G01S

RADIO DIRECTION-FINDING; RADIO NAVIGATION; DETERMINING DISTANCE OR VELOCITY BY USE OF RADIO WAVES; LOCATING OR PRESENCE-DETECTING BY USE OF THE REFLECTION OR RERADIATION OF RADIO WAVES; ANALOGOUS ARRANGEMENTS USING OTHER WAVES

Definition statement

This place covers:

- Methods or apparatus for determining positions, directions and distances by use of radio waves.
- Methods or apparatus for determining velocities of solid objects/bodies by use of radio waves, unless the body is moving relative to some fluid and the influence of the streaming medium on the wave propagating therein is measured.
- Methods or apparatus for locating solid objects/bodies, or detecting their presence by use of reflection or re-radiation of radio waves.
- Methods or apparatus for navigation by use of radio waves (attention is drawn to the limited scope of the term navigation, given below in the section Glossary of Terms).
- Analogous methods or apparatus using other waves than radio waves, e.g. infrared, visible or ultraviolet light, or acoustic waves. Certain restrictions and priorities apply as regards other subclasses (see sections Relationships between larger subject matter areas and References relevant to classification in this subclass below).
- Radar, Lidar, Sonar systems in general and specially adapted for specific applications if not specifically designed for geophysical use.

Relationships with other classification places

The general subject matters direction-finding, navigation, determining distances or velocities, locating, or presence-detecting are covered by several subclasses besides G01S such as: G01B, G01C, G01P, G01V.

G01S necessarily requires the use of waves (attention is drawn to the section Glossary of terms).

Therefore, the use of static or time-varying fields that do not obey a wave equation is not sufficient for subject matter to be classified in G01S.

G01S specially emphasizes radio waves. Thus, this subclass is always the appropriate place when radio waves are used for determining directions, bearings, or distances. It is also always appropriate when radio waves are used for determining velocities of solid objects or bodies as well as for locating such bodies or detecting their presence. It is also always appropriate for navigation by using radio waves (attention is drawn to the limited scope of the term navigation, given below in the section Glossary of terms).

As regards the use of other waves than radio waves, the part "analogous arrangements using other waves" of the title requires careful consideration of G01B, G01C, G01P, and G01V that all cover the use of such waves for the measuring of similar variables like distance, velocity, direction, or location.

When propagation effects of waves are relevant (see definition below in the section Glossary of terms), G01B, G01C, and G01P all refer to G01S as being the appropriate place; however, there are some exceptions where propagation effects are relevant but the subject matter is classified elsewhere (see section References relevant to classification in this subclass below).

It is to be noted that this emphasis on propagation effects does not preclude subject matter from being classified in G01S when propagation effects are irrelevant to that subject matter.

Radar, Sonar, Lidar, or analogous systems specifically designed for geophysical use are classified in G01V. However, they are also classified in G01S if they are of general interest.

References

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:

Measuring volume flow of fluids or fluid solids by propagation effects of electromagnetic or other waves	G01F 1/66
Measuring direction or velocity of flowing fluids or of solid bodies relative to fluids using propagation effects of waves	G01P 5/00
Radar, Sonar, Lidar, or analogous systems specifically designed for geophysical use	G01V
Active systems for generating focusing signals	G02B 7/28
Navigation systems for traffic control purposes, i. e. systems in which the navigation is not performed autonomously by or in the vehicles, but where the vehicles are guided by instructions transmitted to them	G08G
Proximity switches	H03K 17/945, H03K 17/965

Informative references

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

Measuring dimensions or angles of objects	G01B
Measuring distances by optical means between spaced objects when propagation effects are irrelevant	G01B 11/14
Navigation in general	G01C
Passive optical systems for measuring distances in line of sight or transverse to line of sight, respectively	G01C 3/00; G01C 5/00
Navigation not using radio waves when propagation effects are not relevant; navigation beyond position fixing, determining velocity of a vehicle or craft or its direction of velocity	G01C 21/00
Measuring infrasonic, sonic or ultrasonic vibrations in general	G01H
Measuring infra-red, visible, or ultra-violet radiation in general	G01J
Transducers per se, see the following relevant subclasses	G01L, H01L, H04R
Investigating materials by optical radiation, microwaves or acoustic waves	G01N
Measuring direction or velocity of flowing fluids by reception or emission of radio waves or other waves and based on propagation effects caused in the fluid itself	G01P
Determining velocities by optical means when propagation effects are not relevant	G01P 3/36
Determining presence, absence, or direction of movement	G01P 13/00
Measuring electric or magnetic variables in general	G01R
Detecting masses or objects by methods not involving reflection or reradiation of radio, acoustic, or other waves; prospecting	G01V
Prospecting by optical means; detecting the presence of objects or masses by optical means, e.g. by interruption of beams, i.e. light barriers	G01V 8/00
Optical systems	G02B

Time-interval measuring	G04F
Control of position, course, altitude or attitude	G05D
Detecting the presence of objects for the purpose of counting them	G06M 7/00, G06M 11/00
Traffic control systems; anti-collision systems	G08G
Aerials	H01Q

Glossary of terms

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

Waves	Is the mechanism by which energy is transported without the transfer of matter. Waves may be either electromagnetic waves, which do not require a medium to propagate, or mechanical waves, which require a medium, e.g. acoustic waves. Waves most easily are defined in mathematical terms as obeying a so-called wave equation.
Propagation effects	Are relevant if the outcome of a measurement depends on the actual value of a physical quantity characterising the propagation of the wave, i.e. its wavelength, frequency, velocity, or phase. The mere presence or direction of a wave are not considered a propagation effect or to contribute to a propagation effect. To put it in another way, propagation effects are irrelevant, if the radiation may be looked upon as a beam of radiation whose wave nature can be ignored. Examples of measurements where propagation effects are relevant include e.g. measurements of propagation time, phase difference, phase delay, measurements using the Doppler effect, or interference.
Navigation	Is in this subclass limited to position fixing, or determining the velocity or direction of velocity of vehicles or crafts or their distance from other objects.
Reflection	Means the general physical phenomenon that propagating waves are being scattered by any object, body or target in their path. Scattering can be elastic (i.e. the frequencies of the incoming and outgoing waves are the same) or inelastic (i.e. the respective frequencies are different). Other properties of the wave may change as well. Reflection can be specular or diffuse depending on surface properties of the scattering object. Reradiation further includes the mechanism characteristic of a transponder, i.e. receiving a wave and then transmitting an answering wave.
Transponder	Means an arrangement which reacts to an incoming interrogating or detecting wave by emitting a specific answering or identifying wave.
Active systems	Means systems comprising an artificial source for emitting waves. The propagating waves interact with at least one object and are eventually detected by the system. The interaction may consist in e.g. a reflection.
Passive systems	Means systems detecting waves that are not emitted by the measuring system itself (e.g. by the sun).
Object	An entity that is not part of the measuring device.

G01S 1/00

Beacons or beacon systems transmitting signals having a characteristic or characteristics capable of being detected by non-directional receivers and defining directions, positions, or position lines fixed relatively to the beacon transmitters; Receivers co-operating therewith (position fixing by co-ordinating a plurality of determinations of direction or position lines G01S 5/00)

Definition statement

This place covers:

Beacons (transmitters) which are dedicated to transmit signals from which a position, direction or direction line can be derived. It also covers dedicated receivers for these beacons. Marker beacons, i.e. beacons, the reception of whose signal indicates a location, are also found in G01S 1/00.

References

Limiting references

This place does not cover:

Transmitters which are known widely as beacons but which are not intended to aid in the positioning of the receiver but rather to locate the beacon (e.g. emergency beacons). Details of such transmitters which are pertinent to a prior art search in G01S are found in G01S 5/0226.	G01S 5/0226
Satellite Radio Positioning Beacon Systems	G01S 19/00
Transmitters which, although they might be used in the determination of position, were not designed for such, e.g. telecommunications base stations	H04B
Am/fm radio broadcast transmitters	H04H

G01S 1/028

{Simulation means, e.g. of beacon signals therefor (for teaching or training purposes G09B 9/00)}

References

Informative references

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

Simulation means for teaching or training purposes	G08B 9/00

G01S 1/08

Systems for determining direction or position line

References

Informative references

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

Aerial arrangements for changing or varying the orientation or the shape of the directional pattern	H01Q 3/00

Combinations of different interacting units for giving a desired directional characteristic	H01Q 21/29
Aerials or aerial systems providing at least two radiation patterns	H01Q 25/00

G01S 1/20

using a comparison of transit time of synchronised signals transmitted from non-directional antennas or antenna systems spaced apart, i.e. path-difference systems

References

Informative references

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

Synchronisation in general	H03L 7/00

G01S 1/24

the synchronised signals being pulses or equivalent modulations on carrier waves and the transit times being compared by measuring the difference in arrival time of a significant part of the modulations {, e.g. LORAN systems}

Glossary of terms

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

LORAN	(LOng RAnge Navigation) is a terrestrial radio navigation system using low frequency radio transmitters in multiple deployment (multilateration) to determine the location and speed of the receiver.

G01S 1/245

{Details of receivers cooperating therewith, e.g. determining positive zero crossing of third cycle in LORAN-C}

Glossary of terms

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

LORAN-C	Version of LORAN which operates in the low frequency portion of the electromagnetic spectrum from 90 to 110 Kilohertz

G01S 1/304

{Analogous systems in which a beat frequency, obtained by heterodyning the signals, is compared in phase with a reference signal obtained by heterodyning the signals in a fixed reference point and transmitted therefrom, e.g. LORAC (long range accuracy) or TORAN systems}

Glossary of terms

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

LORAC	Long range accuracy

G01S 1/306

{Analogous systems in which frequency-related signals (harmonics) are compared in phase, e.g. DECCA systems}

Glossary of terms

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

DECCA	The Decca Navigator System was a hyperbolic low frequency radio navigation system

G01S 1/308

{particularly adapted to Omega systems}

Glossary of terms

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

Omega	Radio navigation operating in the 10kHz-14kHz range employing hyperbolic techniques

G01S 1/48

wherein the phase angle of the direction-dependent envelope signal is a multiple of the direction angle, e.g. for "fine" bearing indication {TACAN}

Glossary of terms

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

TACAN	TACtical Air Navigation system which provides the user with bearing and distance (slant-range) to a ground or ship-borne station.

G01S 1/50

wherein the phase angle of the direction-dependent envelope signal is compared with a non-direction-dependent reference signal, {e.g. VOR}

Glossary of terms

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

VOR	VHF Omnidirectional Radio range is a radio navigation system for aircraft in which a navigation signal allows the airborne receiving equipment to determine a magnetic bearing from the station to the aircraft

G01S 1/70

using electromagnetic waves other than radio waves

Definition statement

This place covers:

Beacons or beacon systems using electromagnetic waves, notably in the optical frequencies, other than radio waves.

G01S 1/76

Systems for determining direction or position line

References

Informative references

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

Sound focusing or directing using electrical steering of transducer arrays, e.g. beam steering, in general	G10K 11/34

G01S 3/00

Direction-finders for determining the direction from which infrasonic, sonic, ultrasonic, or electromagnetic waves, or particle emission, not having a directional significance, are being received (position-fixing by co-ordinating a plurality of determinations of direction or position lines G01S 5/00)

Definition statement

This place covers:

Direction-finders for determining the direction from which infrasonic, sonic, ultrasonic, or electromagnetic waves (including light), or particle emission, not having a directional significance, are being received.

References

Limiting references

This place does not cover:

Position-fixing by co-ordinating a plurality of determinations of direction or position lines	G01S 5/00

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:

Monopulse radar	G01S 13/44
Supporting structures of photovoltaic modules for generation of electric power specially adapted for solar tracking systems	H02S 20/24

Informative references

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

Systems for regulating electric or magnetic variables	G05F
Acoustic beam-steering	G10K 11/34
Aerials	H01Q
Closed circuit television systems	H04N 7/18

Special rules of classification

Algorithms employing MUSIC (MUltiple SIgnal Classification), ESPRIT (estimation of signal parameters via rotational invariant techniques) and other subspace decomposition algorithms to determine the angle of arrival are classified in G01S 3/74 and G01S 3/8006 respectively.

Glossary of terms

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

Adcock aerial system	array consisting of four equidistant vertical elements which can be used to transmit or receive directional radio waves.

G01S 3/146

{by comparing linear polarisation components}

References

Informative references

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

Polarisation details of antenna systems per se	H01Q 21/245

G01S 3/68

wherein the timing of the pulse-type envelope signal is indicated by cathode-ray tube

References

Informative references

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

Radar cathode-ray tube indicators providing coordinated display of distance and direction	G01S 7/10

G01S 3/802

Systems for determining direction or deviation from predetermined direction

References

Informative references

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

Sound-focusing or directing using electrical steering of transducer arrays, e.g. beam steering in general	G10K 11/34

G01S 5/00

Position-fixing by co-ordinating two or more direction or position line determinations; Position-fixing by co-ordinating two or more distance determinations {(using active systems G01S 13/00, G01S 15/00, G01S 17/00)}

Definition statement

This place covers:

- Determination of position using radio, optical (including infrared) and acoustic waves by co-ordinating two or more direction or position line determinations
- Position fixing by co-ordinating two or more distance determinations
- Radio Fingerprinting, e.g. correlating positions with signal measurements in a database such that the position of a receiver or a transmitter can be determined by database query.

Relationships with other classification places

Passive, as distinct from active - involving reflection or reradiation - found in G01S 13/00, G01S 15/00, G01S 17/00, form the vast bulk of inventions found in the G01S 5/00. However, inventions involving re-radiation (G01S 13/74, G01S 13/876, G01S 13/878) in which the underlying principle is akin to a passive system, with the initial illumination of a target acting like a trigger for transmission may also be classified here.

The schemes relating to the different wave types (i.e. radio, optical, acoustic) would be expected to mirror each other. For practical reasons, subgroups analogous to each of the subgroups of G01S 5/02 have not been created in G01S 5/16 or G01S 5/18. Classification of documents related to G01S 5/16 and G01S 5/18 will be carried out in a manner analogous to G01S 5/02, i.e. where a document refers to aspects which are of inherently involved in the measurement of position, but do not describe the measurement of position itself, e.g. signal details, constructional details of transmitters, then G01S 5/18 should be allocated (as no equivalent of G01S 5/0205 exists) and not merely one of

the subgroups G01S 5/20 - G01S 5/30.Where combinations of signals between acoustic or optical with radio comprise the invention, these inventions should be classified in G01S 5/0257.

G01S 5/0009

{Transmission of position information to remote stations (involving assistance data G01S 5/0236)}

Definition statement

This place covers:

Transmission of data between stations. In general, the subgroups of G01S 5/0009 relate to transmission of either measurements of signals which allow for locating a receiver or transmitter, or the transmission of the position of the located receiver or transmitter.

References

Limiting references

This place does not cover:

Involving assistance data	G01S 5/0236

Informative references

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

Transmission of measured values	G08C
Service making use of the location of users or terminals	H04W 4/02

Special rules of classification

G01S 5/0009 and its subgroups relate to transmission of position information between a remote station and reference station or between remote stations or reference stations. However, inventions are classified in these subgroups only where the transmission of information is related to the calculation of position. It is not intended to cover transmission of positioning data or position related data in applications in which the positioning arrangement is merely a black box. Inventions should be assigned G01S 5/0009 only if the invention would also have warranted G01S 5/00 outside of G01S 5/0009 and its subgroups.

G01S 5/01

{Determining conditions which influence positioning, e.g. radio environment, state of motion or energy consumption}

Definition statement

This place covers:

All aspects which influence the how, when and if a position should be determined.

Examples of such are:

- If it is determined that a device is found to be in an outdoor environment, GPS may be considered to be the most efficient positioning method.
- If a device is found to be moving very slowly, very infrequent measurements of position may be acceptable in order to reduce energy consumption.
- If a device is in a stairwell, the use of GPS should be avoided and a barometer instrument should be used for position determination.

References

Informative references

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

Details related to interference or mitigating interference	G01S 5/0215
Details related to multipath in signal reception	G01S 5/0218
Hybrid positioning by combining or switching between positions derived from two or more separate positioning systems	G01S 5/0263
Details related to receiver power consumption	G01S 19/34
Position determining by combining or switching between position solutions derived from the satellite radio beacon positioning system and position solutions derived from further systems	G01S 19/48

Special rules of classification

Additional allocation should be considered in G01S 5/0215, G01S 5/0218, G01S 5/0263, G01S 19/34, and G01S 19/48 if appropriate.

G01S 5/011

{Identifying the radio environment}

Definition statement

This place covers:

Identifying specific radio environment conditions appropriate for an object position determination, e.g. high incidence of multipath, poor signal reception conditions, high interference levels.

G01S 5/012

{Identifying whether indoors or outdoors}

Definition statement

This place covers:

Identifying whether an object is considered to be indoors or outdoors.

Notes:

- "Indoors" is considered to refer to inside man-made structures.
- In general, signal received inside a structure from transmitters outside the structure tends to be very weak.
- In general, indoor environments tend to suffer from multipath phenomena. Identification of a receiver/transmitter as being indoors may require a positioning method that is based on inertial signals or short range signals
- Such positioning methods are often preferable to GPS in an indoor environment.

Relationships with other classification places

Identifying from received signals whether the receiver is indoors or outdoors and accordingly whether using an indoor position technique or an outdoor position technique is more appropriate is classified here, in G01S 5/012.

Identifying a particular location from received signals should be allocated in G01S 5/0269.

G01S 5/013

{Identifying areas in a building}

Definition statement

This place covers:

Identifying in which type of area, e.g. large room, stairwell, lift, or corridor, of a building a device is located. Accordingly, a positioning algorithm which is optimised for such an environment can be chosen.

Relationships with other classification places

G01S 5/0269 should be allocated in the case of identifying a particular location, e.g. a particular stairwell, or corridor, from received signals.

