

CPC COOPERATIVE PATENT CLASSIFICATION

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 ({for special applications, see the relevant subclasses, e.g. [A61B](#), [G01F](#), [G01N](#), [G02B](#); measuring dimensions or angles of objects [G01B](#); navigation in general [G01C](#); 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 relevant subclasses, e.g. [G01L](#), [H01L](#), [H04R](#); measuring direction or velocity of flowing fluids by reception or emission of radiowaves or other waves and based on propagation effects caused in the fluid itself [G01P](#); measuring electric or magnetic variables in general [G01R](#)}; detecting masses or objects by methods not involving reflection or radiation of radio, acoustic or other waves [G01V](#); {time-interval measuring [G04F](#)}; aerials [H01Q](#))

NOTES

- In this subclass, the following term is used with the meaning indicated:
 - "transponder" means an arrangement which reacts to an incoming interrogating or detecting wave by emitting a specific answering or identifying wave.
- Attention is drawn to the Notes following the title of class [G01](#) and to Note (1) following the title of subclass [G09B](#).

WARNING

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

[G01S 7/26](#)

covered by

[G01S 7/06](#)

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)	1/10	. . . using amplitude comparison of signals transmitted sequentially from aerials or aerial systems having differently-oriented overlapping directivity-characteristics, e.g. equi-signal A-N type
1/02	. using radio waves (G01S 19/00 takes precedence)	1/12	. . . . the signals being transmitted sequentially from an aerial or aerial system having the orientation of its directivity characteristic periodically varied, e.g. by means of sequentially effective reflectors
1/022	. . {Means for monitoring or calibrating}	1/14	. . . using amplitude comparison of signals transmitted simultaneously from aerials or aerial systems having differently-oriented overlapping directivity-characteristics
1/024	. . . {of beacon transmitters}	1/16	. . . . Azimuthal guidance systems, e.g. system for defining aircraft approach path, localiser system
1/026	. . . {of associated receivers}	1/18	. . . . Elevational guidance systems, e.g. system for defining aircraft glide path
1/028	. . . {Simulation means, e.g. of beacon signals therefor (for teaching or training purposes G09B 9/00)}	1/20	. . . using a comparison of transit time of synchronised signals transmitted from non-directional aerials or aerial systems spaced apart, i.e. path-difference systems {(synchronisation in general H03L 7/00)}
1/04	. . Details	1/22	. . . . the synchronised signals being frequency modulations on carrier waves and the transit times being compared by measuring difference of instantaneous frequencies of received carrier waves
1/042	. . . {Transmitters}		
1/045	. . . {Receivers}		
1/047	. . . {Displays or indicators (G01S 1/06 takes precedence)}		
1/06	. . . Means for providing multiple indication, e.g. coarse and fine indications		
1/08	. . Systems for determining direction or position line {(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)}		

- 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}
- 1/245 {Details of receivers cooperating therewith, e.g. determining positive zero crossing of third cycle in LORAN-C}
- 1/26 Systems in which pulses or time-base signals are generated locally at the receiver and brought into predetermined time-relationship with received signals, e.g. pulse duration coincides with time interval between arrival of significant part of modulation of signals received from first and second aerials or aerial systems {contains no documents}
- 1/28 wherein the predetermined time-relationship is maintained automatically {contains no documents}
- 1/30 the synchronised signals being continuous waves or intermittent trains of continuous waves, the intermittency not being for the purpose of determining direction or position line and the transit times being compared by measuring the phase difference
- 1/302 {Systems in which the direction is determined by using an interferometric type transmitting antenna array}
- 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}
- 1/306 {Analogous systems in which frequency-related signals (harmonics) are compared in phase, e.g. DECCA systems}
- 1/308 {particularly adapted to Omega systems}
- 1/32 Systems in which the signals received, with or without amplification, or signals derived therefrom, are compared in phase directly {contains no documents}
- 1/34 Systems in which first and second synchronised signals are transmitted from both aerials or aerial systems and a beat frequency obtained by heterodyning the first signals with each other is compared in phase with a beat frequency obtained by heterodyning the second signals with each other {contains no documents}
- 1/36 Systems in which a beat frequency, obtained by heterodyning the synchronised signals, is compared in phase with a reference signal having a phase substantially independent of direction {contains no documents}
- 1/38 using comparison of (1) the phase of the envelope of the change of frequency, due to Doppler effect, of the signal transmitted by an aerial moving, or appearing to move, in a cyclic path with (2) the phase of a reference signal, the frequency of this reference signal being synchronised with that of the cyclic movement, or apparent cyclic movement, of the aerial
- 1/40 the apparent movement of the aerial being produced by cyclic sequential energisation of fixed aerials
- 1/42 Conical-scan beacons transmitting signals which indicate at a mobile receiver any displacement of the receiver from the conical-scan axis, e.g. for "beam-riding" missile control
- 1/44 Rotating or oscillating beam beacons defining directions in the plane of rotation or oscillation
- 1/46 Broad-beam systems producing at a receiver a substantially continuous sinusoidal envelope signal of the carrier wave of the beam, the phase angle of which is dependent upon the angle between the direction of the receiver from the beacon and a reference direction from the beacon, e.g. cardioid system
- 1/465 {using time-varying interference fields}
- 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}
- 1/50 wherein the phase angle of the direction-dependent envelope signal is compared with a non-direction-dependent reference signal, {e.g. VOR}
- 1/52 wherein the phase angles of a plurality of direction-dependent envelope signals produced by a plurality of beams rotating at different speeds or in different directions are compared
- 1/54 Narrow-beam systems producing at a receiver a pulse-type envelope signal of the carrier wave of the beam, the timing of which is dependent upon the angle between the direction of the receiver from the beacon and a reference direction from the beacon; Overlapping broad beam systems defining a narrow zone and producing at a receiver a pulse-type envelope signal of the carrier wave of the beam, the timing of which is dependent upon the angle between the direction of the receiver from the beacon and a reference direction from the beacon
- 1/56 Timing the pulse-type envelope signals derived by reception of the beam
- 1/58 wherein a characteristic of the beam transmitted or of an auxiliary signal is varied in time synchronously with rotation or oscillation of the beam
- 1/60 Varying frequency of beam signal or of auxiliary signal
- 1/62 Varying phase-relationship between beam and auxiliary signal
- 1/64 Varying pulse timing, e.g. varying interval between pulses radiated in pairs

