

## SECTION G — PHYSICS

### G01 MEASURING; TESTING

**G01C MEASURING DISTANCES, LEVELS OR BEARINGS; SURVEYING; NAVIGATION; GYROSCOPIC INSTRUMENTS; PHOTOGRAMMETRY OR VIDEOGRAMMETRY** (measuring liquid level G01F; radio navigation, determining distance or velocity by use of propagation effects, e.g. Doppler effect, propagation time, of radio waves, analogous arrangements using other waves G01S)

#### Note(s)

- In this subclass, the following term is used with the meaning indicated:
  - "navigation" means determining the position and course of land vehicles, ships, aircraft, and space vehicles.
- Attention is drawn to the Notes following the title of class G01.

#### Subclass index

##### MEASURING INSTRUMENTS

For measuring angles; inclinations.....	1/00, 9/00
For measuring distances; heights or levels.....	3/00, 22/00, 5/00
Compasses; gyroscopes; other navigation instruments.....	17/00, 19/00, 21/00
Other surveying instruments.....	15/00
Combined instruments.....	23/00
Manufacture, calibrating.....	25/00
TRACING PROFILES.....	7/00
PHOTOGRAMMETRY OR VIDEOGRAMMETRY.....	11/00
SURVEYING OPEN WATER.....	13/00

#### 1/00 Measuring angles

- 1/02 • Theodolites
- 1/04 • • combined with cameras
- 1/06 • • Arrangements for reading scales
- 1/08 • Sextants
- 1/10 • • including an artificial horizon (G01C 1/14 takes precedence)
- 1/12 • • • with a stabilised mirror
- 1/14 • • Periscopic sextants

#### 3/00 Measuring distances in line of sight; Optical rangefinders (tapes, chains, or wheels for measuring length G01B 3/00; active triangulation systems, i.e. using the transmission and reflection of electromagnetic waves other than radio waves, G01S 17/48) [1, 2006.01]

- 3/02 • Details
- 3/04 • • Adaptation of rangefinders for combination with telescopes or binoculars
- 3/06 • • Use of electric means to obtain final indication
- 3/08 • • • Use of electric radiation detectors
- 3/10 • using a parallactic triangle with variable angles and a base of fixed length in the observation station, e.g. in the instrument [1, 2006.01]
- 3/12 • • with monocular observation at a single point, e.g. coincidence type (G01C 3/20 takes precedence)
- 3/14 • • with binocular observation at a single point, e.g. stereoscopic type (G01C 3/20 takes precedence)
- 3/16 • • • Measuring marks
- 3/18 • • with one observation point at each end of the base (G01C 3/20 takes precedence)

- 3/20 • • with adaptation to the measurement of the height of an object
- 3/22 • using a parallactic triangle with variable angles and a base of fixed length at, near, or formed by, the object [1, 2006.01]
- 3/24 • using a parallactic triangle with fixed angles and a base of variable length in the observation station, e.g. in the instrument [1, 2006.01]
- 3/26 • using a parallactic triangle with fixed angles and a base of variable length at, near, or formed by, the object [1, 2006.01]
- 3/28 • • with provision for reduction of the distance into the horizontal plane
- 3/30 • • • with adaptation to the measurement of the height of an object, e.g. tachometers
- 3/32 • by focusing the object, e.g. on a ground glass screen

#### 5/00 Measuring height; Measuring distances transverse to line of sight; Levelling between separated points; Surveyors' levels (G01C 3/20, G01C 3/30 take precedence)

- 5/02 • involving automatic stabilisation of the line of sight
- 5/04 • Hydrostatic levelling, i.e. by flexibly interconnected liquid containers at separated points
- 5/06 • by using barometric means

#### 7/00 Tracing profiles (by photogrammetry or videogrammetry G01C 11/00)

- 7/02 • of land surfaces
- 7/04 • • involving a vehicle which moves along the profile to be traced