G01S 5/014

{Identifying transitions between environments}

Definition statement

This place covers:

Identifying that a device has moved from one environment to another, e.g. moving from a corridor to a stairwell, passing under a bridge, entering a tunnel, changing from a rural to an urban environment.

Relationships with other classification places

G01S 5/0269 should be allocated in the case of identifying that the transition allows one to pinpoint a particular position, e.g. detecting from a sudden disappearance and reappearance of GPS signals that one has passed under a particular bridge on a motorway.

G01S 5/015

{between indoor and outdoor environments}

Definition statement

This place covers:

Identifying that a device has moved into or out of a building, this often will be suggested by the sudden appearance or disappearance of GPS signals.

Relationships with other classification places

Where the identification of the transition allows one to pinpoint a particular position (e.g. where the transition unambiguously suggests a particular position, e.g. the doorway of a building with a single door or entry gate of an underground car-park, G01S 5/0269 should be allocated.

G01S 5/016

{between areas within a building}

Definition statement

This place covers:

Identifying that a device has transitioned between different areas of a building, e.g. entering an area of the building with lots of windows such that GPS reception is possible, entering a stairwell or a lift.

Relationships with other classification places

Where the identification of the transition allows one to pinpoint a particular position (e.g. where the transition unambiguously suggests a particular position, e.g. only stairwell in a building, G01S 5/0269 should be allocated.

G01S 5/017

{Detecting state or type of motion}

Definition statement

This place covers:

Among others, detecting whether a device is stationary (in which case position determination could be suspended), whether that pattern of movement suggests that the device is carried by a pedestrian, or that the device is travelling in a car of train.

References

Informative references

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

Radio wave determination of movement/velocity without reflection or reradiation	G01S 11/02
Determination of movement/velocity by radar	G01S 13/50

G01S 5/018

{Involving non-radio wave signals or measurements}

Definition statement

This place covers:

Using non-radio wave signals to identify conditions for positioning, e.g. detecting natural light, noise patterns or temperature can indicate whether a device is likely to be in an indoor or outdoor environment, or in a multipath environment.

G01S 5/019

{Energy consumption}

Definition statement

This place covers:

Power saving, energy consumption and other related issues which can affect the choice of positioning algorithm.

Relationships with other classification places

Allocation of G01S 19/34 or G01S 5/0221 may also be necessary, particularly if the energy saving technique reduces energy without any particular relation to the choice of position determination routine. One example where G01S 19/34 might be allocated without the allocation of G01S 5/019 is where low-power components are employed in the GPS receiver, with no mention of using an alternative to GPS in the determination of position.

G01S 5/02

using radio waves (using satellite radio beacon systems for determining position G01S 19/00)

Relationships with other classification places

G01S 5/02 covers algorithmic steps of positioning determination while H04W 64/00 covers more the network specific aspects thereof, e.g. scheduling, server aspects. H04W 64/00 refers more to established technologies

References

Limiting references

This place does not cover:

Satellite radio beacon positioning systems; Determining position, velocity or attitude using signals transmitted by such systems	G01S 19/00

Informative references

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

Locating users or terminals or network equipment for network management purposes, e.g. mobility management	H04W 64/00

G01S 5/0205

{Details}

Definition statement

This place covers:

Details of receivers, e.g. signal acquisition, interference cancellation; details of transmitters, e.g. transmission signal, constructional details; and other aspects which do not relate directly to the positioning algorithm used.

G01S 5/021

{Calibration, monitoring or correction (G01S 5/0252 takes precedence)}

Definition statement

This place covers:

Detection and/or correction or incorrect operation of transmitters of receivers employed in position determination. Where transmitters involved are dedicated positioning beacons or the receivers are designed for operation using signals from dedicated positioning beacons, G01S 1/022 should be allocated. Accuracy or reliability of positions determined: G01S 5/0244.

References

Limiting references

This place does not cover:

Radio frequency fingerprinting	G01S 5/0252

G01S 5/0218

{Multipath in signal reception}

Definition statement

This place covers:

Multipath detection and/or mitigation in signal reception.

Relationships with other classification places

This group does not relate to how signals which are subject to multipath are subsequently used in determining position. This aspect is addressed in G01S 5/0273. It may be necessary to classify a document in either or both of G01S 5/0218 and G01S 5/0273 depending on which or both the invention refers to.

Where the multipath detection is in the context of determining the electrical environment in which the position device find itself, in order to decide on how best to carry out position determination, G01S 5/01 should also be allocated to the document.

References

Informative references

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

Using multipath or indirect path propagation signals in position determination	G01S 5/0273

G01S 5/02213

{Receivers arranged in a network for determining the position of a transmitter}

Definition statement

This place covers:

Details of networks of receivers for determining position. Typically, aspects such as synchronisation, aspects of communication between the receivers, type and makeup of the receivers is intended.

Relationships with other classification places

Although G01S has a main group entry (G01S 1/00) for the system aspects of networked beacons systems which provide signals received by a mobile receiver which determines its position from these signals, it does not, as yet have an entry for the reciprocal arrangement - i.e. the network aspects of a network of receivers which determine the position of a transmitter. This subgroup is to address this need.

G01S 5/02216

{Timing or synchronisation of the receivers}

Definition statement

This place covers:

Details of networks of receivers for determining position in which timing or synchronisation of the receivers are the focus.

G01S 5/0242

{Determining the position of transmitters to be subsequently used in positioning (G01S 5/0289 takes precedence)}

Definition statement

This place covers:

Determining the position of a transmitter which will later be used in positioning. Examples of such are: determining the location of an FM broadcasting station using triangulation in a mobile receiver, the position of the FM receiver is then stored and signals from the FM transmitter may later be used in position determination.

References

Limiting references

This place does not cover:

Multiple transceivers, e.g. in ad hoc networks	G01S 5/0289

G01S 5/0244

{Accuracy or reliability of position solution or of measurements contributing thereto}

Definition statement

This place covers:

Determinations or indications of accuracy, reliability, plausibility and other similar indicators of positions determined and/or measurements.

G01S 5/0246

{involving frequency difference of arrival or Doppler measurements (G01S 5/02685 takes precedence)}

Definition statement

This place covers:

Positioning methods such as frequency difference of arrival (FDOA) etc., and other techniques where a position can be determined using Doppler measurements.

References

Limiting references

This place does not cover:

Where the Doppler measurements are employed for dead reckoning purposes, e.g. in place of measurements from an inertial sensor.	G01S 5/02685

G01S 5/0247

{Determining attitude}

References

Informative references

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

Using inertial means	G01C 9/00
Control of attitude	G05D 1/00

G01S 5/0249

{Determining position using measurements made by a non-stationary device other than the device whose position is being determined}

Definition statement

This place covers:

Using measurements from a moving receiver to determine position. One illustrative example of what is expected in this place is the following: instead of the position of a transmitter being determined from signals received by multiple stationary receivers, one or more receivers make measurements at different places, essentially mimicking the situation of having stationary receivers.

Relationships with other classification places

This method of determining position of transmitters is often used in G01S 5/0242. It may be necessary to classify such in both G01S 5/0242 and in G01S 5/0249.

G01S 5/0252

{Radio frequency fingerprinting}

Definition statement

This place covers:

Positioning techniques where a database (radio-map) of measurements has been created with radio wave measurements indexed against position coordinates of where the radio wave measurements were made (rf fingerprints), this database is subsequently queried for determining position of other devices.

Alternatively, if the radio environment is accurately known (e.g. where most significant propagation parameters are known), it is possible to simulate the measurements to be used in the database rather than having to physically carry out measurements.

In this subgroup the term "Radio frequency fingerprints" is used to refer to the use of measurements of signal parameters, e.g. Received Signal Strength Indicator [RSSI], signal phase, or differences in times of arrival) and to the use of identifiers, e.g. SSIDs or ApIds, transmitted on a signal.

G01S 5/02521

{using a radio-map}

Definition statement

This place covers:

Where position is determined by comparing measured values, e.g. RSSI, RTT or other measured parameters of signals, or identifiers, e.g. SSIDs, with a radio-map, i.e. a database of previously measured values or identifiers indexed against the position at which they were measured.

G01S 5/02522

{The radio-map containing measured values of non-radio values}

Definition statement

This place covers:

Arrangements where measurements of further values, e.g. acoustics signals, pressure, or temperature, are stored along with the radio wave measurements or identifiers.

G01S 5/02523

{Details of interaction of receiver with radio-map}

Definition statement

This place covers:

Aspects such as protocol, timing, encryption, compression, refresh rate used for transmitting database items to the receiver. It also relates to how much data is downloaded by the receiver, and when, etc.

G01S 5/02524

{Creating or updating the radio-map}

Definition statement

This place covers:

- Updating aspects of areas in a region that are visited in order to collect rf measurements or identifiers.
- Aspects related to what level of precision (granularity) the measurements are to be made in a region, and how frequently a region should be revisited.

G01S 5/02525

{Gathering the radio frequency fingerprints}

Definition statement

This place covers:

Aspects such as the path taken by a receiver when collecting rf measurements or identifiers, rate at which measurements are taken etc.

G01S 5/02527

{Detecting or resolving anomalies in the radio frequency fingerprints of the radio-map}

Definition statement

This place covers:

- aspects such as detecting inconsistencies in the database measurements, etc. which may be brought about e.g. by nearby transmitters being relocated or reconfigured.
- methods of resolving and compensating for such anomalies.

G01S 5/02528

{Simulating radio frequency fingerprints}

Definition statement

This place covers:

Cases where simulated fingerprints are generated.

G01S 5/02529

{not involving signal parameters, i.e. only involving identifiers}

Definition statement

This place covers:

Cases where only identifiers (and not measurements such as RSSIs) have been stored in the radio-map.

G01S 5/0257

{Hybrid positioning (by coordinating position lines of different shape G01S 5/12)}

Definition statement

This place covers:

Combining different signals to compute a position or combining computed positions from different positioning systems to arrive at a final position. The other positioning systems may include non-radio wave signals, e.g. inertial signals, barometer signals, optical signals, acoustics signals.

References

Limiting references

This place does not cover:

By coordinating position lines of different shape	G01S 5/12

Informative references

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

Inertial navigation	G01C 21/16

G01S 5/0258

{by combining or switching between measurements derived from different systems}

Definition statement

This place covers:

Cases where measurements from different sources, e.g. wifi signals, inertial signals, barometric values, light signals, or acoustic signals, are combined to determine a position of a receiver.

Relationships with other classification places

Where at least one of the signals is a GPS signal, G01S 19/45 should be allocated instead of G01S 5/0258 (see limiting reference at G01S 5/02).

G01S 5/0258 differs from G01S 5/0263 in that G01S 5/0263 relates to combining position solutions (rather than measurements) from different systems. The following example should clarify the situation: in a scenario where several wifi signals and several cellular signals are available, if all (or several) signals are combined to determine the position, G01S 5/0258 is allocated; where two separate positions are calculated using exclusively the wifi signals and exclusively cellular signals respectively, and a final solution is determined as a weighted average of the two, G01S 5/0263 is allocated.

G01S 5/02585

{at least one of the measurements being a non-radio measurement}

Definition statement

This place covers:

Determining position using a combination of radio wave signal(s) and e.g. acoustic, light, pressure, etc signals. Tightly coupled radio wave + inertial navigation systems are also covered.

Relationships with other classification places

Where at least one of the signals is a GPS signal, G01S 19/45 should be allocated instead of G01S 5/02585 (see limiting reference at G01S 5/02).

G01S 5/02585 differs from G01S 5/0264 in that G01S 5/0264 relates to combining position solutions (rather than measurements) from different systems. The following example should clarify the situation: in a scenario where several wifi signals and several acoustic signals are available, if all (or several) measurements of signals are combined to determine the position, G01S 5/02585 is allocated; where two separate positions are calculated using exclusively the wifi signals and exclusively acoustic signals respectively, and a final solution is determined as a weighted average of the two, G01S 5/0264 is allocated.

Where position is determined using e.g. dead reckoning, i.e. where an initial position is determined using radio wave signals, and a dead reckoning is done either in parallel or during periods when radio wave signals are not available, G01S 5/0264 is allocated.

G01S 5/0263

{by combining or switching between positions derived from two or more separate positioning systems}

Definition statement

This place covers:

- weighted averages of positions determined using two different type of system, e.g. cellular system and inertial system.
- switching between the determination of position using wifi signals to the determination of position using cellular signals.
- weighted average of position determined using radio fingerprints and position determined using an optical receiver.
- determining position using inertial based dead reckoning combined with position determined from cellular signals.

Note:

The term "positioning systems" is interpreted quite broadly to include any system transmitting sufficient similar signals for the determination of position, i.e. cellular signals, wifi signals (however not a single cellular signal + a single wifi signal + a single nfc signal).

Relationships with other classification places

Where the combination involves a position determined using GPS signals, G01S 19/48 should be allocated (see limiting reference at G01S 5/02).

G01S 5/0264

{at least one of the systems being a non-radio wave positioning system}

Definition statement

This place covers:

- positioning methods involving combinations of or switching between positions derived from radio signals, e.g. cellular signals or wifi signals, and non-radio wave positioning systems, e.g. inertial positioning systems, imaging systems, etc.
- methods where dead reckoning using inertial sensors to extrapolate between positions derived from radio wave signals

References

Informative references

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

Inertial navigation	G01C 21/16

G01S 5/0268

{by deriving positions from different combinations of signals or of estimated positions in a single positioning system}

Definition statement

This place covers:

Determining position by choosing one possible solution out of several possible solutions deliverable by a positioning signal system, e.g. to combining a position solution derived using a TDOA algorithm with one using an angle of arrival algorithm all derived from signals in a single system; also included are instances where different combinations of signals from different transmitters are combined to arrive at an optimal position solution.

G01S 5/0269

{Inferred or constrained positioning, e.g. employing knowledge of the physical or electromagnetic environment, state of motion or other contextual information to infer or constrain a position}

Definition statement

This place covers:

Inferring position using knowledge of:

- physical environment, e.g. using knowledge of a map of a building to limit possible positions
- electromagnetic environment, e.g. suddenly and short lived loss of a signal arising from the receiver passing under a bridge
- state of motion, e.g. speed profile of a receiver suggesting that it is on a train entering or leaving a station

An illustrative example of constraining a position is: a receiver on a train being constrained to lie on a train line.

Relationships with other classification places

The techniques involved in inferring position can be similar to those for determining an electromagnetic environment, such as covered by G01S 5/011. The difference between these subgroups is how the determination of the environment is subsequently used. If the determination of environment is only for the purposes of choosing a particular positioning method, then G01S 5/011 is allocated. If the determination of the environment is specific enough to indicate the position of the device to be positioned, then G01S 5/0269 is allocated. However, it may be necessary to allocate both symbols.

Where a position is inferred as that of e.g. a wifi access point from which a signal has been received, G01S 5/0295 is allocated.

G01S 5/02695

{Constraining the position to lie on a curve or surface}

Definition statement

This place covers:

Devices to be located travelling on railways, travelling on a road, restricted to particular corridors of building etc. In general, when the curve upon which a device is to travel is known, fewer radio-wave measurements are required than in the case of TDOA position determination etc.

G01S 5/0278

{involving statistical or probabilistic considerations (G01S 5/0252, G01S 5/0294 take precedence)}

References

Limiting references

This place does not cover:

Radio frequency fingerprinting	G01S 5/0252
Trajectory determination or predictive filtering, e.g. target tracking, Kalman filtering	G01S 5/0294

G01S 5/0294

{Trajectory determination or predictive filtering, e.g. target tracking or Kalman filtering}

Definition statement

This place covers:

Trajectory determination and general target tracking.

Facets:

In this group, tracking is used to imply employing predictive filtering and other techniques such as determine the position of a target. In general, this group relates to scenarios where predictive filtering will be necessary in order to be able to continuously determine the position of a target. It is not intended for simply "keeping track of" inventory items, taxis, where determination of position of the items is relatively uncomplicated.

References

Informative references

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

Logistics, e.g. warehousing, loading, distribution or shipping; Inventory or stock management, e.g. order filling, procurement or balancing against orders	G06Q 10/08

G01S 5/0295

{Proximity-based methods, e.g. position inferred from reception of particular signals}

Definition statement

This place covers:

Methods where the location is taken from the location of a transmitter whose signal is received and in general involves reading the ID of the transmitter, rather than a measurement of any parameter, e.g. signal strength, angle of arrival, or time of arrival, of the signal received.

The following are examples of documents found in this subgroup:

- taking the position of receiver to be the position of an access point, when the receiver receives a signal from that access point;
- taking the position of a cellular phone to be that of the centre of the cell sector in which it finds itself.

Relationships with other classification places

It may be necessary to also consult G01S 5/02529 during search. The subject-matter of G01S 5/0295 and G01S 5/02529 are not unlike one another. Where a list of identifiers is used purely to look up a corresponding position at which this combination was measured, a symbol in G01S 5/0252 (mostly likely G01S 5/02529) is appropriate; however, where the determination of position is determined based on the coordinates of the transmitters whose I.D. has been read, then a G01S 5/0295 symbol should be allocated.

G01S 5/06

Position of source determined by co-ordinating a plurality of position lines defined by path-difference measurements (G01S 5/12 takes precedence)

References

Limiting references

This place does not cover:

By co-ordinating position lines of different shape, e.g. hyperbolic, circular, elliptical, radial	G01S 5/12

G01S 5/10

Position of receiver fixed by co-ordinating a plurality of position lines defined by path-difference measurements {, e.g. omega or decca systems} (G01S 5/12 takes precedence {; beacons and receivers cooperating therewith G01S 1/306, G01S 1/308})

References

Limiting references

This place does not cover:

By co-ordinating position lines of different shape, e.g. hyperbolic, circular, elliptical, radial	G01S 5/12

Informative references

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

Beacons and receivers cooperating therewith	G01S 1/306, G01S 1/308

Glossary of terms

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

Omega	Radio navigation operating in the 10kHz-14kHz employing hyperbolic techniques

DECCA	The Decca Navigator System was a hyperbolic low frequency radio navigation system

G01S 5/12

by co-ordinating position lines of different shape, e.g. hyperbolic, circular, elliptical or radial

Definition statement

This place covers:

Position determination by co-ordinating position lines of different shapes where all signals received are radio signals.