- 1/66 Superimposing direction-indicating intelligence signals, e.g. speech, Morse
- 1/68 . . Marker, boundary, call-sign, or like beacons transmitting signals not carrying directional information
- 1/685 . . . {using pulse modulation, e.g. pulse frequency modulation}
- 1/70 . using electromagnetic waves other than radio waves
- 1/705 . . {using gamma or X-rays}
- 1/72 . using ultrasonic, sonic or infrasonic waves (signalling devices G08B)
- 1/725 . . {Marker, boundary, call-sign or like beacons transmitting signals not carrying directional information}
- 1/74 . . Details
- 1/76 . . Systems for determining direction or position line (sound focusing or directing using electrical steering of transducer arrays, e.g. beam steering, in general G10K 11/34)
- 1/763 . . . {using the Doppler shift introduced by the relative motion between beacon and receiver}
- 1/766 . . . {Conical-scan beam beacons transmitting signals which indicate at a mobile receiver any displacement of the receiver from the conical-scan axis}
- 1/78 . . . using amplitude comparison of signals transmitted from transducers or transducer systems having differently-oriented characteristics
- 1/783 {the signals being transmitted sequentially}
- 1/786 {the signals being transmitted simultaneously}
- 1/80 . . . using a comparison of transit time of synchronised signals transmitted from non-directional transducers or transducer systems spaced apart, i.e. path-difference systems
- 1/802 {the synchronised signals being frequency modulations on carrier waves and the transit times being compared by measuring difference of instantaneous frequencies of received carrier waves}
- 1/805 {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}
- 1/807 {the synchronised signals being continuous waves or intermittent trains of continuous waves, the intermittency not being for the purpose of determining direction or position line and the transit times being compared by measuring the phase difference}
- 1/82 . . . Rotating or oscillating beam beacons defining directions in the plane of rotation or oscillation
- 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; for geophysical measurement G01C; telescope mountings G02B)**
- 3/02 . using radio waves
- 3/023 . . {Monitoring or calibrating}
- 3/026 . . . {Simulating means therefor}
- 3/04 . . Details
- 3/043 . . . {Receivers}
- 3/046 . . . {Displays or indicators}
- 3/06 . . . Means for increasing effective directivity, e.g. by combining signals having differently-oriented directivity characteristics, by sharpening the envelope waveform of the signal desired from a rotating or oscillating beam aerial (comparing amplitude of signals having differently-oriented directivity characteristics to determine direction G01S 3/16, G01S 3/28; modifications of aerials or aerial systems H01Q)
- 3/065 {by using non-directional aerial}
- 3/08 . . . Means for reducing polarisation errors, e.g. by use of Adcock or spaced loop aerial systems
- 3/085 {by using spaced loop aerial systems}
- 3/10 . . . Means for reducing or compensating for quadrantal, site, or like errors
- 3/12 . . . Means for determining sense of direction, e.g. by combining signals from directional aerial or goniometer search coil with those from non-directional aerial ({G01S 3/065 takes precedence} determining direction by amplitude comparison of signals derived by combining directional and non-directional signals G01S 3/24, G01S 3/34)
- 3/14 . . Systems for determining direction or deviation from predetermined direction {(aerial arrangements for changing or varying the orientation or the shape of the directional pattern H01Q 3/00; combinations of different interacting aerial units for giving a desired directional characteristic H01Q 21/29; aerials or aerial systems providing at least two radiation patterns H01Q 25/00)}
- 3/143 . . . {by vectorial combination of signals derived from differently oriented antennae}
- 3/146 . . . {by comparing linear polarisation components (polarisation details of antenna systems per se H01Q 21/245)}
- 3/16 . . . using amplitude comparison of signals derived sequentially from receiving aerials or aerial systems having differently-oriented directivity characteristics or from an aerial system having periodically-varied orientation of directivity characteristic {(G01S 3/146 takes precedence)}
- 3/18 derived directly from separate directional aerials
- 3/20 derived by sampling signal received by an aerial system having periodically-varied orientation of directivity characteristic
- 3/22 derived from different combinations of signals from separate aerials, e.g. comparing sum with difference
- 3/24 the separate aerials comprising one directional aerial and one non-directional aerial, e.g. combination of loop and open aerials producing a reversed cardioid directivity characteristic
- 3/26 the separate aerials having differently-oriented directivity characteristics