- 7/06 • of cavities, e.g. tunnels
- 9/00 Measuring inclination, e.g. by clinometers, by levels**
  - 9/02 • Details
  - 9/04 • • Transmission means between sensing element and final indicator for giving an enlarged reading
  - 9/06 • • Electric or photoelectric indication or reading means
  - 9/08 • • Means for compensating acceleration forces due to movement of instrument
  - 9/10 • by using rolling bodies
  - 9/12 • by using a single pendulum (plumb lines G01C 15/10)
  - 9/14 • • movable in more than one direction
  - 9/16 • by using more than one pendulum
  - 9/18 • by using liquids
  - 9/20 • • the indication being based on the inclination of the surface of a liquid relative to its container
  - 9/22 • • • with interconnected containers in fixed relation to each other
  - 9/24 • • in closed containers partially filled with liquid so as to leave a gas bubble
  - 9/26 • • • Details
  - 9/28 • • • • Mountings
  - 9/30 • • • • Means for adjusting dimensions of bubble
  - 9/32 • • • • Means for facilitating the observation of the position of the bubble, e.g. illuminating means
  - 9/34 • • • of the tubular type, i.e. for indicating the level in one direction only
  - 9/36 • • • of the spherical type, i.e. for indicating the level in all directions
- 11/00 Photogrammetry or videogrammetry, e.g. stereogrammetry; Photographic surveying [1, 2006.01]**
  - 11/02 • Picture-taking arrangements specially adapted for photogrammetry or photographic surveying, e.g. controlling overlapping of pictures
  - 11/04 • Interpretation of pictures
  - 11/06 • • by comparison of two or more pictures of the same area
  - 11/08 • • • the pictures not being supported in the same relative position as when they were taken
  - 11/10 • • • • using computers to control the position of the pictures
  - 11/12 • • • the pictures being supported in the same relative position as when they were taken
  - 11/14 • • • • with optical projection (G01C 11/26 takes precedence)
  - 11/16 • • • • • in a common plane
  - 11/18 • • • • • involving scanning means
  - 11/20 • • • • • in separate planes
  - 11/22 • • • • • with mechanical projection (G01C 11/26 takes precedence)
  - 11/24 • • • • • with optical-mechanical projection (G01C 11/26 takes precedence)
  - 11/26 • • • • • using computers to control the position of the pictures
  - 11/28 • • • Special adaptation for recording picture point data, e.g. for profiles
  - 11/30 • • by triangulation
  - 11/32 • • • Radial triangulation
  - 11/34 • • • Aerial triangulation
- 11/36 • Videogrammetry, i.e. electronic processing of video signals from different sources to give parallax or range information [2006.01]
- 13/00 Surveying specially adapted to open water, e.g. sea, lake, river or canal (liquid level metering G01F)**
- 15/00 Surveying instruments or accessories not provided for in groups G01C 1/00-G01C 13/00**
  - 15/02 • Means for marking measuring points
  - 15/04 • • Permanent marks; Boundary markers
  - 15/06 • • Surveyors' staffs; Movable markers
  - 15/08 • • • Plumbing or registering staffs or markers over ground marks
  - 15/10 • Plumb lines
  - 15/12 • Instruments for setting out fixed angles, e.g. right angles
  - 15/14 • Artificial horizons
- 17/00 Compasses; Devices for ascertaining true or magnetic north for navigation or surveying purposes (using gyroscopic effect G01C 19/00)**
  - 17/02 • Magnetic compasses
  - 17/04 • • with north-seeking magnetic elements, e.g. needles
    - 17/06 • • • Suspending magnetic elements
    - 17/08 • • • • by flotation
    - 17/10 • • • Comparing observed direction with north indication
    - 17/12 • • • • by sighting means, e.g. for surveyors' compasses
    - 17/14 • • • • by reference marks, e.g. for ships' compasses
    - 17/16 • • • • by clinometers, e.g. for determining dip or strike of geological strata
  - 17/18 • • • Supporting or suspending compasses, e.g. by gimbal, by flotation
  - 17/20 • • • Observing the compass card or needle
  - 17/22 • • • • by projection
  - 17/24 • • • • Illumination
  - 17/26 • • • • using electric pick-offs for transmission to final indicator, e.g. photocell
  - 17/28 • • Electromagnetic compasses (with north-seeking magnetic elements and having electric pick-offs G01C 17/26)
  - 17/30 • • • Earth-inductor compasses
  - 17/32 • • • Electron compasses
  - 17/34 • Sun- or astro-compasses
  - 17/36 • Repeaters for remote indication of readings of a master compass
  - 17/38 • Testing, calibrating, or compensating of compasses
- 19/00 Gyroscopes; Turn-sensitive devices using vibrating masses; Turn-sensitive devices without moving masses; Measuring angular rate using gyroscopic effects [1, 2013.01]**
  - 19/02 • Rotary gyroscopes
  - 19/04 • • Details
  - 19/06 • • • Rotors
    - 19/08 • • • • electrically driven (G01C 19/14 takes precedence)
    - 19/10 • • • • • Power supply
    - 19/12 • • • • • fluid driven (G01C 19/14 takes precedence)
    - 19/14 • • • • • Fluid rotors
    - 19/16 • • • Suspensions; Bearings
    - 19/18 • • • • providing movement of rotor with respect to its rotational axes (G01C 19/20, G01C 19/24 take precedence)