References

Informative references

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

Combinations of radio with acoustic of optical signals	G01S 5/0257

G01S 5/16

using electromagnetic waves other than radio waves

References

Limiting references

This place does not cover:

Using radio waves	G01S 5/02

Informative references

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

Opto-electronic arrangements for converting position into coded form for input into a computer	G06F 3/0304
Optical Communications	H04B 10/00

G01S 5/163

{Determination of attitude (using inertial means G01C 9/00; control of attitude G05D 1/08)}

References

Limiting references

This place does not cover:

Determining attitude using inertial means G01C 9/00	G01C 9/00
Control of attitude	G05D 1/08

Informative references

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

Attitude control of satellites	B64G 1/24
Satellite docking	B64G 1/646

G01S 5/18

using ultrasonic, sonic, or infrasonic waves

Special rules of classification

G01S 5/02 takes precedence

G01S 5/186

{Determination of attitude (using inertial means G01C 9/00; control of attitude G05D 1/08)}

References

Limiting references

This place does not cover:

Determining attitude using inertial means G01C 9/00	G01C 9/00
Control of attitude	G05D 1/08

G01S 5/28

by co-ordinating position lines of different shape, e.g. hyperbolic, circular, elliptical or radial

References

Informative references

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

Sonar indicators providing co-ordinated display of direction and distance	G01S 7/62

G01S 7/00

Details of systems according to groups G01S 13/00, G01S 15/00, G01S 17/00

Definition statement

This place covers:

Disclosures which are directly concerned with details or functionality of sub-systems or component parts of systems according to G01S 13/00, G01S 15/00 or G01S 17/00.

Details common to systems of all groups G01S 13/00, G01S 15/00 and G01S 17/00 are covered by G01S 7/00

Details of systems according to groups G01S 13/00 are covered by G01S 7/02.

Details of systems according to groups G01S 15/00 are covered by G01S 7/52.

Details of systems according to groups G01S 17/00 are covered by G01S 7/48.

Relationships with other classification places

Disclosures which concern the functioning of the full system should go in G01S 13/00, G01S 15/00 or G01S 17/00 respectively;

however details which form an important or technically non-trivial part of a system should also be classified in G01S 7/02, G01S 7/52 or G01S 7/48 respectively.

References

Informative references

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

Apparatus for measuring unknown time-intervals by electronic means, e.g. Vernier method	G04F 10/00

Glossary of terms

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

2D	two dimensional

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

LCD	Liquid Crystal Display

G01S 7/003

{Transmission of data between radar, sonar or lidar systems and remote stations}

Definition statement

This place covers:

E.g. radar/sonar/lidar apparatuses using a communication link (cable or wireless) to transmit data to or exchange data with remote stations.

It does not cover data transferred inside the radar apparatus or data transfer between receivers.

References

Informative references

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

Systems using reradiation of radio waves	G01S 13/74
Data transfer between radars reradiating radio waves, e.g. secondary radar	G01S 13/765, G01S 13/825
Transmission systems for measured values, control or similar signals	G08C

G01S 7/006

{using shared front-end circuitry, e.g. antennas (G01S 13/765, G01S 13/825 take precedence)}

Definition statement

This place covers:

- E.g. radar/sonar/lidar apparatuses using their beam / antenna to communicate (wirelessly) with a remote station.
- Communication equipment using the communication signals for distance determination, e.g. via time-of-flight.

References

Limiting references

This place does not cover:

Data transfer between radars reradiating radio waves, e.g. secondary radar	G01S 13/765, G01S 13/825

Informative references

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

Systems using reradiation of radio waves	G01S 13/74

G01S 7/02

of systems according to group G01S 13/00

Definition statement

This place covers:

Disclosures which are directly concerned with details or functionality of sub-systems or component parts of systems according to G01S 13/00.

Relationships with other classification places

Disclosures which concern the functioning of the full system should go in G01S 13/00; however details which form an important or technically non-trivial part of a system should also be classified in G01S 7/02.

References

Limiting references

This place does not cover:

Radio wave modulation schemes	G01S 13/08, G01S 13/58
Beam-forming	G01S 13/42, H01Q 3/00
Tracking	G01S 13/66
Specific radar applications	G01S 13/88

Special rules of classification

The subgroup G01S 7/28 covers details of pulse systems whereas the subgroup G01S 7/35 covers details of non-pulse systems. This distinction is made in accordance with the subgroups of G01S 13/08 and G01S 13/58. All other subgroups of G01S 7/02 are applicable to both pulse and non-pulse systems.

G01S 7/021

{Auxiliary means for detecting or identifying radar signals or the like, e.g. radar jamming signals}

Definition statement

This place covers:

Detection or identification of

- radar signals or
- other signals in the context of radar, e.g. radar jamming signals.

The use of said information e.g. for anti-jamming or EMI reduction measures is covered by other classes (see below).

References

Informative references

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

Means for anti-jamming, e.g. ECCM, i.e. electronic counter-counter measures	G01S 7/36
Jamming means, e.g. producing false echoes	G01S 7/38
Multi-channel PRF-analysers, per se	G01R 23/155

G01S 7/022

{Road traffic radar detectors}

Definition statement

This place covers:

- Vehicle based detectors for detecting police roadside radars, fixed overhead radars etc.
- The use of said information e.g. jamming the police radar or other measures is covered by other classes (see below).

References

Limiting references

This place does not cover:

Jamming means, e.g. producing false echoes	G01S 7/38

Informative references

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

Radar or analogous systems, designed for traffic control	G01S 13/91

For velocity measurement	G01S 13/92
Traffic control systems for road vehicles	G08G 1/00
Detecting movement of traffic to be counted or controlled	G08G 1/01

G01S 7/03

Details of HF subsystems specially adapted therefor, e.g. common to transmitter and receiver

Definition statement

This place covers:

Radar-related constructional details of HF (i.e. high frequency)-subsystems.

Relationships with other classification places

Details of waveguides, waveguide transitions, couplers (like hybrid couplers etc.) should be classified additionally in H01P, details of antennas should be classified additionally in H01Q, details of oscillators (e.g. VCO, i.e. voltage controlled oscillator, DRO, i.e. dielectric resonator oscillator), resonators, modulators/demodulators (like mixers, switches etc.), amplifiers, impedance matching networks etc. should be classified additionally in H03.

References

Informative references

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

Schematics of pulsed transmitters	G01S 7/282
Schematics of non-pulsed transmitters	G01S 7/35
TR boxes	H01J 17/64
Details of HF(i.e. high frequency)-components per se	H01P, H01Q, H03
Impedance networks or resonators	H03H

G01S 7/032

{Constructional details for solid-state radar subsystems}

Definition statement

This place covers:

E.g. solid state Tx/Rx-modules, single-chip radar sensors etc.

G01S 7/036

{involving a transfer mixer}

References

Informative references

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

Transference of modulation from one carrier to another, e.g. frequency-changing	H03D 7/00

G01S 7/038

{Feedthrough nulling circuits}

Definition statement

This place covers:

Circuits or measures to suppress Tx-Rx-crosstalk.

G01S 7/04

Display arrangements

Definition statement

This place covers:

All details of radar displays and the respective data processing.

G01S 7/046

{using an intermediate storage device, e.g. a recording/reproducing device}

References

Informative references

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

Pictorial communication, e.g. television	H04N

G01S 7/06

Cathode-ray tube displays {or other two dimensional or three-dimensional displays}

Definition statement

This place covers:

Not only details of cathode-ray tube displays (old technique from the days of generating this IPC class) but details of all kind of displays; such details are e.g. the use of different colours, cursor lines, symbols, plan-position indicators etc.

References

Informative references

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

Cathode-ray oscilloscopes in general	G01R 13/20

G01S 7/28

Details of pulse systems

Definition statement

This place covers:

The respective details (e.g. schematics) of radars using a pulsed carrier wave

References

Limiting references

This place does not cover:

Constructional features of the pulsed radar (like a certain waveguide type used etc.)	G01S 7/03

G01S 7/2813

{Means providing a modification of the radiation pattern for cancelling noise, clutter or interfering signals, e.g. side lobe suppression, side lobe blanking, null-steering arrays (specially adapted to secondary radar systems G01S 13/762; aerials or aerials systems H01Q 21/29, H01Q 25/00)}

Definition statement

This place covers:

Methods or means for a pulsed radar system providing a modification of the radiation pattern for cancelling noise, clutter or interfering signals, e.g. side lobe suppression, side lobe blanking, null-steering arrays.

References

Limiting references

This place does not cover:

By using shape of radiation pattern	G01S 7/2925
Modification of radiation pattern specially adapted to secondary radar systems	G01S 13/762
Null steering specially adapted to phased arrays in general	H01Q 3/2611
Aerials or aerials systems as such	H01Q 21/29, H01Q 25/00

Informative references

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

See also "extracting wanted echo signals based on data belonging to a number of consecutive radar periods in pulsed radar by using the shape of the radiation pattern"	G01S 7/2925
See also "simultaneous measurement of distance and other coordinates"	G01S 13/42
Modification of radiation pattern specially adapted to secondary radar systems	G01S 13/762
Null steering specially adapted to phased arrays in general	H01Q 3/2611

Aerials or aerials systems as such	H01Q 21/29, H01Q 25/00

Special rules of classification

These features may likewise apply to non-pulse systems, i.e. G01S 7/35. In the case of non-pulse systems having said features, give both classes, G01S 7/35 and G01S 7/2813.

G01S 7/282

Transmitters

Definition statement

This place covers:

Schematics, circuit details of pulsed radar transmitters

Relationships with other classification places

Circuits for generating electric pulses per se (for all applications, not only radar) are in H03K 3/00

References

Limiting references

This place does not cover:

Constructional features of the transmitter (like a certain waveguide type used etc.)	G01S 7/03

Informative references

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

Pulse technique	H03K

G01S 7/292

Extracting wanted echo-signals

Definition statement

This place covers:

Details of echo extraction in pulsed radars.

References

Informative references

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

Doppler systems	G01S 13/50
Pulsed radars discriminating between fixed and moving objects (e.g. with moving target indication (MTI), adaptive clutter cancellation, etc.)	G01S 13/52

Special rules of classification

Pulsed systems measuring target Doppler but also containing disclosure pertaining to extracting wanted targets from noise are classified in both G01S 13/52 and G01S 7/292.

G01S 7/2921

{based on data belonging to one radar period}

Definition statement

This place covers:

Details of echo extraction based on data belonging to single radar period in pulsed radars.

G01S 7/2922

{by using a controlled threshold}

Definition statement

This place covers:

e.g. CFAR

G01S 7/2925

{by using shape of radiation pattern}

Definition statement

This place covers:

Details of echo extraction based on data belonging to a number of consecutive radar periods in pulsed radars using the shape of radiation pattern.

References

Limiting references

This place does not cover:

Modification of radiation pattern specially adapted to secondary radar systems	G01S 13/762
Null steering specially adapted to phased arrays in general	H01Q 3/2611
Aerials or aerials systems as such	H01Q 21/29, H01Q 25/00

Informative references

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

See also "means for a pulsed radar system providing a modification of the radiation pattern for cancelling noise, clutter or interfering signals, e.g. side lobe suppression, side lobe blanking, null-steering arrays"	G01S 7/2813
See also "simultaneous measurement of distance and other coordinates"	G01S 13/42
Modification of radiation pattern specially adapted to secondary radar systems	G01S 13/762
Null steering specially adapted to phased arrays in general	H01Q 3/2611
Aerials or aerials systems as such	H01Q 21/29, H01Q 25/00

Special rules of classification

These features may likewise apply to non-pulse systems, i.e. G01S 7/35. In that case give both classes, G01S 7/35 and G01S 7/2925.

G01S 7/2927

{by deriving and controlling a threshold value}

Definition statement

This place covers:

e.g. CFAR

G01S 7/295

Means for transforming co-ordinates or for evaluating data, e.g. using computers

Definition statement

This place covers:

E.g., converting polar to Cartesian coordinates, details of computer implemented receivers.

References

Limiting references

This place does not cover:

Methods for processing data to evaluate functions by calculation per se	G06F 7/48

G01S 7/298

Scan converters

References

Informative references

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

Scan converters for sonar receivers	G01S 7/531

G01S 7/34

Gain of receiver varied automatically during pulse-recurrence period, e.g. anti-clutter gain control

References

Limiting references

This place does not cover:

Amplifiers per se	H03F
Automatic gain control in amplifiers per se	H03G 3/20

Informative references

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

Gain control in sonar receivers	G01S 7/529

G01S 7/35

Details of non-pulse systems

Definition statement

This place covers:

Details (e.g. of schematics) of non-pulsed radar systems, e.g. FMCW or CW radar systems.

References

Limiting references

This place does not cover:

Constructional features of the non-pulsed radar (like a certain waveguide type used etc.)	G01S 7/03

G01S 7/36

Means for anti-jamming {, e.g. ECCM, i.e. electronic counter-counter measures}

Definition statement

This place covers:

Means and measures to counter a jamming attack on the radar.

References

Informative references

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

Detection of jamming signals	G01S 7/021
Means providing a modification of the radiation pattern for cancelling noise, clutter or interfering signals, e.g. side lobe suppression, side lobe blanking, null-steering arrays	G01S 7/2813
Random interference pulse cancellers	G01S 7/2928

G01S 7/38

Jamming means, e.g. producing false echoes

Definition statement

This place covers:

Radar jammers (active and passive) and similar means

References

Informative references

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

Identification of radar signals	G01S 7/021
Reflecting surfaces comprising a plurality of reflecting particles, e.g. chaff	H01Q 15/145

G01S 7/40

Means for monitoring or calibrating

Definition statement

This place covers:

Means and measures to

- monitor the (correct) operating status of the radar, e.g. detection of failure, malfunction etc. of Tx- and/or Rx-modules or detection of obstruction of the antenna e.g. by ice, dirt etc., or
- calibrating the radar system e.g. in separate calibration cycles or during operation, intermittently or for each echo, manually or automatically, by internal or external reference; e.g. an internal reference line or an external reflector of known location.

G01S 7/4004

{of parts of a radar system}

Definition statement

This place covers:

Monitoring and calibrating parts of the radar system.

Since monitoring and calibrating of a radar (G01S 7/40) inevitably involves the monitoring and calibrating of the parts of the radar system, this class (G01S 7/4004) is regarded as ill-conceived and has to be reformulated/deleted in the near future. To ensure that all documents are found, see also G01S 7/40 and the classes G01S 7/4008 - G01S 7/4026).

References

Informative references

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

To ensure that all documents are found, see also:	G01S 7/40 and G01S 7/4008 - G01S 7/4026

Special rules of classification

This class is not used, and is awaiting revision.

G01S 7/4008

{of transmitters}

Definition statement

This place covers:

Monitoring and calibrating the transmitter of the radar system.

Since monitoring and calibrating of the parts of the radar system (G01S 7/4004) inevitably involves the monitoring and calibrating of the transmitter of the radar system, it is recommended to consult also G01S 7/4004 for a complete search. The same applies to G01S 7/4017 (HF systems) in which also some documents with transmitter monitoring/calibrating may be hidden.

References

Informative references

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

To ensure that all documents are found, see also:	G01S 7/4004 and G01S 7/4017

G01S 7/4017

{of HF systems}

Definition statement

This place covers:

Monitoring and calibrating the HF systems of the radar system.

Since monitoring and calibrating of the HF systems of the radar system inevitably overlaps with the monitoring and calibrating of the transmitter (G01S 7/4008) and / or the receiver (G01S 7/4021) of the radar system, it is recommended to consult also these classes for a complete search.

This class (G01S 7/4017) is regarded as ill-conceived and has to be reformulated/deleted in the near future.

References

Informative references

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

To ensure that all documents are found, see also:	G01S 7/4008, G01S 7/4021

Special rules of classification

This class is not used, and is awaiting revision.

G01S 7/4021

{of receivers}

Definition statement

This place covers:

Monitoring and calibrating the receiver of the radar system.

Since monitoring and calibrating of the parts of the radar system (G01S 7/4004) inevitably involves the monitoring and calibrating of the receiver of the radar system, it is recommended to consult also G01S 7/4004 for a complete search. The same applies to G01S 7/4017 (HF systems) in which also some document with transmitter monitoring/calibrating may be hidden.

References

Informative references

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

To ensure that all documents are found, see also:	G01S 7/4004, G01S 7/4017

G01S 7/4026

{Antenna boresight}

Definition statement

This place covers:

- The monitoring and (re-)adjusting of the antenna boresight.
- The monitoring / checking of the antenna boresight is done e.g. either by observing the history/ speed/vector etc. of targets during operation (i.e. adaptively) or by manually checking the boresight in a calibration environment.
- The adjustment is done e.g. either by steering the antenna or the antenna beam in the correct pointing position (mechanically, electronically etc.) or by re-calculating the target positions in the post-processing.

G01S 7/4052

{by simulation of echoes}

Definition statement

This place covers:

All kinds of radar echo simulation, be it by an internal reference line, be it by external reflectors, e.g. passive of active reflectors, being e.g. either moved or modulated respectively for Doppler-simulation etc.

References

Informative references

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

Systems in general using reradiation of radio waves	G01S 13/74
Analogue computers for direction-finding, locating, distance or velocity measuring, or navigation systems	G06G 7/78

Special rules of classification

Example:

An internal reference/delay line in the receiver for generating a distance calibration, e.g. for each echo, would be classified not only in G01S 7/4052 but also in G01S 7/4021 (calibrating the receiver).

G01S 7/4056

{specially adapted to FMCW}

Definition statement

This place covers:

Simulation of echoes in or for FMCW radars, e.g. internal reference/delay lines for distance calibration or external frequency modulated active reflectors etc.

