

**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

<b>G04F 5/00</b>	<b>Apparatus for producing preselected time intervals for use as timing standards</b> (generating clock signals for electric digital computers <a href="#">G06F 1/04</a> ; regulating frequency in general <a href="#">H03C</a> , <a href="#">H03L</a> )
G04F 5/02	<ul style="list-style-type: none"> <li>• Metronomes {(periodic signalisation by acoustic signals in general <a href="#">G04B 21/005</a>)}</li> </ul>
G04F 5/022	<ul style="list-style-type: none"> <li>• • {Mechanic metronomes}</li> </ul>
G04F 5/025	<ul style="list-style-type: none"> <li>• • {Electronic metronomes (rhytem generation for electrophonic musical instruments <a href="#">G10H 1/36</a>)}</li> </ul>
G04F 5/027	<ul style="list-style-type: none"> <li>• • {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 <a href="#">G10H 3/00</a>)}</li> </ul>
G04F 5/04	<ul style="list-style-type: none"> <li>• using oscillators with electromechanical resonators {producing electric oscillations or timing pulses}</li> </ul>
G04F 5/06	<ul style="list-style-type: none"> <li>• • using piezoelectric resonators</li> </ul>
G04F 5/063	<ul style="list-style-type: none"> <li>• • • {Constructional details (details of resonators in general <a href="#">H03H 9/02</a>)}</li> </ul>
G04F 5/066	<ul style="list-style-type: none"> <li>• • • • {Trimmer condensators (capacitors in general <a href="#">H01G</a>)}</li> </ul>
G04F 5/08	<ul style="list-style-type: none"> <li>• • using magnetostrictive resonators</li> </ul>
G04F 5/10	<ul style="list-style-type: none"> <li>• using electric or electronic resonators (<a href="#">G04F 5/14</a> takes precedence)</li> </ul>
G04F 5/12	<ul style="list-style-type: none"> <li>• using fluidic devices</li> </ul>
G04F 5/14	<ul style="list-style-type: none"> <li>• using atomic clocks</li> </ul>
G04F 5/145	<ul style="list-style-type: none"> <li>• • {using Coherent Population Trapping}</li> </ul>
G04F 5/16	<ul style="list-style-type: none"> <li>• using pulses produced by radioisotopes</li> </ul>
<b>G04F 7/00</b>	<b>Apparatus for measuring unknown time intervals by mechanical means</b>
G04F 7/02	<ul style="list-style-type: none"> <li>• by measuring the distance of fall or the final velocity of a falling body</li> </ul>
G04F 7/04	<ul style="list-style-type: none"> <li>• using a mechanical oscillator</li> </ul> <p><b><u>WARNING</u></b></p> <p>The subgroups of <a href="#">G04F 7/04</a> are not complete pending reclassification; see also this group</p>
G04F 7/06	<ul style="list-style-type: none"> <li>• • running only during the time interval to be measured, e.g. stop-watch</li> </ul>
G04F 7/062	<ul style="list-style-type: none"> <li>• • • {with reset mechanisms}</li> </ul>
G04F 7/065	<ul style="list-style-type: none"> <li>• • • {with start-stop control arrangements}</li> </ul>
G04F 7/067	<ul style="list-style-type: none"> <li>• • • • {with a single push-button or actuation member for start-stop and reset}</li> </ul>
G04F 7/08	<ul style="list-style-type: none"> <li>• • Watches or clocks with stop devices, e.g. chronograph</li> </ul>
G04F 7/0804	<ul style="list-style-type: none"> <li>• • • {with reset mechanisms}</li> </ul>
G04F 7/0809	<ul style="list-style-type: none"> <li>• • • • {with single hammers, i.e. one hammer acts on each counter}</li> </ul>
G04F 7/0814	<ul style="list-style-type: none"> <li>• • • • {with double hammer , i.e. one hammer acts on two counters}</li> </ul>
G04F 7/0819	<ul style="list-style-type: none"> <li>• • • • {with triple hammer, i.e. one hammer acts on three counters}</li> </ul>
G04F 7/0823	<ul style="list-style-type: none"> <li>• • • {with couplings between the chronograph mechanism and the base movement}</li> </ul>

- 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](#)