart from the time-piece for starting or stopping same {(see provisionally too : [G04F 8/08](#))}

#### **G04F 8/00 Apparatus for measuring unknown time intervals by electromechanical means**

- G04F 8/003 . . {using continuously running driving means}
- G04F 8/006 . . {running only during the time interval to be measured, e.g. stop-watch}
- G04F 8/02 . . using an electromechanical oscillator {([G04F 5/00](#), [G04F 10/00](#) take precedence)}
- G04F 8/04 . . using a piezoelectric oscillator {not used}
- G04F 8/06 . . using a magnetostrictive oscillator {not used}
- G04F 8/08 . . Means used apart from the time-piece for starting or stopping same

#### **G04F 10/00 Apparatus for measuring unknown time intervals by electric means {(timing devices for clocks or watches for comparing the rate of the oscillating member with a standard [G04D 7/12](#); radar systems, analogous systems [G01S 7/00](#); measuring frequency [G01R 23/00](#); measuring phase angle [G01R 25/00](#))}**

- G04F 10/005 . . {Time-to-digital converters [TDC] (analog-to-digital converters with intermediate conversion to time or phase [H03M 1/50](#), [H03M 1/60](#))}

#### **WARNING**

This group is not complete pending reclassification; see also groups [G04F 10/04](#) and [G04F 10/06](#)

- G04F 10/02 . . using oscillators with passive electric resonator, e.g. lumped LC {([G04F 10/04](#), [G04F 10/06](#) and [G04F 10/10](#) take precedence)}

- G04F 10/04 . by counting pulses or half-cycles of an alternating current {(G04F 10/005 takes precedence)}
- G04F 10/06 . by measuring phase {(G04F 10/005 takes precedence)}
- G04F 10/10 . by measuring electric or magnetic quantities changing in proportion to time
- G04F 10/105 .. {with conversion of the time-intervals}
- G04F 13/00 Apparatus for measuring unknown time intervals by means not provided for in groups G04F 5/00 to G04F 10/00**
- G04F 13/02 . using optical means
- G04F 13/023 .. {using cathode-ray oscilloscopes (circuits for inserting reference time markers for cathode-ray oscilloscopes G01R 13/305)}
- G04F 13/026 .. {Measuring duration of ultra-short light pulses, e.g. in the pico-second range; particular detecting devices therefor (non-linear optics G02F 1/35; monitoring arrangements for lasers in general H01S 3/0014; photometry, radiation pyrometry G01J 1/00, G01J 5/00)}
- G04F 13/04 . using electrochemical means
- WARNING**
- Not complete, see also G04F 10/00
- G04F 13/06 . using fluidic means
- WARNING**
- Not complete, see also G04F 10/00