Special rules of classification

Example:

An internal reference/delay line in the receiver for generating a distance calibration, e.g. for each echo, would be classified not only in G01S 7/4052 but also in G01S 7/4021 (calibrating the receiver)

G01S 7/414

{Discriminating targets with respect to background clutter}

References

Limiting references

This place does not cover:

Pulsed radars discriminating between fixed and moving objects and having adaptive clutter cancellation	G01S 13/5244

Informative references

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

Pulsed radars discriminating between fixed and moving objects and having adaptive clutter cancellation	G01S 13/5244

Special rules of classification

G01S 13/5244 takes precedence

G01S 7/415

{Identification of targets based on measurements of movement associated with the target}

References

Limiting references

This place does not cover:

Pulsed radars discriminating between fixed and moving objects and having moving target indicator (MTI)	G01S 13/524
--- based upon the phase or frequency shift resulting from movement of objects, with reference to the transmitted signals, e.g. coherent MT	G01S 13/524

Informative references

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

Pulsed radars discriminating between fixed and moving objects and having moving target indicator (MTI)	G01S 13/524

G01S 7/418

{Theoretical aspects}

Definition statement

This place covers:

The theoretical aspects (e.g. equations etc.) involved in target characterisation.

G01S 7/42

Diversity systems specially adapted for radar

Definition statement

This place covers:

Diversity means redundancy, e.g. of components or features: For example a plurality of redundant Tx/Rx-modules, antennas, beams, tilt angles or frequency ranges to be used to ensure target detection (e.g. under jamming, interference or combat conditions).

G01S 7/48

of systems according to group G01S 17/00

Definition statement

This place covers:

Details of systems which do not have a specific entry in lower groups, but which are included in the inventive concept of the disclosure, or which do have a specific entry in lower groups but are combinations of such details features, and where classification of each feature individually is inappropriate, should be classified here. disclosures which are directly concerned with details or functionality of sub-systems or component parts of systems according to G01S 17/00.

Relationships with other classification places

Disclosures which concern the functioning of the full system should go in G01S 17/00; however details of systems which form an important or technically non-trivial part of a disclosure of a system should also be classified in G01S 7/48.

References

Limiting references

This place does not cover:

Ammunition fuzes operated by light or similar radiation	F42C 13/02
(constructional) details of optical interferometers	G01B 9/00
Measuring polarisation of light	G01J
Optical scanners per se	G02B 26/00
Optical fibres per se	G02B 6/00
Optical lenses and objectives per se	G02B 9/00
(constructional) features of semiconductor devices	H01L 23/00, H01L 31/00
(constructional) features of lasers	H01S 3/00, H01S 5/00

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:

Systems per se are classified in	G01S 17/00

Informative references

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

Optical signalling in vehicles	B60Q
Vehicle fittings	B60R
Optical interferometers	G01B 9/00
Optical arrangements	G02B
(acousto-)optical modulators	G02F

Special rules of classification

Details of disclosures of systems which form a technically important or technically non-trivial part of a disclosure should be classified in G01S 7/48, as well as the appropriate system group in G01S 17/00, especially if these details form a significant part of the disclosure, and do not concern well-known and widely retrievable subject-matter.

Glossary of terms

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

2D	means two dimensional

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

LCD	Liquid Crystal Display

G01S 7/4804

{Auxiliary means for detecting or identifying lidar signals or the like, e.g. laser illuminators}

Definition statement

This place covers:

Detection or identification of

- lidar signals or
- other signals in the context of lidar, e.g. laser jamming, laser designator, or high power destructive light beams.

References

Limiting references

This place does not cover:

Means for jamming, anti-jamming, e.g. ECM, i.e. electronic counter-measures: ECCM, i.e. electronic counter-counter-measures: electro-optical counter-(counter)-measures.	G01S 7/495

G01S 7/4806

{Road traffic laser detectors}

Definition statement

This place covers:

Vehicle based detectors for detecting police roadside lidars, fixed overhead lidars etc.

The use of said information e.g. jamming the police lidar or other measures is covered by other classes (see below).

References

Limiting references

This place does not cover:

Jamming means, e.g. producing false echoes	G01S 7/495

Informative references

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

Radar or analogous systems, designed for traffic control	G01S 13/91
For velocity measurement	G01S 13/92
Traffic control systems for road vehicles	G08G 1/00

Detecting movement of traffic to be counted or controlled	G08G 1/01

G01S 7/481

Constructional features, e.g. arrangements of optical elements

Definition statement

This place covers:

All aspects of mechanical features, of physical layouts and component details where these are relevant, and which do not have a specific entry in lower groups, but which are included in the inventive concept of the disclosure, or which do have a specific entry in lower groups but are combinations of such details features, and where classification of each feature individually is inappropriate.

References

Limiting references

This place does not cover:

Arrangements of lenses and optical elements per se	G02B 1/00 - G02B 5/00, G02B 13/00 - G02B 25/00, G02B 27/00
Optical scanners per se	G02B 26/00

G01S 7/4811

{common to transmitter and receiver}

Definition statement

This place covers:

All aspects of mechanical features, of physical layouts involving both transmitter and receiver, where these are non-trivial, and which do not have a specific entry in lower groups, but which are included in the inventive concept of the disclosure, or which do have a specific entry in lower groups but are combinations of such details features, and where classification of each feature individually is inappropriate.

G01S 7/4812

{transmitted and received beams following a coaxial path}

Definition statement

This place covers:

Arrangements where at least a part of the measurement beam is guided coaxially for transmission and reception.

G01S 7/4813

{Housing arrangements}

Definition statement

This place covers:

Enclosing means, structural and supporting means both internal and external.

References

Limiting references

This place does not cover:

Printed circuits; casings or constructional details of electric apparatus; manufacture of assemblages of electrical components, per se.	H05K

G01S 7/4814

{of transmitters alone}

Relationships with other classification places

Constructional details of sources of illumination per se	F21, H01J, H01K, H01L 33/00
Constructional details of lasers; devices using stimulated emission, per se	H01S

G01S 7/4816

{of receivers alone}

Relationships with other classification places

Constructional details of photo sensitive detectors per se	G01J 5/00 - G01J 11/00
Constructional details of photo-sensitive semiconductor devices per se	H01L 31/00
Constructional details of imaging devices, e.g. CCD's, per se	H01L 27/00, H04N 5/30

G01S 7/4818

{using optical fibres}

Definition statement

This place covers:

Transmitting lidar signals at least partially through optically conducting light guides e.g., optical fibres.

References

Limiting references

This place does not cover:

Light guides per se	G02B 6/00

G01S 7/483

Details of pulse systems

Definition statement

This place covers:

Details including circuit details (circuit diagrams) of lidars, ladars, optical rangefinders using pulsed carrier waves.

G01S 7/484

Transmitters

Relationships with other classification places

Sources of optical illumination per se	F21, H01J, H01K, H01L 33/00
Devices using stimulated emission, per se	H01S
Circuits for generating electric pulses per se	H03K 3/00

References

Limiting references

This place does not cover:

Constructional features of the transmitter (like a certain optical arrangement or type used etc.)	G01S 7/4814

G01S 7/486

Receivers

Definition statement

This place covers:

Details including circuit details (circuit diagrams) of receiving devices used in lidars, ladars, optical rangefinders using pulsed carrier waves.

References

Informative references

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

Details of photo sensitive detectors including semiconductor devices per se	G01J, H01L
Image intensifiers	G02B 23/12
Light transforming elements per se	H01J, H01L
Imaging devices, e.g. CCD's,	H01L 27/14, H04N 5/30
Phototransistors	H01L 31/101

G01S 7/4861

Circuits for detection, sampling, integration or read-out

Definition statement

This place covers:

Details of the hardware circuits in the signal path from the photodetector to the pulse detection circuit or processor. Details of components and their circuitry like photodetectors, amplifiers, filters or analogue to-digital converters.

References

Informative references

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

Details of photo sensitive detectors	G01J 1/00
Imager structures	H01L 27/146
Amplifiers	H03F

G01S 7/4863

Detector arrays, e.g. charge-transfer gates

Definition statement

This place covers:

Details of detector arrays and details associated with detector arrays, e.g. integrated detector arrays for flash ladar and ToF cameras.

Details of single elements which are adapted or intended for integration as an array.

References

Informative references

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

Details of photo sensitive detectors	G01J 1/00
Imager structures	H01L 27/146
Solid state imaging devices, read-out	H04N 5/30

G01S 7/4865

Time delay measurement, e.g. time-of-flight measurement, time of arrival measurement or determining the exact position of a peak (peak detection in noise, signal conditioning G01S 7/487)

Definition statement

This place covers:

Time delay measurement, i.e. detecting time between a sent pulse and the reception of its echo, and finding the best point of a signal peak for time measurement, e.g. interpolation over range bins or when to trigger and stop measurement or time interpolation between clock pulses, measures to

improve time measurement accuracy, dealing with time walk error, e.g. by knowledge of intensity dependence or an intensity dependent time correction.

References

Limiting references

This place does not cover:

Peak detection in noise, signal conditioning	G01S 7/487

Informative references

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

Time delay measurement, e.g. operational details for pixel components	G01S 7/4915

G01S 7/487

Extracting wanted echo signals {, e.g. pulse detection}

Definition statement

This place covers:

Details of echo extraction in pulsed lidars (ladars).

References

Limiting references

This place does not cover:

Pulsed lidars (ladars) discriminating between fixed and moving objects (e.g. with moving target indication, adaptive clutter cancellation, etc.	G01S 17/50

Informative references

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

Pulsed lidars (ladars) discriminating between fixed and moving objects etc.	G01S 17/50

G01S 7/489

Gain of receiver varied automatically during pulse-recurrence period

References

Limiting references

This place does not cover:

Gain control of amplifiers per se	H03F

Informative references

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

Gain control of radar receivers	G01S 7/34

G01S 7/491

Details of non-pulse systems

Definition statement

This place covers:

Details including circuit details (circuit diagrams) of lidars, ladars, optical rangefinders using non-pulsed carrier waves.

References

Informative references

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

Pulsed lidars (ladars) discriminating between fixed and moving objects etc.	G01S 17/50

G01S 7/4911

Transmitters

Definition statement

This place covers:

Transmitter details, e.g. relating to the modulation or circuitry of the transmitter.

References

Informative references

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

Lasers	H01S
Driving circuits for electric light sources	H05B 33/00, H05B 45/00, H05B 47/00

G01S 7/4912

Receivers

Definition statement

This place covers:

Receiver details in general and receiver circuits of optical rangefinders (e.g. based on phase measurements or FMCW). Of time-of-flight cameras measuring distance using indirect time-of-flight.

G01S 7/4913

Circuits for detection, sampling, integration or read-out

Definition statement

This place covers:

Details of the hardware circuits in the signal path from the photodetector to the detection circuit or processor, e.g. particular details of photodetectors, amplifiers, filters or analogue to-digital converters.

References

Informative references

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

Details of photo sensitive detectors	G01J 1/00
Imager structures	H01L 27/146
Amplifiers	H03F

G01S 7/4914

of detector arrays, e.g. charge-transfer gates

Definition statement

This place covers:

Details of detector arrays and details associated with detector arrays, e.g. integrated detector arrays for time-of-flight (ToF) cameras based on indirect time-of-flight, i.e. based on a phase measurement.

Details of single elements which are adapted or intended for integration as an array.

References

Informative references

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

Details of photo sensitive detectors	G01J 1/00
Imager structures	H01L 27/146
Solid state imaging devices, read-out	H04N 5/30

G01S 7/4915

Time delay measurement, e.g. operational details for pixel components (signal extraction and conditioning G01S 7/493); Phase measurement

Definition statement

This place covers:

Details of time or phase measurement, i.e. details of how the delay or phase values are obtained. Details of FFT, waveform extraction, circuits for obtaining phase or delay information, comparison with reference signal, phase shifting of transmit signal until same phase as received signal, also phase delay of pulse signal train, indirect time-of-flight determination.

References

Limiting references

This place does not cover:

Signal detection and conditioning	G01S 7/493

G01S 7/493

Extracting wanted echo signals

Definition statement

This place covers:

Details of echo extraction and signal information relating to distance between transmitter and receiver in non-pulsed lidars (ladars).

G01S 7/495

Counter-measures or counter-counter-measures {using electronic or electro-optical means}

Definition statement

This place covers:

Means and measures to carry out OR to counter a jamming attack.

References

Limiting references

This place does not cover:

Detection of jamming signals	G01S 7/4804

G01S 7/497

Means for monitoring or calibrating

Definition statement

This place covers:

Means and measures to:

- Monitor the (correct) operating status of the lidar, e.g. detection of failure, malfunction etc. of Tx- and/or Rx-modules or detection of obstruction of the beam path, e.g. by ice, dirt etc., or to:
- Calibrate the lidar system (e.g. in separate calibration cycles or during operation, intermittently or for each echo, manually or automatically, by internal or external reference; e.g. an internal reference line, an internal optical waveguide, or an external reflector of known location.

G01S 7/4972

{Alignment of sensor}

Definition statement

This place covers:

The monitoring and (re-)adjusting of the transmitted and/or received beam direction.

G01S 7/499

using polarisation effects

References

Informative references

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

Measuring polarisation of light	G01J

G01S 7/51

Display arrangements

Definition statement

This place covers:

All forms of visual, audible or tactile display.

G01S 7/52

of systems according to group G01S 15/00

Definition statement

This place covers:

- Disclosures which are directly concerned with details or functionality of sub-systems or component parts of systems according to G01S 15/00.
- Details of short range imaging systems and echography are put in G01S 7/52017; this short range imaging area is dealt with in a separate definition statement.
- Details of systems which do not have a specific entry in lower groups, but which are included in the inventive concept of the disclosure, or which do have a specific entry in lower groups but are combinations of such details features, and where classification of each feature individually is inappropriate, should be classified here.

Relationships with other classification places

Disclosures which concern the functioning of the full system should go in G01S 15/00; however details of systems which form an important or technically non-trivial part of a disclosure of a system should also be classified in G01S 7/52.

References

Limiting references

This place does not cover:

(constructional) details of (ultra)sound transducers	B06B, H04R
Measuring properties of acoustic signals per se	G01H
Passive acoustic presence detection	G01V 1/001
Acoustic lenses and objectives per se	G10K 11/30
Acoustic beamformers per se	G10K 11/34
Analysing information e.g. speech in acoustic signals	G10L

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:

Systems per se are classified in	G01S 15/00
Acoustic well logging	G01V 1/40
Towed fish	G10K, G01V

Informative references

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

Ultrasound transducers per se	B06B
Measuring properties of acoustic signals	G01H
Analysing materials using the information in acoustic signals	G01N 29/44
Recognising patterns in signals in general	G06K 9/00496
Using acoustic lenses	G10K 11/30
Acoustic beamformers per se	G10K 11/34
Loudspeakers	H04R
Microphones (i.e. transducers producing electrical signal determined by the frequency/amplitude of the exciting acoustic signal)	H04R 1/08

Special rules of classification

Details of disclosures of systems which form a technically important or technically non-trivial part of a disclosure should be classified in G01S 7/52, as well as the appropriate system group in G01S 15/00, especially if these details form a significant part of the disclosure, and do not concern well-known and widely retrievable subject-matter.

Synonyms and Keywords

In patent documents, the following words/expressions are often used with the meaning indicated:

"sonar"	of a "purely passive listening device", which may make measurements or estimates of range and/or position. Such passive systems are not classified here. However details where it is not important whether the measurement/detection is carried out actively or passively, and are applicable to active sonar receivers, are classified here.

G01S 7/52001

{Auxiliary means for detecting or identifying sonar signals or the like, e.g. sonar jamming signals}

Definition statement

This place covers:

detection or identification of

- sonar signals or
- other signals in the context of sonar, e.g. sonar jamming signals.

The use of said information e.g. for anti-jamming measures is covered by other classes (see below).

References

Informative references

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

Means for anti-jamming, e.g. acoustic counter-countermeasures	G01S 7/537
Multi-channel PRF-analysers	G01R 23/155

G01S 7/52003

{Techniques for enhancing spatial resolution of targets (G01S 7/52046 takes precedence)}

Definition statement

This place covers:

Methods or means for a sonar system providing a modification of the beam pattern for cancelling noise, clutter or interfering signals.

References

Limiting references

This place does not cover:

Techniques for image enhancement involving transmitter or receiver	G01S 7/52046

Informative references

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

Acoustic beam forming per se	G10K 11/00

G01S 7/52004

{Means for monitoring or calibrating (short-range imaging G01S 7/5205)}

Definition statement

This place covers:

Means and measures to:

- monitor the (correct) operating status of the sonar, e.g. detection of failure, malfunction etc. of Tx- and/or Rx components or detection of obstruction of the beam path (e.g. by ice, dirt etc.), or to
- calibrate the sonar system (e.g. before installation, in separate calibration cycles or during operation, or for each echo, manually or automatically, by internal or external reference

References

Limiting references

This place does not cover:

Taking into account temperature effects	G01S 7/52006

G01S 7/52006

{with provision for compensating the effects of temperature}

References

Limiting references

This place does not cover:

Measuring acoustic properties of acoustic transmission media related to temperature	G01H

G01S 7/52015

{Diversity systems}

Definition statement

This place covers:

Diversity means redundancy, e.g. of components or features: For example a plurality of redundant Tx/Rx-modules, transducers, beams, tilt angles or frequency ranges to be used to ensure target detection (e.g. under jamming, interference or combat conditions).

G01S 7/52017

{particularly adapted to short-range imaging (G01S 7/53 takes precedence)}

Definition statement

This place covers:

Disclosures which are directly concerned with details or functionality of sub-systems or component parts of systems according to G01S 15/8906, i.e. short range imaging systems; acoustic microscope systems using pulse-echo techniques.

Relationships with other classification places

Disclosures which concern the functioning of the full system should go in G01S 15/8906; however details of systems which form an important or technically non-trivial part of a disclosure of a system should also be classified in G01S 7/52017.