- 3/28 . . . using amplitude comparison of signals derived simultaneously from receiving aerials or aerial systems having differently-oriented directivity characteristics [{\(G01S 3/146 takes precedence\)}](#)
- 3/30 derived directly from separate directional systems
- 3/32 derived from different combinations of signals from separate aerials, e.g. comparing sum with difference
- 3/325 [{Automatic tracking systems}](#)
- 3/34 the separate aerials comprising one directional aerial and one non-directional aerial, e.g. combination of loop and open aerials producing a reversed cardioid directivity characteristic
- 3/36 the separate aerials having differently-oriented directivity characteristics
- 3/38 . . . using adjustment of real or effective orientation of directivity characteristic of an aerial or aerial system to give a desired condition of signal derived from that aerial or aerial system, e.g. to give a maximum or minimum signal [\(G01S 3/16, G01S 3/28 take precedence\)](#)
- 3/40 adjusting orientation of a single directivity characteristic to produce maximum or minimum signal, e.g. rotatable loop aerial, equivalent goniometer system
- 3/42 the desired condition being maintained automatically
- 3/44 the adjustment being varied periodically or continuously until it is halted automatically when the desired condition is attained
- 3/46 . . . using aerials spaced apart and measuring [{frequency}](#) phase or time difference between signals therefrom, i.e. path-difference systems
- 3/465 [{the waves arriving at the aerials being frequency modulated and the frequency difference of signals therefrom being measured}](#)
- 3/48 the waves arriving at the aerials being continuous or intermittent and the phase difference of signals derived therefrom being measured
- 3/50 the waves arriving at the aerials being pulse modulated and the time difference of their arrival being measured
- 3/52 . . . using a receiving aerial moving, or appearing to move, in a cyclic path to produce a Doppler variation of frequency of the received signal
- 3/54 the apparent movement of the aerial being produced by coupling the receiver cyclically and sequentially to each of several fixed spaced aerials
- 3/56 . . . Conical-scan beam systems using signals indicative of the deviation of the direction of reception from the scan axis
- 3/58 . . . Rotating or oscillating beam systems using continuous analysis of received signal for determining direction in the plane of rotation or oscillation or for determining deviation from a predetermined direction in such a plane [\(G01S 3/14 takes precedence\)](#)
- 3/60 Broad-beam systems producing in the receiver a substantially sinusoidal envelope signal of the carrier wave of the beam, the phase angle of which is dependent upon the angle between the direction of the transmitter from the receiver and a reference direction from the receiver, e.g. cardioid system
- 3/62 wherein the phase angle of the signal is indicated by a cathode-ray tube
- 3/64 wherein the phase angle of the signal is determined by phase comparison with a reference alternating signal varying in synchronism with the directivity variation
- 3/66 Narrow-beam systems producing in the receiver a pulse-type envelope signal of the carrier wave of the beam, the timing of which is dependent upon the angle between the direction of the transmitter from the receiver and a reference direction from the receiver; Overlapping broad-beam systems defining in the receiver a narrow zone and producing a pulse-type envelope signal of the carrier wave of the beam, the timing of which is dependent upon the angle between the direction of the transmitter from the receiver and a reference direction from the receiver
- 3/68 wherein the timing of the pulse-type envelope signal is indicated by cathode-ray tube [\(radar cathode-ray tube indicators providing co-ordinated display of distance and direction G01S 7/10\)](#)
- 3/70 wherein the timing of the pulse-type envelope signal is determined by bringing a locally-generated pulse-type signal into coincidence or other predetermined time-relationship with the envelope signal
- 3/72 . . Diversity systems specially adapted for direction-finding
- 3/74 . . Multi-channel systems specially adapted for direction-finding, i.e. having a single aerial system capable of giving simultaneous indications of the directions of different signals [\(systems in which the directions of different signals are determined sequentially and displayed simultaneously G01S 3/04, G01S 3/14\)](#)
- 3/78 . . using electromagnetic waves other than radio waves
- 3/7803 . . . [{Means for monitoring or calibrating}](#)
- 3/7806 . . . [{using gamma or X-rays}](#)
- 3/781 . . Details
- 3/782 . . Systems for determining direction or deviation from predetermined direction
- 3/783 . . . using amplitude comparison of signals derived from static detectors or detector systems
- 3/7835 [{using coding masks}](#)
- 3/784 using a mosaic of detectors
- 3/785 . . . using adjustment of orientation of directivity characteristics of a detector or detector system to give a desired condition of signal derived from that detector or detector system
- 3/786 the desired condition being maintained automatically, [{i.e. tracking systems; \(G01S 3/783 takes precedence\)}](#)
- 3/7861 [{Solar tracking systems}](#)