- 19/20 • • • • in fluid
- 19/22 • • • • torsional
- 19/24 • • • • using magnetic or electrostatic fields
- 19/26 • • • • Caging, i.e. immobilising moving parts, e.g. for transport
- 19/28 • • • • Pick-offs, i.e. devices for taking off an indication of the displacement of the rotor axis
- 19/30 • • • • Erection devices, i.e. devices for restoring rotor axis to a desired position (for instrument indicating the vertical G01C 19/46)
- 19/32 • • • • Indicating or recording means specially adapted for rotary gyroscopes
- 19/34 • • • • for indicating a direction in the horizontal plane, e.g. directional gyroscopes
- 19/36 • • • • with north-seeking action by magnetic means, e.g. gyromagnetic compasses
- 19/38 • • • • with north-seeking action by other than magnetic means, e.g. gyrocompasses using earth's rotation
- 19/40 • • • • for control by signals from a master compass, i.e. repeater compasses
- 19/42 • • • • for indicating rate of turn; for integrating rate of turn
- 19/44 • • • • for indicating the vertical
- 19/46 • • • • Erection devices for restoring rotor axis to a desired position
- 19/48 • • • • operating by electrical means (G01C 19/54 takes precedence)
- 19/50 • • • • operating by mechanical means (G01C 19/54 takes precedence)
- 19/52 • • • • operating by fluid means (G01C 19/54 takes precedence)
- 19/54 • • • • with correction for acceleration forces due to movement of instrument
- 19/56 • • • • Turn-sensitive devices using vibrating masses, e.g. vibratory angular rate sensors based on Coriolis forces [1, 2012.01]
- 19/5607 • • • • using vibrating tuning forks (double-ended tuning forks using planar vibrating masses suspended at opposite ends G01C 19/5719) [2012.01]
- 19/5614 • • • • Signal processing [2012.01]
- 19/5621 • • • • the devices involving a micro-mechanical structure [2012.01]
- 19/5628 • • • • Manufacturing; Trimming; Mounting; Housings [2012.01]
- 19/5635 • • • • using vibrating wires or strings [2012.01]
- 19/5642 • • • • using vibrating bars or beams [2012.01]
- 19/5649 • • • • Signal processing [2012.01]
- 19/5656 • • • • the devices involving a micro-mechanical structure [2012.01]
- 19/5663 • • • • Manufacturing; Trimming; Mounting; Housings [2012.01]
- 19/567 • • • • using the phase shift of a vibration node or antinode [2012.01]
- 19/5677 • • • • of essentially two-dimensional vibrators, e.g. ring-shaped vibrators [2012.01]
- 19/5684 • • • • the devices involving a micro-mechanical structure [2012.01]
- 19/5691 • • • • of essentially three-dimensional vibrators, e.g. wine glass-type vibrators [2012.01]
- 19/5698 • • • • using acoustic waves, e.g. surface acoustic wave gyros [2012.01]
- 19/5705 • • • • using masses driven in reciprocating rotary motion about an axis [2012.01]
- 19/5712 • • • • the devices involving a micro-mechanical structure [2012.01]
- 19/5719 • • • • using planar vibrating masses driven in a translation vibration along an axis [2012.01]
- 19/5726 • • • • Signal processing [2012.01]
- 19/5733 • • • • Structural details or topology [2012.01]
- 19/574 • • • • the devices having two sensing masses in anti-phase motion [2012.01]
- 19/5747 • • • • • each sensing mass being connected to a driving mass, e.g. driving frames [2012.01]
- 19/5755 • • • • the devices having a single sensing mass [2012.01]