References

Limiting references

This place does not cover:

Generic details for imaging systems where the type of system is not explicitly mentioned	G01S 7/00
Means for transforming coordinates in sonar systems	G01S 7/53
Ultrasound transducers per se	B06B
Measuring properties of acoustic signals	G01H
Analysing materials using the information in acoustic signals	G01N 29/44
Recognising patterns in signals in general	G06K 9/00496
Using acoustic lenses	G10K 11/30
Acoustic beamformers per se	G10K 11/34

Loudspeakers	H04R
Microphones(i.e. transducers producing electrical signal determined by the frequency/amplitude of the exciting acoustic signal)	H04R 1/08

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:

Systems per se are classified in	G01S 15/8906

Special rules of classification

Details of disclosures of acoustic short range imaging systems which form a technically important or technically non-trivial part of a disclosure should be classified in G01S 7/52017, as well as the appropriate system subgroup in G01S 15/8906, especially if these details form a significant part of the disclosure, and do not concern well-known and widely retrievable subject-matter.

As a general rule G01S 7/52017 classes should not be given simultaneously with other G01S 7/00 classes (exceptions: G01S 7/003 and G01S 7/521).

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

ARFI	Acoustic Radiation Force Impulse:uses brief, high energy focused acoustic pulses to generate radiation force in remote locations in tissue and conventional diagnostic ultrasound methods to detect the resulting tissue displacements in order to provide information about mechanical properties of tissue (e.g. shear wave modulus)
ASAE	Acoustically Stimulated Acoustic Emission: A contrast phenomenon which involves microbubble destruction and enables imaging of small vessel flow (also LOC: loss of correlation; Transient disruption; SAE: Stimulated Acoustic Emission;)
CDE	Colour Doppler Energy, synonym of Colour Power Doppler
CPA	Colour Power Angio, synonym to Colour Power Doppler
DGC	Depth Gain Compensation, synonyms: AGC: Automated Gain Compensation; TGC: Time gain compensation; STC: Sensitivity time control; FGC: Focal Gain Compensation; other forms of compensation: LGC: lateral gain compensation (azimuth);axial gain compensation ; EGC: elevation gain compensation- in ultrasonic flaw detection also called DAC: distance amplitude correction
XFOV	eXtended Field Of View (see EFOV)
EFOV	Extended Field Of View imaging is marketed under at least five different names (see G01S 7/52065) - Siescape, - LOGIQView, - FreeStyle extended imaging, - ApliClear- Panoramic imaging
LOC	Loss of correlation: Contrast agent imaging method. A high MI pulse destroys the microbubbles of the contrast agent, which leads to a sudden increase of the scattered signal. Later, weaker pulses image the region. Synonyms: - SEA: stimulated acoustic emission, - ASEA: Acoustically Stimulated Acoustic Emission - intermittent imaging - sonoscintigraphy, - flash echo imaging - flashing - transient disruption- transient imaging

MI	Mechanical Index: An indicator of nonthermal mechanism activity; equal to the peak rarefactional pressure divided by the square root of the center frequency of the pulse bandwidth.
MLA	Multi-Line-Acquisition (a special case would be: Fat Beam Transmission)
MPR (also called I-scan: inclined)	Multi-Planar-Reslicingarbitrary cut plane in a 3D ultrasonic imaging data block
RGC	Rationalised Gain Control (in contrast to TGC): the gain control depends on and is derived from the image itself rather than from a user--entered time relationship. Some of these determine a compensating gain function from an analysis of the echo intensities or the amplitude distribution of the picture elements ("pixels") in the image. In these methods, the gain compensation is thus indirect and does not result from a direct estimate of the attenuation
TGC	see DGC
STC	Sensitivity Time Control (see DGC)
SAE	Stimulated Acoustic Emission (see LOC)
SRI	Strain Rate Imaging
Strain rate	Synonyms: - rate-of-deformation, - stretching, - strain velocity, - velocity strain, - strain Doppler, - sonoelastography, - velocity gradient
TDI	Tissue Doppler Imaging DTV: Doppler Tissue Velocity DTI: Doppler Tissue Imaging, (but also tachycardia detection interval)

G01S 7/52025

{for pulse systems (G01S 7/52034 takes precedence)}

References

Limiting references

This place does not cover:

Data rate converters	G01S 7/52034

G01S 7/52026

{Extracting wanted echo signals (Doppler systems G01S 15/50; Doppler short range imaging systems G01S 15/8979)}

Definition statement

This place covers:

Pulse detection and extraction in pulsed acoustic short range receivers using e.g. thresholding. Complementary to G01S 7/52077.

References

Limiting references

This place does not cover:

If the inventive concept resides in the elimination of unwanted signals such as speckle or artefacts	G01S 7/52077
Unspecified Doppler sonar systems	G01S 15/50
Doppler short range imaging systems	G01S 15/8979
Detecting the response signal in analysing materials	G01N 29/36
Biomedical image inspection, from bit-mapped image to non bit-mapped feature	G06T 7/0012

G01S 7/52028

{using digital techniques}

Definition statement

This place covers:

Pulsed acoustic short range receivers with digital techniques for signal extraction, such as digital beamforming, delta sigma converters, synthetic focusing

References

Limiting references

This place does not cover:

Programmable filters per se	H03H 17/0294
Analogue/digital conversion per se	H03M 3/00
Delta sigma converters per se	H03M 3/02

G01S 7/5203

{for non-pulse systems, e.g. CW systems (G01S 7/52034 takes precedence)}

References

Limiting references

This place does not cover:

Data rate converters	G01S 7/52034

G01S 7/52033

{Gain control of receivers (for seismic signals G01V 1/245)}

References

Limiting references

This place does not cover:

Gain control of receivers for unspecified pulse sonar systems	G01S 7/529
Gain control of receivers for unspecified non-pulse sonar systems	G01S 7/5345
Detecting the response signal by gain control in analysing materials	G01N 29/40
Distance amplitude correction in analysing materials	G01N 29/4463
Amplitude control for seismic recording	G01V 1/245
Amplifiers per se	H03F
Automatic gain control in amplifiers per se	H03G 3/20

Informative references

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

Gain control of pulsed sonar receivers	G01S 7/529
Gain control of non-pulse sonar systems	G01S 7/5345

G01S 7/52034

{Data rate converters}

Definition statement

This place covers:

Data rate converters for acoustic short range imaging systems. This comprises in particular ultrasound imaging scan converters.

References

Limiting references

This place does not cover:

Scan converters for unspecified pulse sonar systems	G01S 7/531
Data rate converters for unspecified pulse sonar systems	G01S 7/533
Control of visual indicators by using colour palettes, e.g. look-up tables	G09G 5/06
Beamforming using different frequencies	G10K 11/343

G01S 7/52036

{using analysis of echo signal for target characterisation}

Definition statement

This place covers:

Analyzing the echo signal in acoustic short range imaging systems in order to characterize the reflecting target or the propagation medium. (e.g. determination of varying sound propagation velocity or frequency dependent attenuation of the propagation medium).

Relationships with other classification places

Generic details about analysis of echo signal for target characterisation for acoustic imaging should be classified in G01S 7/539.

References

Limiting references

This place does not cover:

Classification of defects in analyzing materials using ultrasonic waves	G01N 29/4445
Classification of features based on pattern recognition	G06K 9/00536

Informative references

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

Imaging strain for diagnostic purposes	see Indexing Codes of A61B

G01S 7/52038

{involving non-linear properties of the propagation medium or of the reflective target}

Definition statement

This place covers:

Details of acoustic short range imaging systems relating to non-linear interaction of the propagating acoustic wave with the propagation medium and/or the reflecting target. Covers (sub)harmonic imaging.

References

Informative references

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

Indexing Codes of	A61B

G01S 7/52046

{Techniques for image enhancement involving transmitter or receiver (image enhancement by image data processing G06T 5/00)}

Definition statement

This place covers:

Details of disclosures of acoustic short range imaging systems relating to the transmit or receive channel in order to enhance the output image. Examples are modifications of the transducer diagram such as limited diffraction beams.

Relationships with other classification places

Disclosures of generic details for enhancing spatial resolution of targets in acoustic imaging systems where the type of system is not explicitly mentioned, go in G01S 7/52003

References

Limiting references

This place does not cover:

Image enhancement by image data processing	G06T 5/00
Beamforming per se	G10K 11/341 and subgroups

G01S 7/52047

{for elimination of side lobes or of grating lobes; for increasing resolving power}

Definition statement

This place covers:

Details of acoustic short range imaging systems, relating to the receiver or transmitter aiming at eliminating side or grating lobes and at increasing the resolving power of the resulting system.

References

Informative references

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

Enhancing the spatial resolution in sonar systems	G01S 7/52003
Sound-focusing or directing using electrical steering of transducer arrays, e.g. beam steering	G10K 11/34
Apodisation per se	G10K 11/348

G01S 7/52049

{using correction of medium-induced phase aberration}

Definition statement

This place covers:

Details of short range imaging systems relating to the correction of the phase aberration due to inhomogeneous sound velocities in the propagation medium. Also called adaptive imaging.

Glossary of terms

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

Phase aberration	A phased array system assumes a certain acoustic velocity to calculate the focal and steering delays to ensure that all transmitted or received signals are in phase at the focal point. Inhomogeneous acoustic propagation velocities change the effective acoustic path length thereby producing a broadening of the focal point.

G01S 7/5205

{Means for monitoring or calibrating}

Definition statement

This place covers:

Details of short range imaging systems relating to the monitoring during use of the system or calibration prior to the use of the system.

References

Limiting references

This place does not cover:

Disclosures of generic details for monitoring and calibrating in acoustic imaging systems where the type of system is not explicitly mentioned	G01S 7/52004
Ultrasound phantoms	G09B 23/28
Phased array checking or checking devices	H01Q 3/267

Informative references

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

Calibration or testing of ultrasound probes, simulators for testing probes	see Indexing Codes of A61B
Calibration phantoms/bodies for testing ultrasound probes	see Indexing Codes of A61B

G01S 7/52052

{with simulation of echoes}

Definition statement

This place covers:

Details of monitoring and calibrating devices wherein the user has complete control of the reflected signal which is used for monitoring or calibration. Covers in particular computer simulation of the echo signal.

References

Limiting references

This place does not cover:

Calibrating or correcting the measurement of coordinates of points	G01B 21/04, G01B 21/042, G01B 21/045

G01S 7/52053

{Display arrangements}

References

Limiting references

This place does not cover:

Disclosures of generic details for display arrangements in acoustic imaging systems where the type of system is not explicitly mentioned	G01S 7/56
Arrangements for displaying electric variables in general	G01R 13/20

G01S 7/52055

{in association with ancillary recording equipment}

Glossary of terms

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

Ancillary recording equipment	supplementary or auxiliary devices, for supplementary recording during imaging, such as VCR, data storage, external memory

G01S 7/52057

{Cathode ray tube displays}

Definition statement

This place covers:

Details of short range imaging systems relating to the display of the image.

References

Informative references

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

Display representation in the analysis of materials (A-, B- or C-Scan)	G01N 29/0645
Cathode ray oscilloscopes in general	G01R 13/20

Glossary of terms

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

Cathode ray tube	any type of display or screen device. In particular modern LCD, OLED

G01S 7/5206

{Two-dimensional coordinated display of distance and direction; B-scan display}

Definition statement

This place covers:

Details of acoustic short range imaging relating to a 2D display.

Glossary of terms

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

2D	two-dimensional

G01S 7/52061

{Plan position indication (PPI display); C-scan display}

Definition statement

This place covers:

Display of constant (or arbitrary) depth images of acoustic short range imaging wherein the image plane does not correspond to the acquisition plane.

References

Informative references

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

Imaging apparatus producing slice/tomographic images in user-selectable planes, not corresponding to acquisition planes. Often combined with 3D imaging	see Indexing Codes of A61B

Glossary of terms

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

C-scan display	Constant depth scan;However, exists as well as arbitrary orientation scan

G01S 7/52063

{Sector scan display}

Definition statement

This place covers:

Disclosure relating to the display of parts of an image, such as a particular region of interest, a zoom, a magnifying lens effect.

References

Informative references

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

Operator selection of a ROI on an ultrasound image	see Indexing Codes of A61B

Glossary of terms

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

2D	region of interest

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

ROI	region of interest

G01S 7/52065

{Compound scan display, e.g. panoramic imaging}

Definition statement

This place covers:

Display of images covering a larger area than what the transducer could cover without movement. Examples are 2D or 3D panoramic imaging, extended field of view imaging.

References

Limiting references

This place does not cover:

Acoustic short range imaging systems using a dynamic transducer configuration	G01S 15/8934
Spatial or frequency compounding	G01S 15/8995

Sound steering by moving the transducer with arcuate movement	G10K 11/352, G10K 11/355

Glossary of terms

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

3D	three-dimensional
2D	two-dimensional

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

Extended field of view imaging (EFOV, XFOV)	EXtended Field Of View imaging is marketed under at least five different names - Siescape, - LOGIQView, - FreeStyle extended imaging, - ApliClear- Panoramic imaging

G01S 7/52066

{Time-position or time-motion displays}

Definition statement

This place covers:

Display of a variable over time in acoustic short range imaging. This covers in particular spectral Doppler imaging, M-mode imaging.

References

Limiting references

This place does not cover:

M-mode imaging for diagnosis	see Indexing Codes of A61B
Measuring blood flow for medical diagnosis	A61B 8/06
Detecting organic movements or changes for medical diagnosis	A61B 8/08

Informative references

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

Indexing Codes of	A61B

Glossary of terms

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

M mode	(time) Motion mode. B-mode presentation of changing reflector position (motion) versus time (used in echocardiography).

G01S 7/52068

{Stereoscopic displays; Three-dimensional displays; Pseudo 3D displays (G01S 15/8993 takes precedence)}

Definition statement

This place covers:

Displays of acoustic short range imaging producing a stereoscopic effect when looked at. Disclosures related exclusively to the displaying of 3D images.

Relationships with other classification places

Acoustic short range imaging systems acquiring and producing 3D data sets which are rendered for displaying an image should be classified in G01S 15/8993.

References

Limiting references

This place does not cover:

Three dimensional short range imaging	G01S 15/8993
Stereoscopic television systems and details thereof	H04N 13/00 and subgroups

Informative references

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

3D imaging for medical diagnosis	see Indexing Codes of A61B

G01S 7/52071

{Multicolour displays; using colour coding; Optimising colour or information content in displays, e.g. parametric imaging}

Definition statement

This place covers:

Disclosures of acoustic short range imaging systems colour coding and mapping information; optimising the colour and/or information display; parametric imaging.

References

Limiting references

This place does not cover:

Colour displays in material analysis	G01N 29/0609, G01N 29/0618, G01N 29/0627
Control of visual indicators by using colour palettes, e.g. look-up tables	G09G 5/06

G01S 7/52073

{Production of cursor lines, markers or indicia by electronic means}

Definition statement

This place covers:

Disclosure of acoustic short range systems overlaying non-alphanumeric information on top of an image.

References

Limiting references

This place does not cover:

Display of alphanumeric information together with an image	G01S 7/52074

Informative references

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

Indexing Codes of	A61B

G01S 7/52074

{Composite displays, e.g. split-screen displays; Combination of multiple images or of images and alphanumeric tabular information}

References

Informative references

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

Indexing Codes of	A61B

G01S 7/52076

{Luminous indicators}

Definition statement

This place covers:

Disclosures of any kind of visual indicator in acoustic short range imaging systems, such as LED for information or warning.

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

LED	Light Emitting Device

G01S 7/52077

{with means for elimination of unwanted signals, e.g. noise or interference}

Definition statement

This place covers:

Details of disclosures of acoustic short range imaging systems relating to noise or interference reduction or elimination: speckle reduction, elimination of artefacts such as aliasing, multiline. Complementary to G01S 7/52026.

References

Limiting references

This place does not cover:

Signal extraction	G01S 7/52026
Discriminating between fixed and moving objects or between objects moving at different speeds in combined Doppler and pulse-echo short range imaging systems	G01S 15/8981
Image enhancement by deblurring, restoration or noise filtering	G06T 5/001

G01S 7/521

Constructional features

Definition statement

This place covers:

All aspects of mechanical features, of physical layouts involving both transmitter and/or receiver, where these are non-trivial.

References

Informative references

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

Transducers, singly, in pairs or in arrays, where there is no further non-trivial disclosure of sonar operation	B06B

G01S 7/524

Transmitters

Definition statement

This place covers:

Schematics, circuit details, circuit diagrams of pulsed sonar transmitters

References

Limiting references

This place does not cover:

Methods or devices for transmitting, conducting or directing sound in general	G10K 11/00

Informative references

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

Generating the ultrasonic, sonic or infrasonic wave for investigating or analysing materials by the use of ultrasonic, sonic or infrasonic waves	G01N 29/34

G01S 7/527

Extracting wanted echo signals {(Doppler systems G01S 15/50)}

Definition statement

This place covers:

Pulse detection and extraction in pulsed acoustic receivers using e.g. thresholding.

References

Limiting references

This place does not cover:

Detecting the response signal in analysing materials	G01N 29/36

G01S 7/5273

{using digital techniques}

Definition statement

This place covers:

Pulsed acoustic receivers with digital techniques for signal extraction.

References

Limiting references

This place does not cover:

Analogue/digital conversion per se	H03M 3/00

G01S 7/5276

{using analogue techniques}

Definition statement

This place covers:

Pulsed acoustic receivers using analogue techniques such as analogue sampling, pulse level thresholds.

G01S 7/529

Gain of receiver varied automatically during pulse-recurrence period {(for seismic signals G01V 1/245)}

References

Limiting references

This place does not cover:

For seismic signals	G01V 1/245
Gain control of amplifiers per se	H03F

G01S 7/53

Means for transforming coordinates or for evaluating data, e.g. using computers

Definition statement

This place covers:

e.g., converting polar to Cartesian coordinates, details of computer implemented receivers.