- 3/7862 {mounted on a moving platform, e.g. space vehicle}
- 3/7864 {T.V. type tracking systems}
- 3/7865 {using correlation of the live video image with a stored image}
- 3/7867 {Star trackers (navigation using star trackers [G01C 21/025](#))}
- 3/7868 {using horizon sensors}
- 3/787 . . . using rotating reticles producing a direction-dependant modulation characteristic
- 3/788 . . . producing a frequency modulation characteristic
- 3/789 . . . using rotating or oscillating beam systems, e.g. using mirrors, prisms
- 3/80 . . using ultrasonic, sonic or infrasonic waves
- 3/8003 . . {Diversity systems specially adapted for direction finding}
- 3/8006 . . {Multi-channel systems specially adapted for direction-finding, i.e. having a single aerial system capable of giving simultaneous indications of the directions of different signals}
- 3/801 . . Details {([G01S 3/82](#), [G01S 3/84](#), [G01S 3/86](#) take precedence)}
- 3/802 . . Systems for determining direction or deviation from predetermined direction (sound-focusing or directing using electrical steering of transducer arrays, e.g. beam steering, in general [G10K 11/34](#))
- 3/8022 . . . {using the Doppler shift introduced by the relative motion between source and receiver}
- 3/8025 . . . {Conical-scan beam systems using signals indicative of the deviation of the direction of reception from the scan axis}
- 3/8027 . . . {By vectorial composition of signals received by plural, differently-oriented transducers}
- 3/803 . . . using amplitude comparison of signals derived from receiving transducers or transducer systems having differently-oriented directivity characteristics
- 3/8032 {wherein the signals are derived sequentially}
- 3/8034 {wherein the signals are derived simultaneously}
- 3/8036 {derived directly from separate directional systems}
- 3/8038 {derived from different combinations of signals from separate transducers comparing sum with difference}
- 3/805 . . . using adjustment of real or effective orientation of directivity characteristic of a transducer or transducer system to give a desired condition of signal derived from that transducer or transducer system, e.g. to give a maximum or minimum signal
- 3/8055 {adjusting orientation of a single directivity characteristic to produce maximum or minimum signal}
- 3/807 . . . the desired condition being maintained automatically
- 3/808 . . . using transducers spaced apart and measuring phase or time difference between signals therefrom, i.e. path-difference systems
- 3/8083 {determining direction of source}
- 3/8086 {determining other position line of source}
- 3/809 . . . Rotating or oscillating beam systems using continuous analysis of received signal for determining direction in the plane of rotation or oscillation or for determining deviation from a predetermined direction in such a plane
- 3/82 . . with means for adjusting phase or compensating for time-lag errors
- 3/84 . . with indication presented on cathode-ray tubes
- 3/86 . . with means for eliminating undesired waves, e.g. disturbing noises
- 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](#))}**
- 5/0009 . {Transmission of position information to remote stations (transmission of measured values in general, [G08C](#); services making use of location of users or terminals, [H04W 4/02](#))}
- 5/0018 . . {Transmission from mobile station to base station}
- 5/0027 . . . {of actual mobile position, i.e. position determined on mobile}
- 5/0036 . . . {of measured values, i.e. measurement on mobile and position calculation on base station}
- 5/0045 . . {Transmission from base station to mobile station ([G01S 5/009](#) takes precedence)}
- 5/0054 . . . {of actual mobile position, i.e. position calculation on base station}
- 5/0063 . . . {of measured values, i.e. measurement on base station and position calculation on mobile}
- 5/0072 . . {Transmission between mobile stations, e.g. anti-collision systems}
- 5/0081 . . {Transmission between base stations}
- 5/009 . . {Transmission of differential positioning data to mobile}
- 5/02 . . using radio waves ([G01S 19/00](#) takes precedence)
- 5/0205 . . {Details}
- 5/021 . . . {Calibration, monitoring or correction ([G01S 5/0252](#) takes precedence)}
- 5/0215 . . . {interference or multipath issues related to signal reception}
- 5/0221 . . . {of receivers or network of receivers}
- 5/0226 . . . {of transmitters or network of transmitters (wireless system synchronisation per se [H04B 7/2662](#))}
- 5/0231 {Emergency, distress or locator beacons}
- 5/0236 . . . {Receiving assistance data, e.g. base station almanac}
- 5/0242 . . . {locating transmitters to be used for positioning ([G01S 5/0289](#) takes precedence)}
- 5/0247 . . {Determination of attitude (using inertial means [G01C 9/00](#); control of attitude [G05D 1/08](#))}
- 5/0252 . . {by comparing measured values with pre-stored measured or simulated values}
- 5/0257 . . {Hybrid positioning solutions (by coordinating position lines of different shape [G01S 5/12](#))}
- 5/0263 . . . {employing positioning solutions derived from one of several separate positioning systems}
- 5/0268 . . . {employing positioning solutions derived from a single positioning system}
- 5/0273 . . {using multipath or indirect path propagation signals in position determination}