- 19/5762 • • • • • the sensing mass being connected to a driving mass, e.g. driving frames [2012.01]
- 19/5769 • • • • Manufacturing; Mounting; Housings [2012.01]
- 19/5776 • • • • Signal processing not specific to any of the devices covered by groups G01C 19/5607-G01C 19/5719 [2012.01]
- 19/5783 • • • • Mountings or housings not specific to any of the devices covered by groups G01C 19/5607-G01C 19/5719 [2012.01]
- 19/58 • • • • Turn-sensitive devices without moving masses [3]
- 19/60 • • • • Electronic or nuclear magnetic resonance gyrometers [3, 4]
- 19/62 • • • • with optical pumping [3]
- 19/64 • • • • Gyrometers using the Sagnac effect, i.e. rotation-induced shifts between counter-rotating electromagnetic beams [3]
- 19/66 • • • • Ring laser gyrometers [5]
- 19/68 • • • • Lock-in prevention [5]
- 19/70 • • • • • by mechanical means [5]
- 19/72 • • • • with counter-rotating light beams in a passive ring, e.g. fibre laser gyrometers [5]
- 21/00 • • • • **Navigation; Navigational instruments not provided for in groups G01C 1/00-G01C 19/00** (measuring distance traversed on the ground by a vehicle G01C 22/00; control of position, course, altitude or attitude of vehicles G05D 1/00; traffic control systems for road vehicles involving transmission of navigation instructions to the vehicle G08G 1/0968)
- 21/02 • • • • by astronomical means (G01C 21/24, G01C 21/26 take precedence) [1, 7]
- 21/04 • • • • by terrestrial means (G01C 21/24, G01C 21/26 take precedence) [1, 7]
- 21/06 • • • • • involving measuring of drift angle; involving correction for drift
- 21/08 • • • • • involving use of the magnetic field of the earth
- 21/10 • • • • • by using measurement of speed or acceleration (G01C 21/24, G01C 21/26 take precedence) [1, 7]
- 21/12 • • • • • executed aboard the object being navigated; Dead reckoning
- 21/14 • • • • • by recording the course traversed by the object (G01C 21/16 takes precedence)
- 21/16 • • • • • by integrating acceleration or speed, i.e. inertial navigation
- 21/18 • • • • • Stabilised platforms, e.g. by gyroscope
- 21/20 • • • • Instruments for performing navigational calculations (G01C 21/24, G01C 21/26 take precedence) [1, 7]
- 21/22 • • • • Plotting boards
- 21/24 • • • • specially adapted for cosmonautical navigation
- 21/26 • • • • specially adapted for navigation in a road network [7]
- 21/28 • • • • • with correlation of data from several navigational instruments [7]
- 21/30 • • • • Map- or contour-matching [7]
- 21/32 • • • • • Structuring or formatting of map data [7]

G01C

- 21/34

- • Route searching; Route guidance [7]
- 21/36

- • • Input/output arrangements for on-board computers [7]
- 22/00

**Measuring distance traversed on the ground by vehicles, persons, animals or other moving solid bodies, e.g. using odometers or using pedometers**
- 22/02

- by conversion into electric waveforms and subsequent integration, e.g. using tachometer generator
- 23/00

**Combined instruments indicating more than one navigational value, e.g. for aircraft; Combined measuring devices for measuring two or more variables of movement, e.g. distance, speed, acceleration**
- 25/00

**Manufacturing, calibrating, cleaning, or repairing instruments or devices referred to in the other groups of this subclass (testing, calibrating, or compensating compasses G01C 17/38)**