G01S 7/531

Scan converters

References

Informative references

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

Radar display scan converters	G01S 7/298
Ultrasound imaging scan converters	G01S 7/52034

G01S 7/533

Data rate converters

References

Informative references

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

Data rate converters for acoustic short range imaging systems	G01S 7/52034

G01S 7/534

Details of non-pulse systems {(short-range imaging G01S 7/52017)}

Definition statement

This place covers:

Details including circuit details (circuit diagrams) of sonar using non-pulsed carrier waves.

G01S 7/5345

{Gain control of receivers (for seismic signals G01V 1/245)}

References

Limiting references

This place does not cover:

For seismic signals	G01V 1/245
Gain control of amplifiers per se	H03F

G01S 7/537

Counter-measures or counter-counter-measures, e.g. jamming, anti-jamming

Definition statement

This place covers:

Means and measures to carry out OR to counter a jamming attack.

References

Informative references

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

Detection of jamming signals	G01S 7/52001

G01S 7/54

with receivers spaced apart

Definition statement

This place covers:

Receiver arrangements primarily to aid in measuring the distance to the target.

References

Limiting references

This place does not cover:

Receivers spaced apart measuring the bearing of the incoming acoustic signal	G01S 3/802.

G01S 7/56

Display arrangements {(short-range imaging G01S 7/52053)}

Definition statement

This place covers:

All details of sonar displays and the respective data processing.

References

Informative references

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

Display systems for short range ultrasonic imaging,	G01S 7/52053
Display systems for visualising the interior of objects using sonic, ultrasonic, and infrasonic waves	G01N 29/06

G01S 7/58

for providing variable ranges

Definition statement

This place covers:

User or automatic selection of e.g. different depth ranges.

G01S 7/60

for providing a permanent recording

Definition statement

This place covers:

e.g. arrangements for storing sonar display data for later use.

G01S 7/62

Cathode-ray tube displays

Definition statement

This place covers:

Not only details of cathode-ray tube displays (old technique now superseded by newer technologies, e.g. LCD) but details of all kind of displays; such details being e.g. the use of different colours, cursor lines, symbols, plan-position indicators etc.

References

Informative references

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

Cathode ray oscilloscopes in general	G01R 13/20

G01S 7/6209

{providing display of one measured variable}

Definition statement

This place covers:

e.g. displaying, either graphically or not a single variable, e.g. range to target.

G01S 11/00

Systems for determining distance or velocity not using reflection or reradiation (position-fixing by co-ordinating two or more distance determinations G01S 5/00)

Definition statement

This place covers:

Systems for determining distance or velocity not using reflection or reradiation of electromagnetic waves. The exemption does not preclude reflected sunlight, thus cameras operating on images received from reflected sunlight, are classified here.

References

Limiting references

This place does not cover:

Position fixing	G01S 5/00

Informative references

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

Direction Finders	G01S 3/00

Special rules of classification

G01S 11/16 takes precedence over G01S 11/02, G01S 11/12 and G01S 11/14.

G01S 11/02

using radio waves (G01S 19/00 takes precedence)

References

Limiting references

This place does not cover:

Using difference in transit time between electrical and acoustic signals.	G01S 11/16
Satellite radio beacon positioning systems including receivers and elements cooperating therewith. Determination of position, velocity or attitude using signals transmitted by such systems.	G01S 19/00

G01S 11/08

using synchronised clocks

References

Informative references

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

Synchronisation of electrical clocks	G04G 7/02

G01S 11/12

using electromagnetic waves other than radio waves

Definition statement

This place covers:

- Systems for determining distance or velocity not using reflection or reradiation of electromagnetic waves, notably in the optical range, other than radio waves.
- Vehicle anti-collision systems employing optical signals which have neither been reflected nor reradiated are classified in this subgroup. Anti-collision systems involving video signals are also included.

References

Limiting references

This place does not cover:

Using difference in transit time between electrical and acoustic signals	G01S 11/16
Measuring distance in line of sight using parallax, i.e. stereo cameras	G01C 3/085

Informative references

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

Lidar systems specially adapted for anti-collision purposes:	G01S 17/93

G01S 11/14

using ultrasonic, sonic, or infrasonic waves

References

Limiting references

This place does not cover:

Using difference in transit time between electrical and acoustic signals	G01S 11/16

G01S 11/16

using difference in transit time between electrical and acoustic signals

Definition statement

This place covers:

Using difference in transit time between electrical and acoustic signals to determine distance and velocity. Electromagnetic signals, including optical signals are considered as electrical signals.

G01S 13/00

Systems using the reflection or reradiation of radio waves, e.g. radar systems; Analogous systems using reflection or reradiation of waves whose nature or wavelength is irrelevant or unspecified

Definition statement

This place covers:

Systems for detecting the presence of an object, e.g. by reflection or reradiation (G01S 13/74) from the object itself, or from a transponder associated with the object, for determining the distance or relative velocity of an object, for providing a co-ordinated display of the distance and direction of an object or for obtaining an image thereof; - systems arranged for mounting on a moving craft or vehicle and using the reflection of waves from an extended surface external to the craft, e.g. the surface of the earth, to determine the velocity and direction of motion of the craft relative to the surface.

Relationships with other classification places

Disclosure of analogous systems using reflection or reradiation of acoustic waves go in G01S 15/00; using electromagnetic waves other than radio waves go in G01S 17/00.

References

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:

Measuring liquid levels	G01F 23/284

Informative references

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

Systems for determining the direction of an object by means not employing reflection or reradiation, which are covered by groups	G01S 1/00, G01S 3/00

Systems for determining distance or velocity of an object by means not employing reflection or reradiation, which are covered by group	G01S 11/00
Using forward scattering and measuring material property	G01N

Special rules of classification

Details of disclosures of systems which conceptually form a technically important or technically non-trivial part of a disclosure should be classified in G01S 7/02, as well as the appropriate system group in G01S 13/00, especially if these details form a significant part of the disclosure, and do not concern well-known and widely retrievable subject-matter.

where a disclosure specifies alternative methods of measuring distance, for example, both time of flight of a transmitted and received radio pulse, as well as a difference measured in a transmitted and reflected continuous wave radio signal, and if these are described in detail, then the disclosure is classified in both G01S 13/10 and G01S 13/32.

G01S 13/003

{Bistatic radar systems; Multistatic radar systems}

Definition statement

This place covers:

Radar systems having a transmitting antenna which is dislocated from the receiving antenna; radar systems without a transmitter antenna that use illuminators of opportunity, e.g. ambient radio signals, satellite signals, TV-station signals.

References

Informative references

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

Monostatic radar systems having a separate transmit and receive antenna, as typically used in FMCW radar	G01S 13/34
Combination of radar systems	G01S 13/87

G01S 13/0209

{Systems with very large relative bandwidth, i.e. larger than 10 %, e.g. baseband, pulse, carrier-free, ultrawideband}

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

UWB	Ultra Wideband

G01S 13/0218

{Very long range radars, e.g. surface wave radar, over-the-horizon or ionospheric propagation systems (for meteorological use G01S 13/95)}

References

Limiting references

This place does not cover:

Radar or analogous systems for meteorological use	G01S 13/95

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

OTH	Over-The-Horizon

G01S 13/04

Systems determining presence of a target (based on relative movement of target G01S 13/56)

Definition statement

This place covers:

Systems where only the detection of the existence or not of a signal reflected from a target to the receiver is important.

References

Limiting references

This place does not cover:

Systems determining the presence of a target based on relative movement of target	G01S 13/56

Informative references

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

Systems determining the presence of a target	G01S 15/04, G01S 17/04

G01S 13/06

Systems determining position data of a target

Definition statement

This place covers:

Systems where an own position at a measuring point is unknown within a given reference system, and is measured using active radio rangefinding, as well as systems where position of a target relative to a measuring point is determined using non-defined measurements of a signal reflected from the target and received at that measuring point.

G01S 13/08

Systems for measuring distance only (indirect measurement G01S 13/46)

Definition statement

This place covers:

Systems where a disclosure specifies alternative methods of measuring distance, for example, both time of flight of a transmitted and received radio pulse, as well as a difference measured in a transmitted and reflected continuous wave radio signal, and if these are described in detail, then the disclosure is classified in both G01S 13/10 and G01S 13/32.

References

Limiting references

This place does not cover:

Indirect measurement	G01S 13/46

G01S 13/103

{particularities of the measurement of the distance (G01S 13/12, G01S 13/14, G01S 13/16, G01S 13/18 and G01S 13/20 take precedence)}

Definition statement

This place covers:

Particularities relating to measurement method involving transmission and reception; details as such are put in G01S 7/02.

Special rules of classification

G01S 13/14, G01S 13/12, G01S 13/16, G01S 13/20, and G01S 13/18 take precedence.

G01S 13/106

{using transmission of pulses having some particular characteristics (G01S 13/12, G01S 13/22, G01S 13/24, G01S 13/26, G01S 13/28 and G01S 13/30 take precedence)}

Special rules of classification

G01S 13/12, G01S 13/22, G01S 13/24, G01S 13/26, G01S 13/28 and G01S 13/30 take precedence

G01S 13/18

wherein range gates are used

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "range gate", "range bin" and "range cell"

G01S 13/38

wherein more than one modulation frequency is used

Definition statement

This place covers:

Systems using the simultaneous transmission of dual- or multi-frequency signals.

G01S 13/42

Simultaneous measurement of distance and other co-ordinates (indirect measurement G01S 13/46)

Definition statement

This place covers:

Systems using other coordinates that include Cartesian or polar spatial coordinates of target

References

Limiting references

This place does not cover:

Indirect measurement	G01S 13/46

Informative references

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

Bearing and direction finders per se	G01S 3/02

G01S 13/44

Monopulse radar, i.e. simultaneous lobing

References

Informative references

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

Monopulse in direction finding	G01S 3/32

G01S 13/4409

{HF sub-systems particularly adapted therefor, e.g. circuits for signal combination (multi-lobing aerials or aerial systems H01Q 25/00)}

References

Limiting references

This place does not cover:

Multilobing aerials or aerial systems	H01Q 25/00

Informative references

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

Waveguide couplers	H01P 5/00

G01S 13/46

Indirect determination of position data

Definition statement

This place covers:

Techniques for determining position involving the use of indirect waves, e.g. waves travelling along multiple paths.

G01S 13/48

using multiple beams at emission or reception

References

Informative references

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

Stacked beam radar systems	G01S 13/424

G01S 13/505

{using Doppler effect for determining closest range to a target or corresponding time, e.g. miss-distance indicator}

References

Informative references

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

Miss-distance indicators in general	F41J 5/12
Proximity fuze	F42C 13/04

G01S 13/52

Discriminating between fixed and moving objects or between objects moving at different speeds

References

Informative references

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

Coherent receivers	G01S 7/288

G01S 13/524

based upon the phase or frequency shift resulting from movement of objects, with reference to the transmitted signals, e.g. coherent MTi

References

Informative references

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

Coherent receivers	G01S 7/288

Glossary of terms

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

MTI	moving target indicator

G01S 13/5244

{Adaptive clutter cancellation (specially adapted for airborne MTI, G01S 13/5242)}

References

Limiting references

This place does not cover:

Clutter analysis for stationary targets:

Specially adapted for MTI	G01S 13/5242

Informative references

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

Discriminating targets with respect to background clutter	G01S 7/414

G01S 13/5265

{IF cancellers, e.g. TACCAR systems}

Glossary of terms

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

TACCAR	Time-Averaged Clutter-Coherent Airborne Radar

G01S 13/58

Velocity or trajectory determination systems; Sense-of-movement determination systems

Definition statement

This place covers:

Systems that measure properties of the reflected signal which contain information allowing the velocity of a moving target to be derived, where the moving target has a surface which causes reflection of the impinging radio measurement beam e.g. solid objects, particles suspended in a moving fluid: Note: the velocity of the moving fluid may be inferred from the measured velocity of the particles.

References

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:

Systems applied to the controlling of traffic	G01S 13/92

Informative references

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

Velocity or trajectory determination systems; Sense-of-movement determination systems	G01S 17/58

G01S 13/587

{using optical means}

References

Informative references

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

Optical computing devices in general	G06E

G01S 13/75

using transponders powered from received waves, e.g. using passive transponders {, or using passive reflectors}

Definition statement

This place covers:

Transponders which are operable in the context of determining position, range, or velocity.

Relationships with other classification places

Record carriers comprising integrated circuit chips: G06K 19/07

References

Informative references

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

Transponders that are used for the mere exchange of data.	G06K 7/00

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

RFID	Radio Frequency Identification

G01S 13/756

{using a signal generator for modifying the reflectivity of the reflector (G01S 13/758 takes precedence)}

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "modifying reflectivity for data transmission" and "backscatter modulation"

G01S 13/767

{Responders; Transponders (teaching or practice apparatus for gun-aiming or gun-laying using reflecting targets or active targets F41G 3/26)}

References

Limiting references

This place does not cover:

Teaching or practice apparatus for gun-aiming or gun-laying	F41G 3/26

Informative references

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

For anti-collision purposes cooperating with reflectors or transponders	G01S 2013/9329
Combination of several spaced transponders or reflectors of known location for determining the position of a receiver	G01S 15/876

G01S 13/84

for distance determination by phase measurement

References

Informative references

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

Phase measurement using reflection	G01S 13/36

G01S 13/86

Combinations of radar systems with non-radar systems, e.g. sonar, direction finder

References

Informative references

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

Combination of sonar systems with non-sonar or non-radar systems	G01S 15/86
Combination of lidar systems with systems other than lidar, radar or sonar	G01S 17/86

G01S 13/87

Combinations of radar systems, e.g. primary radar and secondary radar

References

Informative references

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

Transmission of data between radar systems	G01S 7/003

Special rules of classification

This subgroup relates to combination of radar systems, meaning that separate, independently operating radar systems are combined into one overall system, in particular by combining measurement data. Radar systems that for example comprise two transmitters are not considered a combination of radar systems.

G01S 13/878

{Combination of several spaced transmitters or receivers of known location for determining the position of a transponder or a reflector (G01S 13/874 takes precedence)}

References

Informative references

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

Determining absolute distances from a plurality of spaced points of known location	G01S 5/14

G01S 13/885

{for ground probing (prospecting or detecting using electromagnetic waves G01V 3/12)}

References

Limiting references

This place does not cover:

Prospecting or detecting using electromagnetic waves	G01V 3/12

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

GPR	ground penetrating radar

G01S 13/887

{for detection of concealed objects, e.g. contraband or weapons}

References

Informative references

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

Prospecting using millimetre waves	G01V 8/005

G01S 13/9023

{combined with interferometric techniques}

References

Informative references

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

Phase comparisons monopulse	G01S 13/4454
Monopulse hyvrid systems, e.g. conopulse	G01S 13/4481

G01S 13/9029

{specially adapted for moving target detection within a single SAR image or within multiple SAR images taken at the same time}

References

Informative references

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

Discriminating between fixed and moving objects or between objects moving at different speeds	G01S 13/52

G01S 13/91

for traffic control (G01S 13/93 takes precedence)

Relationships with other classification places

Traffic control system per se: G08G.

References

Limiting references

This place does not cover:

For anti-collision purposes	G01S 13/93

Informative references

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

Monitoring traffic from ground station	G08G 5/0082

G01S 13/92

for velocity measurement

References

Informative references

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

Traffic control systems measuring speed	G08G 1/052

G01S 13/933

of aircraft or spacecraft

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

TCAS	Traffic Collision Avoidance System

G01S 13/95

for meteorological use

Relationships with other classification places

Meteorology per se: G01W 1/00

G01S 15/00

Systems using the reflection or reradiation of acoustic waves, e.g. sonar systems

Definition statement

This place covers:

Systems for detecting presence, distance, position, movement and velocity of objects in space using the reflection of propagating acoustic waves or re-radiation (G01S 15/74) of acoustic waves. Systems for acoustic imaging are also covered, but are divided between long range (far field systems): G01S 15/89, and short range imaging and echography G01S 15/8906; this short range imaging area is dealt with in a separate definition statement.

Relationships with other classification places

Disclosures of generic systems for detecting presence, distance, position, movement and velocity of objects in space using the reflection of propagating waves or re-radiation of waves where the type of waves are not explicitly mentioned, go in G01S 13/00; but if these systems include features which are identifiable as relating to acoustic systems, then a class is also given in G01S 15/00.

References

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:

Acoustic well logging	G01V 1/40
Towed fish	G10K, G01V

Informative references

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

Seismic prospecting, acoustic detecting	G01V 1/00- G01V 1/37
Acoustic beamformers	G10K

Special rules of classification

Details of disclosures of systems which conceptually form a technically important or technically non-trivial part of a disclosure should be classified in G01S 7/52, as well as the appropriate system group in G01S 15/00, especially if these details form a significant part of the disclosure, and do not concern well-known and widely retrievable subject-matter.

where a disclosure specifies alternative methods of measuring distance, for example, both time of flight of a transmitted and received sound pulse, as well as a difference measured in a transmitted and reflected continuous wave acoustic signal, and if these are described in detail, then the disclosure is classified in both G01S 15/10 and G01S 15/32.

Glossary of terms

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

2D	two dimensional

Synonyms and Keywords

In patent documents, the following words/expressions are often used with the meaning indicated:

Sonar	passive acoustic receiving/listening system

G01S 15/04

Systems determining presence of a target

Definition statement

This place covers:

Systems where only the detection of the existence or not of a signal reflected from a target to the receiver is important.

G01S 15/06

Systems determining the position data of a target

Definition statement

This place covers:

Systems where an own position at a measuring point is unknown within a given reference system, and is measured using active acoustic rangefinding, are put here; as well as systems where position of a target relative to a measuring point is determined using non-defined measurements of a signal reflected from the target and received at that measuring point.