- 5/0278 . . {involving statistical or probabilistic considerations ([G01S 5/0252](#), [G01S 5/0294](#) take precedence)}
 - 5/0284 . . {Relative positioning}
 - 5/0289 . . {of multiple transceivers, e.g. in ad hoc networks}
 - 5/0294 . . {Tracking, i.e. predictive filtering, e.g. Kalman filtering}
 - 5/04 . . Position of source determined by a plurality of spaced direction-finders
 - 5/06 . . Position of source determined by co-ordinating a plurality of position lines defined by path-difference measurements ([G01S 5/12](#) takes precedence)
 - 5/08 . . Position of single direction-finder fixed by determining direction of a plurality of spaced sources of known location
 - 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](#)})
 - 5/12 . . by co-ordinating position lines of different shape, e.g. hyperbolic, circular, elliptical, radial (radar indicators providing co-ordinated display of direction and distance [G01S 7/10](#))
 - 5/14 . . Determining absolute distances from a plurality of spaced points of known location
 - 5/145 . . . {Using a supplementary range measurement, e.g. based on pseudo-range measurements}
 - 5/16 . . using electromagnetic waves other than radio waves
 - 5/163 . . {Determination of attitude (using inertial means [G01C 9/00](#); control of attitude [G05D 1/08](#))}
 - 5/166 . . {using gamma or X-rays}
 - 5/18 . . using ultrasonic, sonic, or infrasonic waves
 - 5/183 . . {Emergency, distress or locator beacons}
 - 5/186 . . {Determination of attitude (using inertial means [G01C 9/00](#); control of attitude [G05D 1/08](#))}
 - 5/20 . . Position of source determined by a plurality of spaced direction-finders
 - 5/22 . . Position of source determined by co-ordinating a plurality of position lines defined by path-difference measurements ([G01S 5/28](#) takes precedence)
 - 5/24 . . Position of single direction-finder fixed by determining direction of a plurality of spaced sources of known location
 - 5/26 . . Position of receiver fixed by co-ordinating a plurality of position lines defined by path-difference measurements ([G01S 5/28](#) takes precedence)
 - 5/28 . . by co-ordinating position lines of different shape, e.g. hyperbolic, circular, elliptical, radial (sonar indicators providing co-ordinated display of direction and distance [G01S 7/62](#))
 - 5/30 . . Determining absolute distances from a plurality of spaced points of known location
 - 7/00** Details of systems according to groups [G01S 13/00](#), [G01S 15/00](#), [G01S 17/00](#) {(apparatus for measuring unknown time-intervals by electronic means, e.g. Vernier method [G04F 10/00](#))}
 - 7/003 . . {Transmission of data between radar, sonar or lidar systems and remote stations (in general [G08C](#))}
 - 7/006 . . {using shared front-end circuitry, e.g. antennas ([G01S 13/765](#), [G01S 13/825](#) take precedence)}
 - 7/02 . . of systems according to group [G01S 13/00](#)
 - 7/021 . . {Auxiliary means for detecting or identifying radar signals or the like, e.g. radar jamming signals (multi-channel PRF-analysers, [per se](#) [G01R 23/155](#))}
 - 7/022 . . . {Road traffic radar detectors}
 - 7/023 . . {interference mitigation, e.g. reducing or avoiding non-intentional interference with other HF-transmitters, base station transmitters for mobile communication or other radar systems, e.g. using electro-magnetic interference [EMI] reduction techniques (means for anti-jamming [G01S 7/36](#); auxiliary means for detecting or identifying radar signals or the like [G01S 7/021](#))}
 - 7/024 . . {using polarisation effects (in waveguides [H01P 1/165](#); for aerials [H01Q](#), e.g. [H01Q 15/22](#), [H01Q 15/24](#), [H01Q 19/195](#))}
 - 7/025 . . . {involving the transmission of linearly polarised waves}
 - 7/026 . . . {involving the transmission of elliptically or circularly polarised waves}
 - 2007/027 . . {Housing details, e.g. form, type, material, ruggedness}
 - 2007/028 . . . {involving miniaturizing aspects, e.g. surface mounted device [SMD] packaging or housing}
 - 7/03 . . Details of HF subsystems specially adapted therefor, e.g. common to transmitter and receiver (TR boxes [H01J 17/64](#); waveguides or resonators or other devices of the waveguide type [H01P](#); aerials [H01Q](#); basic electronic circuitry, e.g. generation of oscillations, modulation, demodulation, amplification, pulse technique [H03](#); impedance networks, resonators [H03H](#))
 - 7/032 . . . {Constructional details for solid-state radar subsystems}
 - 7/034 . . . {Duplexers (switching devices for waveguides [H01P 1/10](#); transmit-receive switching in transceivers [H04B 1/44](#))}
 - 7/036 {involving a transfer mixer (mixers in general, [H03D 7/00](#))}
 - 7/038 . . . {Feedthrough nulling circuits}
 - 7/04 . . Display arrangements
 - 7/043 . . . {Synchronising the display device with the scanning of the antenna}
 - 7/046 . . . {using an intermediate storage device, e.g. a recording/reproducing device (video recording in general [H04N](#))}
 - 7/06 . . . Cathode-ray tube displays {or other two-dimensional or three-dimensional displays (cathode ray oscilloscopes in general [G01R 13/20](#))}
- WARNING**
- Groups [G01S 7/062](#) - [G01S 7/24](#) are not complete pending a reorganization. See provisionally [G01S 7/06](#)
- 7/062 {in which different colours are used}
 - 7/064 {using a display memory for image processing ([G01S 7/298](#) takes precedence)}
 - 7/066 {with means for showing the history of the radar trails, e.g. artificial remanence}