G01S 15/08

Systems for measuring distance only (indirect measurement G01S 15/46)

Definition statement

This place covers:

Where a disclosure specifies alternative methods of measuring distance, for example, both time of flight of a transmitted and received acoustic pulse, as well as a difference measured in a transmitted and reflected continuous wave acoustic signal, and if these are described in detail, then the disclosure is classified in both G01S 15/10 and G01S 15/32.

References

Limiting references

This place does not cover:

Indirect measurement	G01S 15/46

G01S 15/101

{Particularities of the measurement of distance (G01S 15/12, G01S 15/14, and G01S 15/18 take precedence)}

Definition statement

This place covers:

Particularities relating to measurement method involving transmission and reception; details as such are put in G01S 7/52.

G01S 15/42

Simultaneous measurement of distance and other co-ordinates (indirect measurement G01S 15/46)

Definition statement

This place covers:

Other coordinates include Cartesian or polar spatial coordinates of target.

References

Limiting references

This place does not cover:

Indirect measurement	G01S 15/46

Informative references

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

Bearing and direction finders per se	G01S 3/80

G01S 15/46

Indirect determination of position data

Definition statement

This place covers:

Techniques for determining position involving the use of indirect waves, e.g. waves travelling along multiple paths.

G01S 15/58

Velocity or trajectory determination systems; Sense-of-movement determination systems {(velocity measurement in imaging systems G01S 15/8979)}

Definition statement

This place covers:

Measuring properties of the reflected signal which contain information allowing the velocity of a moving target to be derived, where the moving target has a surface which causes reflection of the impinging

acoustic measurement beam e.g. solid objects, particles suspended in a moving fluid: Note: the velocity of the moving fluid may be inferred from the measured velocity of the particles.

References

Limiting references

This place does not cover:

Velocity measurement in imaging systems	G01S 15/8979

Special rules of classification

Determining velocities by acoustic means when propagation effects are not relevant, e.g. acoustically measuring the velocity of moving fluids per se, G01P 5/24, acoustically measuring fluid flow per se; G01F 1/66, measuring blood flow per se A61B 8/00.

G01S 15/74

Systems using reradiation of acoustic waves, e.g. IFF, i.e. identification of friend or foe

References

Informative references

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

Teaching or practice apparatus for gun-arming or gun-laying using reflecting targets or active targets	F41G 3/26

G01S 15/86

Combinations of sonar systems with lidar systems; Combinations of sonar systems with systems not using wave reflection

Definition statement

This place covers:

Combination of sonar systems with systems according to G01S 17/00 and/or with passive systems, e.g. direction finders.

G01S 15/885

{Meteorological systems}

References

Informative references

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

Measuring wind speed	G01P 5/24

G01S 15/8906

{Short-range imaging systems; Acoustic microscope systems using pulse-echo techniques}

Definition statement

This place covers:

Systems for short range imaging using reflection of propagating acoustic waves, in particular medical ultrasound imaging systems.

Relationships with other classification places

Disclosures which concern the functioning of the full system should go in G01S 15/8906.

References

Informative references

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

Medical diagnostic ultrasound applications	A61B 8/00
Generating or transmitting mechanical vibrations of ultrasonic frequency	B06B
Thickness measurement by ultrasonic waves	G01B 17/02
Flow measurements by ultrasonic waves	G01F 1/66
Measuring or indicating of ultrasonic, sonic or infrasonic waves in general	G01H
Analysing solids by imaging using ultrasonic waves	G01N 29/06
Seismic or acoustic prospecting or detecting	G01V 1/00
Obtaining records by techniques analogous to photography using ultrasonic waves	G03B 42/06
Image processing per se	G06T
Models for scanning techniques in medical ultrasonics	G09B 23/286
Wiring or connecting of acoustic transducers per se	G10K 11/004
Sound-focusing or directing, e.g. scanning	G10K 11/26
Beamforming of ultrasound waves	G10K 11/34

Special rules of classification

For systems transmitting data to a remote station G01S 7/003 should be given

Details of disclosures of systems which conceptually form a technically important or technically non-trivial part of a disclosure should be classified in G01S 7/52017, as well as the appropriate system subgroup in G01S 15/8906, especially if these details form a significant part of the disclosure, and do not concern well-known and widely retrievable subject-matter.

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

ARFI	Acoustic Radiation Force Impulse:uses brief, high energy focused acoustic pulses to generate radiation force in remote locations in tissue and conventional diagnostic ultrasound methods to detect the resulting tissue displacements in order to provide information about mechanical properties of tissue (e.g. shear wave modulus)

ASAE	Acoustically Stimulated Acoustic Emission: A contrast phenomenon which involves microbubble destruction and enables imaging of small vessel flow (also LOC: loss of correlation; Transient disruption; SAE: Stimulated Acoustic Emission)
CDE	Colour Doppler Energy, synonym of Colour Power Doppler
CPA	Colour Power Angio, synonym to Colour Power Doppler
DGC	Depth Gain Compensation, synonyms: AGC: Automated Gain Compensation; TGC: Time gain compensation; STC: Sensitivity time control; FGC: Focal Gain Compensation; other forms of compensation: LGC: lateral gain compensation (azimuth);axial gain compensation ; EGC: elevation gain compensation- in ultrasonic flaw detection also called DAC: distance amplitude correction
XFOV	eXtended Field Of View (see EFOV)
EFOV	Extended Field Of View imaging is marketed under at least five different names (see G01S 7/52065) - Siescape, - LOGIQView, - FreeStyle extended imaging, - ApliClear- Panoramic imaging
LOC	Loss of correlation: Contrast agent imaging method. A high MI pulse destroys the microbubbles of the contrast agent, which leads to a sudden increase of the scattered signal. Later, weaker pulses image the region. Synonyms: - SEA: stimulated acoustic emission, - ASEA: Acoustically Stimulated Acoustic Emission - intermittent imaging - sonoscintigraphy, - flash echo imaging - flashing - transient disruption- transient imaging
MI	Mechanical Index: An indicator of nonthermal mechanism activity; equal to the peak rarefactional pressure divided by the square root of the center frequency of the pulse bandwidth.
MLA	Multi-Line-Acquisition (a special case would be: Fat Beam Transmission)
MPR (also called I-scan: inclined)	Multi-Planar-Reslicingarbitrary cut plane in a 3D ultrasonic imaging data block
RGC	Rationalised Gain Control (in contrast to TGC): the gain control depends on and is derived from the image itself rather than from a user--entered time relationship. Some of these determine a compensating gain function from an analysis of the echo intensities or the amplitude distribution of the picture elements ("pixels") in the image. In these methods, the gain compensation is thus indirect and does not result from a direct estimate of the attenuation
TGC	see DGC
STC	Sensitivity Time Control (see DGC)
SAE	Stimulated Acoustic Emission (see LOC)
SRI	Strain Rate Imaging
Strain rate	Synonyms: - rate-of-deformation, - stretching, - strain velocity, - velocity strain, - strain Doppler, - sonoelastography, - velocity gradient
TDI	Tissue Doppler Imaging DTV: Doppler Tissue Velocity DTI: Doppler Tissue Imaging, (but also tachycardia detection interval)

G01S 15/8909

{using a static transducer configuration}

Definition statement

This place covers:

Acoustic short range imaging systems, in particular medical ultrasound imaging systems, wherein the fact that the imaging transducers are static is essential.

References

Informative references

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

Transducers per se	B06B 1/06
Constructional aspects of transducers	B06B 1/0607, B06B 1/085
Piezoelectric probes for analysing materials	G01N 29/2437
Analysing materials using electronic focusing, e.g. phased arrays	G01N 29/262
Sound-focusing or directing per se	G10K 11/26
Aspects related to the shape of the transducer	G10K 11/32
Phased arrays and beamforming per se	G10K 11/34

G01S 15/8934

{using a dynamic transducer configuration}

Definition statement

This place covers:

Acoustic short range imaging systems, in particular medical ultrasound imaging systems, wherein the fact that the imaging transducers can be moved or wherein movable parts inside a transducer probe are essential.

References

Informative references

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

Analysing materials using a sensor moving relative to a stationary material	G01N 29/265
Mounting transducers per se, e.g. provided with mechanical moving or orienting device	G10K 11/004
Sound directing per se using mechanical steering by moving the transducer	G10K 11/352
Sound directing per se by moving a reflector	G10K 11/357

G01S 15/895

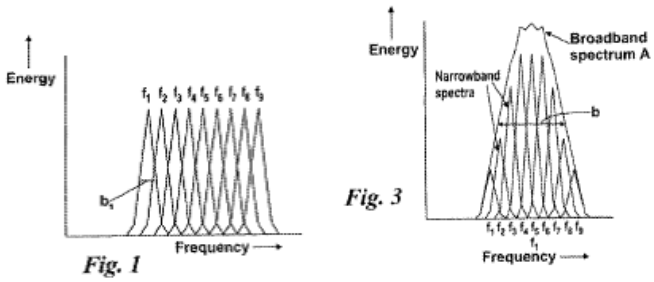
{characterised by the transmitted frequency spectrum}

Definition statement

This place covers:

Acoustic short range imaging systems, in particular medical ultrasound imaging systems, wherein the transmitted frequency spectrum is essential for the invention.

example for G01S 15/895:



(from WO2010004333)

e.g. a parametric source with a non-linear medium to transform a high-frequency electric driving signal into a low frequency collimated beam.

frequency switching on transmit

References

Informative references

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

Different forms of pulses	G01S 15/10
Investigating or analysing materials generating the ultrasonic waves with frequency characteristics, e.g. single frequency, chirps	G01N 29/348

Special rules of classification

High frequency, i.e. above 20 MHz, ultrasound imaging should be classified here

G01S 15/8952 should be given for several Dirac peaks in the frequency spectrum

G01S 15/8954 should be given in case of a spread spectrum and of chirps. However, only when using ultrashort (and hence broadband) pulses

In case the two possibilities, G01S 15/8952 and G01S 15/8954, are relevant the main subgroup should be given, not both sub-groups

G01S 15/8959

{using coded signals for correlation purposes}

Definition statement

This place covers:

Acoustic short range imaging systems, in particular medical ultrasound imaging systems, using coded signals for pulse compression (coding by e.g. Golay codes, Barker codes or chirps), differentiating multiple transmit beams using coded signals.

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

PED	Pulse Elongation and Deconvolution

G01S 15/8965

{using acousto-optical or acousto-electronic conversion techniques}

Definition statement

This place covers:

Acoustic short range imaging systems, in particular medical ultrasound imaging systems, with an optical-acoustic transducer structure using an absorbed pump light pulse in the transducer probe to generate a sound pulse;

Systems comprising two acoustic arrays with circuitry between them in order to work after the manner of a lens; Interferometric detection of reflected ultrasound waves for imaging purposes.

References

Informative references

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

Optoacoustic imaging, i.e. imaging of tissue using ultrasound waves generated in the tissue by a laser pulse	A61B 5/0073
Investigating materials with probes using optoacoustic interaction with the material, e.g. laser radiation	G01N 29/2418
Devices for manipulating acoustic surface waves	G10K 11/36
Sound-production using optical excitation per se, e.g. laser bundle	G10K 15/046

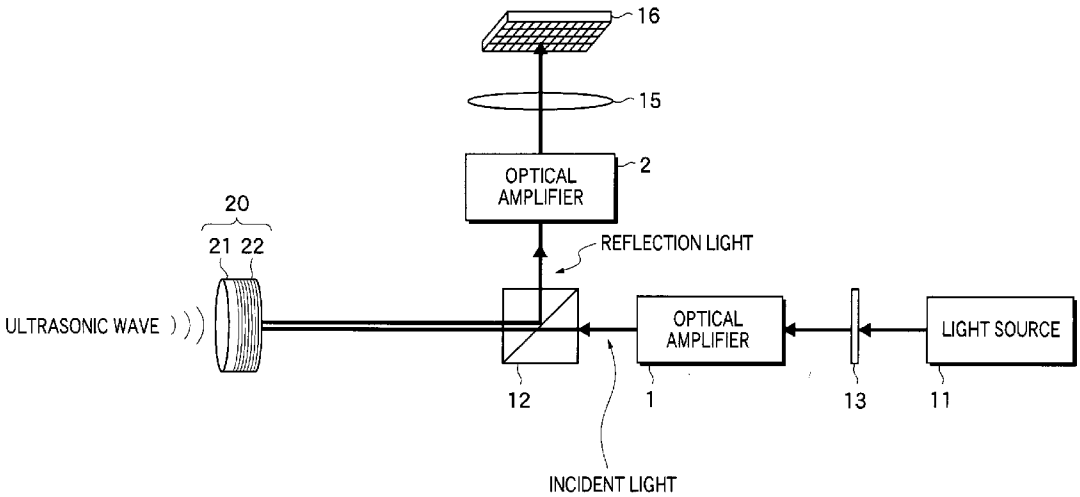
G01S 15/8968

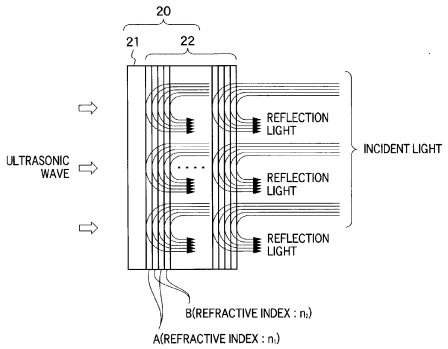
{using acoustical modulation of a light beam (acousto-optical light control devices G02F 1/11, G02F 1/33)}

Definition statement

This place covers:

Interferometric detection of reflected acoustic waves for imaging purposes using the acoustical modulation of a light beam





(from EP1298450, published 2003)

References

Limiting references

This place does not cover:

Control the position or direction of light beams using acousto-optical deflection devices	G02F 1/33
Control of amplitude or phase of light based on acousto-optical elements	

Informative references

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

Measuring ultrasonic waves using mechanical fibre optic sensors	G01H 9/004

Investigating materials whereby incident light is modified using opto-acoustic detection	G01N 21/1702

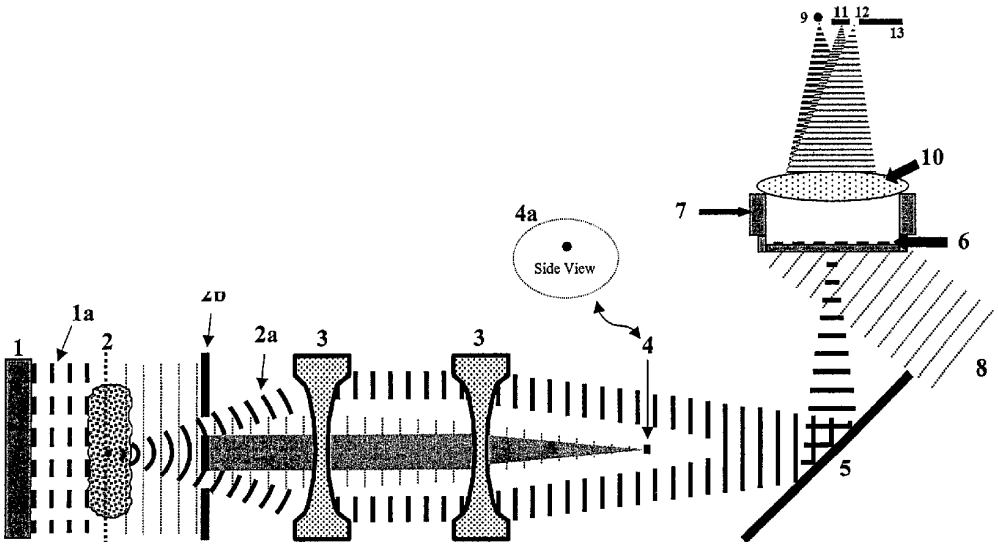
G01S 15/897

{using application of holographic techniques}

Definition statement

This place covers:

example:



(from WO03032817)

References

Informative references

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

Analysing solids using the imaging of the interior by acoustic holography	G01N 29/0663
Holography per se	G03H
Acoustic holography per se	G03H 3/00

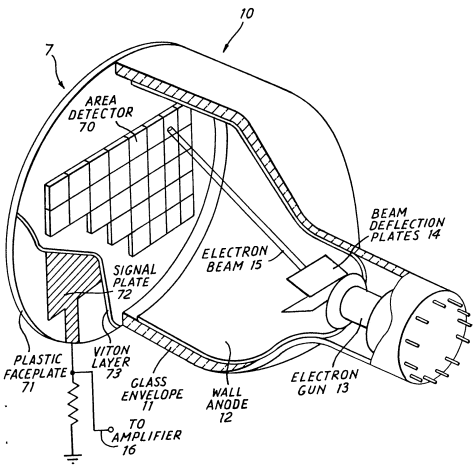
G01S 15/8975

{using acoustical image/electron beam converter tubes (tubes therefor H01J 31/495)}

Definition statement

This place covers:

Using e.g. Sokolov tubes for ultrasound detection (obsolete: technique from the 1980s)



(from GB2066957, published 1981)

References

Limiting references

This place does not cover:

Tubes for acoustical image/electron beam converters	H01J 31/495

G01S 15/8977

{using special techniques for image reconstruction, e.g. FFT, geometrical transformations, spatial deconvolution, time deconvolution}

Definition statement

This place covers:

Acoustic short range imaging systems, in particular medical ultrasound imaging systems, using special techniques on the already acquired set of acoustic data to (re)construct an image from these data.

References

Informative references

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

Analysing materials by processing the detected response signal using	G01N 29/44
Statistical methods	G01N 29/449
Spectral analysis (e.g. FFT)	G01N 29/46
Auto- or cross-correlation techniques	G01N 29/50
Digital image processing per se	G06T 1/00

G01S 15/8979

{Combined Doppler and pulse-echo imaging systems}

Definition statement

This place covers:

- Acoustic short range imaging systems, in particular medical ultrasound imaging systems, using duplex imaging, i.e. colour coded flow velocity information extracted using Doppler signals overlaid as parametric information on B-mode images.
- General Doppler systems.