7/068	. . . . {with data-rate converters preceding the display, e.g. flicker free display, constant brightness display (G01S 7/298 takes precedence)}	7/2955	. . . . . {Means for determining the position of the radar coordinate system for evaluating the position data of the target in another coordinate system (G01S 7/24 takes precedence; sighting devices adapted for indirect laying of fire F41G 3/16 ; Inertial navigation G01C 21/16)}
7/08	. . . . with vernier indication of distance, e.g. using two cathode-ray tubes	7/298	. . . . . Scan converters
7/10	. . . . Providing two-dimensional and co-ordinated display of distance and direction {(in general G01R 13/208)}	7/32	. . . . . Shaping echo pulse signals; Deriving non-pulse signals from echo pulse signals
7/12	. . . . . Plan-position indicators, i.e. P.P.I.	7/34	. . . . . Gain of receiver varied automatically during pulse-recurrence period, e.g. anti-clutter gain control
7/14	. . . . . Sector, off-centre, or expanded angle display	7/35	. . Details of non-pulse systems
7/16	. . . . . Signals displayed as intensity modulation with rectangular co-ordinates representing distance and bearing, e.g. type B	7/352	. . . {Receivers}
7/18	. . . . . Distance-height displays; Distance-elevation displays, e.g. type RHI, type E	7/354	. . . . {Extracting wanted echo-signals (Doppler systems G01S 13/50)}
7/20	. . . . Stereoscopic displays; Three-dimensional displays; Pseudo-three-dimensional displays {(in general G01R 13/206)}	2007/356	. . . . {involving particularities of FFT processing}
7/22	. . . . Producing cursor lines and indicia by electronic means {(in general G01R 13/30)}	2007/358	. . . . {using I/Q processing}
7/24	. . . . the display being orientated or displaced in accordance with movement of object carrying the transmitting and receiving apparatus, e.g. true-motion radar	7/36	. . Means for anti-jamming (in general H04K 3/00) {, e.g. ECCM, i.e. electronic counter-counter measures (for irregular PRF see also G01S 13/22 , G01S 13/528 ; for frequency agility of carrier wave see also G01S 13/24 ; G01S 7/2813 takes precedence; random interference pulse cancellers G01S 7/2928 ; identification of radar jamming signals G01S 7/021)}
7/28	. . Details of pulse systems	7/38	. . Jamming means, e.g. producing false echoes (in general H04K 3/00 {reflecting surfaces comprising a plurality of reflecting particles, e.g. chaff, H01Q 15/145 ; identification of radar signals G01S 7/021)}
7/2806	. . . {Employing storage or delay devices which preserve the pulse form of the echo signal, e.g. for comparing and combining echoes received during different periods}	7/40	. . Means for monitoring or calibrating
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 ; aeriels or aeriels systems H01Q 21/29 , H01Q 25/00)}	7/4004	. . . {of parts of a radar system (see provisionally also G01S 7/40)}
7/282	. . . Transmitters	7/4008	. . . . {of transmitters}
7/285	. . . Receivers	2007/4013	. . . . . {involving adjustment of the transmitted power}
7/288	. . . . Coherent receivers	7/4017	. . . . . {of HF systems}
2007/2883	. . . . . {using FFT processing}	7/4021	. . . . . {of receivers}
2007/2886	. . . . . {using I/Q processing}	7/4026	. . . . . {Antenna boresight}
7/292	. . . . Extracting wanted echo-signals (Doppler systems G01S 13/50)	2007/403	. . . . . {in azimuth, i.e. in the horizontal plane}
7/2921	. . . . . {based on data belonging to one radar period}	2007/4034	. . . . . {in elevation, i.e. in the vertical plane}
7/2922	. . . . . {by using a controlled threshold}	2007/4039	. . . . . {of sensor or antenna obstruction, e.g. dirt- or ice-coating}
7/2923	. . . . . {based on data belonging to a number of consecutive radar periods}	2007/4043	. . . . . {including means to prevent or remove the obstruction}
7/2925	. . . . . {by using shape of radiation pattern}	2007/4047	. . . . . {heated dielectric lens, e.g. by heated wire}
7/2926	. . . . . {by integration}	7/4052	. . . {by simulation of echoes (analogue simulators in general G06G 7/78)}
7/2927	. . . . . {by deriving and controlling a threshold value}	7/4056	. . . . {specially adapted to FMCW}
7/2928	. . . . . {Random or non-synchronous interference pulse cancellers}	2007/406	. . . . {using internally generated reference signals, e.g. via delay line, via RF or IF signal injection or via integrated reference reflector or transponder}
7/295	. . . . Means for transforming co-ordinates or for evaluating data, e.g. using computers	2007/4065	. . . . . {involving a delay line}
		2007/4069	. . . . . {involving a RF signal injection}
		2007/4073	. . . . . {involving an IF signal injection}
		2007/4078	. . . . . {involving an integrated reference reflector or reference transponder}
		2007/4082	. . . . . {using externally generated reference signals, e.g. via remote reflector or transponder}

- 2007/4086 {in a calibrating environment, e.g. anechoic chamber}
- 2007/4091 {during normal radar operation}
- 2007/4095 {the external reference signals being modulated, e.g. rotating dihedral reflector or modulating transponder for simulation of a Doppler echo etc.}
- 7/41 using analysis of echo signal for target characterisation; Target signature; Target cross-section
- 7/411 {Identification of targets based on measurements of radar reflectivity ([G01S 7/415 takes precedence](#))}
- 7/412 {based on a comparison between measured values and known or stored values}
- 7/414 {Discriminating targets with respect to background clutter}
- 7/415 {Identification of targets based on measurements of movement associated with the target}
- 7/417 {involving the use of neural networks}
- 7/418 {Theoretical aspects}
- 7/42 Diversity systems specially adapted for radar
- 7/48 of systems according to group [G01S 17/00](#)
- 7/4802 {using analysis of echo signal for target characterisation; Target signature; Target cross-section}
- 7/4804 {Auxiliary means for detecting or identifying lidar signals or the like, e.g. laser illuminators}
- 7/4806 {Road traffic laser detectors}
- 7/4808 {Evaluating distance, position or velocity data}
- 7/481 Constructional features, e.g. arrangements of optical elements
- 7/4811 {common to transmitter and receiver}
- 7/4812 {transmitted and received beams following a coaxial path}
- 7/4813 {Housing arrangements}
- 7/4814 {of transmitters alone}
- 7/4815 {using multiple transmitters}
- 7/4816 {of receivers alone}
- 7/4817 {relating to scanning}
- 7/4818 {using optical fibres}
- 7/483 Details of pulse systems
- 7/484 Transmitters
- 7/486 Receivers
- 7/4861 {Details of detection, sampling, integration or read-out circuits}
- 7/4863 {of detector arrays}
- 7/4865 {Details of time delay measurement, e.g. time of flight or time of arrival measurement, determining the exact position of a peak}
- 7/4866 {by fitting a model or function to the received signal}
- 7/4868 {Controlling received signal intensity or exposure of sensor}
- 7/487 Extracting wanted echo signals, {e.g. pulse detection}
- 7/4873 {by deriving and controlling a threshold value}
- 7/4876 {by removing unwanted signals ([G01S 7/495 takes precedence](#))}
- 7/489 Gain of receiver varied automatically during pulse-recurrence period
- 7/491 Details of non-pulse systems
- 7/4911 {Transmitters}
- 7/4912 {Receivers}
- 7/4913 {Details of detection, sampling, integration or read-out circuits}
- 7/4914 {of detector arrays}
- 7/4915 {Details of time delay measurement or phase measurement}
- 7/4916 {using self-mixing in the laser cavity}
- 7/4917 {superposing optical signals in a photodetector, e.g. optical heterodyne detection}
- 7/4918 {Controlling received signal intensity, gain or exposure of sensor}
- 7/493 Extracting wanted echo signals
- 7/495 Counter-measures or counter-counter-measures {using electronic or electro-optical means}
- 7/497 Means for monitoring or calibrating
- 7/4972 {Alignment of sensor}
- 2007/4975 {of sensor obstruction by, e.g. dirt- or ice-coating, e.g. by reflection measurement on front-screen}
- 2007/4977 {including means to prevent or remove the obstruction}
- 7/499 using polarisation effects ([measuring polarisation of light G01J](#))
- 7/51 Display arrangements
- 7/52 of systems according to group [G01S 15/00](#)
- 7/52001 {Auxiliary means for detecting or identifying sonar signals or the like, e.g. sonar jamming signals ([multi-channel PRF-analysers per se G01R 23/155](#))}
- 7/52003 {Techniques for enhancing spatial resolution of targets ([beam formers in general G10K 11/34; G01S 7/52046 takes precedence](#))}
- 7/52004 {Means for monitoring or calibrating ([short-range imaging G01S 7/5205](#))}
- 7/52006 {with provision for compensating the effects of temperature}
- 2007/52007 {involving adjustment of transmitted power}
- 2007/52009 {of sensor obstruction, e.g. dirt- or ice-coating}
- 2007/52011 {including means to prevent or remove the obstruction}
- 2007/52012 {involving a reference ground return}
- 2007/52014 {involving a reference reflector integrated in the sensor or transducer configuration}
- 7/52015 {Diversity systems}
- 7/52017 {particularly adapted to short-range imaging ([G01S 7/53 takes precedence](#))}
- 7/52019 {Details of transmitters}
- 7/5202 {for pulse systems}
- 7/52022 {using a sequence of pulses, at least one pulse manipulating the transmissivity or reflexivity of the medium}
- 7/52023 {Details of receivers}
- 7/52025 {for pulse systems ([G01S 7/52034 takes precedence](#))}
- 7/52026 {Extracting wanted echo signals ([Doppler systems G01S 15/50; Doppler short range imaging systems G01S 15/8979](#))}
- 7/52028 {using digital techniques}
- 7/5203 {for non-pulse systems, e.g. CW systems ([G01S 7/52034 takes precedence](#))}