References

Informative references

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

Systems relating to spectral Doppler only	G01S 7/52066
For the principle underlying wall filters (i.e. G01S 15/8981)	G01S 13/5244
Determining the velocity vector	G01S 15/588
Measuring blood flow for medical diagnosis	A61B 8/06
Diagnostic techniques involving Doppler signals	A61B 8/488
Blood flow in combination with B-scan for diagnosis	A61B 8/5246
Measuring of volume flow using ultrasound	G01F 1/663
Measuring speed of fluids in general	G01P 5/00

G01S 15/899

{Combination of imaging systems with ancillary equipment}

Definition statement

This place covers:

Acoustic short range imaging systems, in particular medical ultrasound imaging systems, wherein the ancillary equipment has a direct and important influence on the acoustic imaging itself.

References

Informative references

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

Measuring for diagnostic purposes	A61B 5/00
Ultrasound lithotripsy	A61B 17/22004, A61B 17/225
ICT specially adapted for handling or processing of medical images	G16H 30/00

Glossary of terms

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

Ancillary equipment	supplementary or auxiliary devices, for supplementary sensing or monitoring during imaging, such as temperature sensors, cooling systems, tracking systems, docking units, ECG systems, high intensity focused ultrasound probes used for or during imaging, or combinations thereof

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

ECG	Electrocardiogram
PPG	photoplenthysmography, e.g. a pulse oximeter

G01S 15/8993

{Three dimensional imaging systems}

Definition statement

This place covers:

Acoustic short range imaging systems, in particular medical ultrasound imaging systems, using the acquisition of a three-dimensional set of data to produce via per se well-known rendering techniques a three-dimensional image.

References

Informative references

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

Diagnosis using ultrasound 3D	A61B 8/466
Three-dimensional stereoscopic images	G01S 7/52068
3D image rendering	G06T 15/00
Ray tracing per se	G06T 15/06
Volume rendering per se	G06T 15/08
3D modelling, e.g. data description of 3D objects	G06T 17/00
Manipulating 3D images	G06T 19/00

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

3D	three-dimensional

G01S 15/8995

{Combining images from different aspect angles, e.g. spatial compounding}

References

Informative references

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

Image enhancement per se using more than one image, e.g. averaging, subtraction	G06T 5/50
Determination of transform parameters for the alignment of images, i.e. image registration	G06T 7/30

Glossary of terms

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

Spatial Compounding	Averaging of frames that view anatomy from different imaging angles.

G01S 17/00

Systems using the reflection or reradiation of electromagnetic waves other than radio waves, e.g. lidar systems

Definition statement

This place covers:

This main group covers systems for detecting presence, distance, position, movement and velocity of objects in space using the reflection of propagating electromagnetic waves or re-radiation (G01S 17/74) of electromagnetic waves where the wavelength of the electromagnetic waves is shorter than the range of electromagnetic wavelengths including millimetric waves.

Relationships with other classification places

Disclosures of generic systems for detecting presence, distance, position, movement and velocity of objects in space using the reflection of propagating electromagnetic waves or re-radiation of electromagnetic waves where the range of wavelengths are not explicitly mentioned, go in G01S 13/00; but if these systems include features which are identifiable as relating to optical systems, then a class is also given in G01S 17/00.

References

Informative references

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

Measuring linear dimensions, e.g. length, thickness, and distances between spaced objects	G01B
Measuring distances, levels, bearings; surveying; navigation	G01C
Photogrammetry or videogrammetry	G01C 11/00
Measuring light per se	G01J
Investigating materials by optical radiation, microwaves or acoustic waves	G01N

Measuring linear or angular speed, indicating presence, absence, or direction of movement	G01P
Detecting masses or objects by methods not involving reflection or reradiation of radio, acoustic, or other waves; prospecting	G01V
Optical systems	G02B
Control of position, course, altitude or attitude	G05D
Detecting the presence of objects for the purpose of counting them	G06M 7/00, G06M 11/00
Traffic control systems; anti-collision systems	G08G
Laser per se	H01S

Special rules of classification

Details of disclosures of systems which conceptually form a technically important or technically non-trivial part of a disclosure should be classified in G01S 7/48, as well as the appropriate system group in G01S 17/00, especially if these details form a significant part of the disclosure, and do not concern well-known and widely retrievable subject-matter.

Systems for optically measuring the velocity of particles suspended in fluids by reflection are put in G01S 17/58

Glossary of terms

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

Triangulation	identifying an unknown location by calculating the length of one side of a triangle based on distance and angle measurements to known reference points
Trilateration	identifying an unknown location by using the geometry of triangles and spheres.
Multilateration	identifying an unknown location using a process similar to triangulation and trilateration using three or more known reference points.

Synonyms and Keywords

In patent documents, the following words/expressions are often used as synonyms:

- "Lidar", "Ladar" and "Laser Radar"

G01S 17/04

Systems determining the presence of a target

Definition statement

This place covers:

Systems where only the detection of the existence or not of a signal reflected from a target to the receiver is important.

References

Informative references

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

Prospecting by optical means; detecting the presence of objects or masses by optical means, e.g. by interruption of beams, i.e. light barriers	G01V 8/00

G01S 17/06

Systems determining position data of a target

Definition statement

This place covers:

Systems where the position of the emitting system is determined relative to a reference frame, using active optical range finding. Systems where the position of a target is determined with respect to a measuring point, using signals reflected by the target, provided that these signals were not emitted by a single, well-defined source.

G01S 17/08

for measuring distance only (indirect measurement G01S 17/46; active triangulation systems G01S 17/48)

References

Limiting references

This place does not cover:

Indirect determination of position data	G01S 17/46
Active triangulation systems, i.e. using the transmission and reflection of electromagnetic waves other than radio waves	G01S 17/48

Special rules of classification

Where a disclosure specifies alternative methods of measuring distance, for example, both time of flight of a transmitted and received optical pulse, as well as a time of flight measured with a transmitted and reflected continuous wave optical signal, and if these are described in detail, then the disclosure is classified in both G01S 17/10.

G01S 17/32

using transmission of continuous waves, whether amplitude-, frequency-, or phase-modulated, or unmodulated

References

Informative references

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

Interferometers per se	G01B 9/00
Optically measuring length, width or thickness	G01B 11/02

Special rules of classification

Interferometers per se; G01B 9/00: optically measuring length, width or thickness by measuring distance to an object; G01B 11/026.

G01S 17/42

Simultaneous measurement of distance and other co-ordinates (indirect measurement G01S 17/46)

Definition statement

This place covers:

Other coordinates include Cartesian or polar spatial coordinates of target.

References

Limiting references

This place does not cover:

Indirect determination of position data	G01S 17/46

Informative references

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

Bearing and direction finders per se	G01S 3/78

G01S 17/46

Indirect determination of position data

Definition statement

This place covers:

Techniques for determining position involving the use of indirect waves, e.g. waves travelling along multiple paths.

G01S 17/48

Active triangulation systems, i.e. using the transmission and reflection of electromagnetic waves other than radio waves

Glossary of terms

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

Active system	An active system uses a transmitter and a receiver.
Passive system	A passive system listens without transmitting.

G01S 17/58

Velocity or trajectory determination systems; Sense-of-movement determination systems

Definition statement

This place covers:

Measuring the properties of the reflected signal in order to calculate the velocity of a moving target. The moving target may be a solid object or particles suspended in a moving fluid.

Special rules of classification

Determining velocities by optical means when propagation effects are not relevant, e.g. optically measuring the velocity of moving fluids per se; G01P 3/36, optically measuring fluid flow per se; G01F 1/66.

G01S 17/74

Systems using reradiation of electromagnetic waves other than radio waves, e.g. IFF, i.e. identification of friend or foe

References

Informative references

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

Teaching or practice apparatus for gun-arming or gun-laying using reflecting targets or active targets	F41G 3/26

G01S 17/89

for mapping or imaging

Definition statement

This place covers:

Optical imaging systems which are active, i.e. a dedicated illuminator/transmitter whether coherent or not is present, and the depth and/or range to objects within the illuminated space is measured

References

Informative references

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

Optically measuring length, width or thickness	G01B 11/02
Surveying systems per se	G01C 15/00
Television/imaging systems not having range measurement per se	H04N

Special rules of classification

Optically measuring length, width or thickness using tv-camera scanning; G01B 11/022: television/imaging systems not having range measurement per se; H04N: surveying systems per se; G01S 15/00.

G01S 17/894

3D imaging with simultaneous measurement of time-of-flight at a 2D array of receiver pixels, e.g. time-of-flight cameras or flash lidar

Definition statement

This place covers:

Systems for generating a 3D image without scanning a light beam, e.g. time-of-flight cameras or flash LADAR.

References

Informative references

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

Depth or shape recovery from laser ranging	G06T 7/521
Stereoscopic imaging in combination with an illumination source for illuminating objects	H04N 13/254
Stereoscopic imaging wherein the generated image signals comprise depth maps or disparity maps	H04N 13/271

G01S 19/00

Satellite radio beacon positioning systems; Determining position, velocity or attitude using signals transmitted by such systems

Definition statement

This place covers:

- Satellite radio beacon positioning systems including receivers and elements cooperating therewith.
- Determination of position, velocity or attitude using signals transmitted by such systems.

Special rules of classification

Relating to G01S 19/03, G01S 19/25, G01S 19/41, G01S 19/43 and G01S 19/45:

The distinction made between the use of subgroups of G01S 19/03 and subgroups with similar sounding names, such as G01S 19/25, G01S 19/41, G01S 19/43, G01S 19/45 is according to where the invention lies. Taking G01S 19/07 and G01S 19/41 an example: publications relating to differential GPS often mention both the reference station which creates the differential corrections and the act of correcting the position in the receiver. Usually, the inventive information present in a publication will relate either to the act of correction, or to reference station and method of sending the correction data to the receiver. Should the subject matter relate to carrying out correction, G01S 19/41 should be allocated; in the case of creating the differential data in the reference station or transferring it to the receiver, G01S 19/07 should be allocated. It is not uncommon for cooperating elements to provide all or some of the set of acquisition data, differential correction data, integrity data, ranging signals. Classification symbols should be given only to a document for those elements of the list which are part of the inventive disclosure of the document. Additional classification symbols may then be given to indicate the presence of the other information.

Relating to G01S 19/13 and G01S 19/39.

Subject matter related to the carrying out of processing not in the receiver itself, but at a remote station, should - in the absence of a dedicated subgroup in G01S 19/13 or G01S 19/42 - be allocated G01S 19/09.

Relating to G01S 19/14, G01S 19/35 and G01S 19/39

Subgroups – are "application-places for (GPS) receivers" insofar as they cover special characteristics of the (GPS) receivers, or specific constraints imposed on the receivers, so that they can adapt to the specific application. These subgroups do not cover the mere indication of the possible uses of a general GPS receiver.

The decision as to whether to classify in these groups will depend on the extent to which the invention relates to the core subject of these groups. Patent documents which deal with GPS merely as a "black box" to provide positioning information for use by the application would not normally be classified in these groups.

These subgroups are also intended as an aid in making search in other G01S 19/00 groups more efficient, as the application may suggest particular restrictions on the function of the receiver, e.g. a military application may imply a harsh electromagnetic environment and use of higher spec. components.

Should the matter in hand disclose constructional feature or software or hardware implementation issues, allocation of a G01S 19/35 code may be appropriate.

Matter relating to the determination of position, velocity and attitude should be classified in G01S 19/00, however, should matter be disclosed which would warrant classification and which relates to other parameters such as angular velocity, altitude, meteorological properties etc, such matter should be allocated to G01S 19/39.

Glossary of terms

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

Cooperating elements	designates additional elements or subsystems, including receivers of other users, which interact or communicate with the receiver to assist in acquisition or position determination. It does not refer to the ground control segments of the satellite systems.
Time-stamped message	designates a message encoded with time of transmission for use in determining the signal travel time
Relative Positioning	designates that position (angle + range) is calculated relative to another measured position.

Synonyms and Keywords

In patent documents, the following abbreviations are often used:

AGPS	Assisted (or aided) GPS
DGPS	Differential GPS
GLONASS	Global Orbiting Navigation Satellite System
GPS	Global Positioning System
IMU	Inertial Measurement Unit
INS	Inertial Navigation System
LAMBDA	Least-squares AMBiguity Decorrelation Adjustment

G01S 19/03

Cooperating elements; Interaction or communication between different cooperating elements or between cooperating elements and receivers

References

Limiting references

This place does not cover:

Services making use of the location of users or terminals, i.e. position related information.	H04W 4/02

G01S 19/10

providing dedicated supplementary positioning signals

Relationships with other classification places

Where the matter refers to a transmitter having more general application than merely GPS related, classification in G01S 1/00 should also be considered.

References

Informative references

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

Beacons transmitting signals having a characteristic or characteristics capable of being detected by non-directional receivers and definition direction, positions, or position lines	G01S 1/00

G01S 19/13

Receivers

References

Limiting references

This place does not cover:

Receivers present in cooperating elements, in so far as they would not be susceptible of more general application, should be classified in the relevant subclass of:	G01S 19/03 .

G01S 19/14

specially adapted for specific applications

References

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:

Fire Fighting	A62C

Apparatus for physical training, sports	A63B
Vehicle fittings for preventing or indicating unauthorised use or theft of vehicles	B60R 25/00
Surveying	G01C 15/00
Navigation	G01C 21/00
Electronic time-pieces for aspects of time-setting or synchronization	G04G 5/00, G04G 7/00
Alarms responsive to a single specified undesired or abnormal operating condition	G08B 21/00
Alarm systems in which the location of the alarm condition is signalled to a central station, e.g. fire or police telegraphic systems	G08B 25/00
Traffic control systems for road vehicles	G08G 1/00
Locating users or terminals for network management purposes	H04W 64/00

G01S 19/21

Interference related issues {; Issues related to cross-correlation, spoofing or other methods of denial of service}

References

Informative references

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

Spoofers, jammers etc.	G01S 19/015
Interference related aspects in spread spectrum receivers	H04B 1/7097

G01S 19/22

Multipath-related issues

Relationships with other classification places

Multipath detection and mitigation is often tightly bound to the signal acquisition. Where the subject matter related to signal acquisition is more generally applicable, classification in G01S 19/30 may also be desirable.

G01S 19/22 and G01S 19/428 both relate to multipath issues. Matter in G01S 19/22 relates principally to identification and mitigation of multipath effects. G01S 19/428 contains matter in which the multipath signals are deliberately taken into account to calculate position.

G01S 19/23

Testing, monitoring, correcting or calibrating of receiver elements

References

Informative references

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

Automatic control of frequency or phase; synchronisation	H03L 7/00

Special rules of classification

The decision to classify in G01S 19/23 or G01S 19/235 relates to the interpretation of the term "calibration". In GPS, it is foreseen that the oscillator used for signal acquisition and tracking operates well - any procedure to bring to oscillator into alignment with its correct operating frequency is considered calibration. A receiver, however, is not expected to maintain exact time, as this is a by-product of position calculation. Thus, time is not calibrated.

G01S 19/24

Acquisition or tracking {or demodulation} of signals transmitted by the system {(synchronisation aspects of direct sequence spread spectrum modulation H04B 1/7073)}

References

Informative references

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

Spread spectrum techniques in general using direct sequence modulation (DSM)	H04B 1/707
Synchronisation aspects of direct sequence spread spectrum modulation	H04B 1/7073

G01S 19/34

Power consumption

Special rules of classification

Reduced energy consumption due to an improved acquisition paradigm or apparatus, e.g. reduced time to first fix due to acquisition aiding. Improvement in acquisition etc which necessarily result in improved power consumption should not be classified here.

G01S 19/35

Constructional details or hardware or software details of the signal processing chain

References

Informative references

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

Printed circuits; casing or constructional details of electric apparatus	H05K

G01S 19/36

relating to the receiver frond end

Definition statement

This place covers:

Constructional details relating to the front end; also positioning of the front end, if separated from the processing navigation processor.

References

Informative references

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

Aerials	H01Q

G01S 19/37

Hardware or software details of the signal processing chain

Special rules of classification

G01S 19/30 takes precedence. Should the hardware details be so specific that they have no application outside of G01S 19/30, then there is no need to classify these aspects in G01S 19/37

G01S 19/39

the satellite radio beacon positioning system transmitting time-stamped messages, e.g. GPS [Global Positioning System], GLONASS [Global Orbiting Navigation Satellite System] or GALILEO

Special rules of classification

Although matter relating to the determination of position, velocity and attitude should only by classified in G01S 19/00; however, should it be necessary to indicate that another parameter is being measured, e.g. angular velocity, altitude, meteorological properties, such matter should be allocated G01S 19/39.

G01S 19/428

{using multipath or indirect path propagation signals in position determination}

Definition statement

This place covers:

Position determination where multipath or indirect path signals are deliberately taken into account to calculate position.

References

Limiting references

This place does not cover:

Identification and mitigation of multipath effects; these are classified in:	G01S 19/22

G01S 19/47

the supplementary measurement being an inertial measurement, e.g. tightly coupled inertial

Definition statement

This place covers:

Positioning solutions where measurements are combined to arrive as a position involving inertial measurement.

References

Limiting references

This place does not cover:

Progressing forward in time by integration of inertial measurements a position solution derived from GPS signals, i.e. this subgroup does not cover the combination of positions with measurements. Such positioning algorithms are found in:	G01S 19/49

G01S 19/48

by combining or switching between position solutions derived from the satellite radio beacon positioning system and position solutions derived from a further system

Definition statement

This place covers:

By a combination of GPS and another positioning technique, e.g. from Wifi signals, or by switching between the two techniques. Switching between routines is often done when the electromagnetic environment, energy requirements, state of movement in which the receiver finds itself is more or less suitable for position determination by GPS.

Relationships with other classification places

G01S 5/01 should be allocated where the electromagnetic environment, e.g. multipath or suggesting an indoor rather than an outdoor environment, or any other aspect which would determine the choice of combination/switch of positioning technique, is determined.