- 7/52031 {Extracting wanted echo signals}
- 7/52033 {Gain control of receivers ([for seismic signals G01V 1/245](#))}
- 7/52034 {Data rate converters}
- 7/52036 {using analysis of echo signal for target characterisation}
- 7/52038 {involving non-linear properties of the propagation medium or of the reflective target}
- 7/52039 {exploiting the non-linear response of a contrast enhancer, e.g. a contrast agent ([diagnostic techniques involving the use of contrast agents A61B 8/481](#))}
- 7/52041 {detecting modification of a contrast enhancer, e.g. detecting the destruction of a contrast agent by an acoustic wave, e.g. loss of correlation ([diagnostic techniques involving the use of contrast agents A61B 8/481](#))}
- 7/52042 {determining elastic properties of the propagation medium or of the reflective target ([diagnostic techniques involving the measurement of strain A61B 8/485](#))}
- 7/52044 {Scan converters}
- 7/52046 {Techniques for image enhancement involving transmitter or receiver ([image enhancement by image data processing G06T 5/00](#))}
- 7/52047 {for elimination of side lobes or of grating lobes; for increasing resolving power ([beam formers in general G10K 11/34](#))}
- 7/52049 {using correction of medium-induced phase aberration}
- 7/5205 {Means for monitoring or calibrating}
- 7/52052 {with simulation of echoes}
- 7/52053 {Display arrangements}
- 7/52055 {in association with ancillary recording equipment}
- 7/52057 {Cathode ray tube displays ([cathode ray oscilloscopes in general G01R 13/20](#))}
- 7/52058 {displaying one measured variable; A-scan display}
- 7/5206 {Two-dimensional coordinated display of distance and direction; B-scan display}
- 7/52061 {Plan position indication (PPI display); C-scan display}
- 7/52063 {Sector scan display}
- 7/52065 {Compound scan display, e.g. panoramic imaging}
- 7/52066 {Time-position or time-motion displays}
- 7/52068 {Stereoscopic displays; Three-dimensional displays; Pseudo 3D displays ([G01S 15/8993 takes precedence](#))}
- 7/52069 {Grey-scale displays}
- 7/52071 {Multicolour displays; using colour coding; Optimising colour or information content in displays, e.g. parametric imaging}
- 7/52073 {Production of cursor lines, markers or indicia by electronic means}
- 7/52074 {Composite displays, e.g. split-screen displays; Combination of multiple images or of images and alphanumeric tabular information}
- 7/52076 {Luminous indicators}
- 7/52077 {with means for elimination of unwanted signals, e.g. noise or interference}
- 7/52079 {Constructional features ([constructional features of transducers B06B](#); [mounting transducers G10K 11/00](#); [constructional features of ultrasonic medical diagnostic devices A61B 8/44](#))}
- 7/5208 {with integration of processing functions inside probe or scanhead}
- 7/52082 {involving a modular construction, e.g. a computer with short range imaging equipment ([modular ultrasonic medical diagnostic devices A61B 8/4411](#))}
- 7/52084 {related to particular user interfaces ([special user input means for ultrasonic medical diagnostic devices A61B 8/467](#))}
- 7/52085 {Details related to the ultrasound signal acquisition, e.g. scan sequences ([control of medical diagnostic ultrasound devices A61B 8/54](#))}
- 7/52087 {using synchronization techniques ([control of medical diagnostic ultrasound devices involving acquisition triggered by a physiological signal A61B 8/543](#))}
- 7/52088 {involving retrospective scan line rearrangements ([medical diagnostic ultrasound devices involving retrospective matching to a physiological signal A61B 8/5284](#))}
- 7/5209 {using multibeam transmission}
- 7/52092 {using frequency diversity}
- 7/52093 {using coded signals ([G01S 15/8959 takes precedence](#))}
- 7/52095 {using multiline receive beamforming}
- 7/52096 {related to power management, e.g. saving power or prolonging life of electronic components ([details of power supplies for ultrasonic medical diagnostic imaging devices A61B 8/56](#))}
- 7/52098 {related to workflow protocols}
- 7/521 Constructional features ([constructional features of transducers B06B](#); [mounting transducers G10K 11/00](#))}
- 7/523 Details of pulse systems ([short-range imaging G01S 7/52017](#); [methods or devices for transmitting, conducting or directing sound G10K 11/18](#))}
- 7/524 Transmitters
- 7/526 Receivers
- 7/527 Extracting wanted echo signals ([Doppler systems G01S 15/50](#))}
- 7/5273 {using digital techniques}
- 7/5276 {using analogue techniques}
- 7/529 Gain of receiver varied automatically during pulse-recurrence period ([for seismic signals G01V 1/245](#))}
- 7/53 Means for transforming coordinates or for evaluating data, e.g. using computers
- 7/531 Scan converters
- 7/533 Data rate converters
- 7/534 Details of non-pulse systems ([short-range imaging G01S 7/52017](#))}

- 7/5345 . . . {Gain control of receivers (for seismic signals [G01V 1/245](#))}
- 7/536 . . . Extracting wanted echo signals
- 7/537 . . Counter-measures or counter-counter-measures, e.g. jamming, anti-jamming {(in general [H04K](#))}
- 7/539 . . using analysis of echo signal for target characterisation; Target signature; Target cross-section
- 7/54 . . with receivers spaced apart
- 7/56 . . Display arrangements {(short-range imaging [G01S 7/52053](#))}
- 7/58 . . . for providing variable ranges
- 7/60 . . . for providing a permanent recording
- 7/62 . . . Cathode-ray tube displays {or other two-dimensional or three-dimensional displays (cathode ray oscilloscopes in general [G01R 13/20](#))}
- 7/6209 {providing display of one measured variable}
- 7/6218 {providing two-dimensional coordinated display of distance and direction}
- 7/6227 {Plan-position indicators, i.e. P.P.I.}
- 7/6236 {Sector-scan displays}
- 7/6245 {Stereoscopic displays; Three-dimensional displays; Pseudo-three dimensional displays}
- 7/6254 {Grey-scale displays}
- 7/6263 {in which different colours are used}
- 7/6272 {producing cursor lines and indicia by electronic means}
- 7/6281 {Composite displays, e.g. split-screen, multiple images}
- 7/629 {the display being oriented or displaced in accordance with the movement of object carrying the transmitting and receiving apparatus}
- 7/64 . . Luminous indications ([G01S 7/62](#) takes precedence {; short-range imaging [G01S 7/52076](#)})
- 11/00 Systems for determining distance or velocity not using reflection or reradiation (direction-finders [G01S 3/00](#); position-fixing by co-ordinating two or more distance determinations [G01S 5/00](#))**
- 11/02 . . using radio waves ([G01S 19/00](#) takes precedence)
- 11/023 . . {using impedance elements varying with distance}
- 11/026 . . {using moving transmitters}
- 11/04 . . using angle measurements
- 11/06 . . using intensity measurements
- 11/08 . . using synchronised clocks (synchronisation of electronic clocks [G04G 7/02](#))
- 11/10 . . using Doppler effect
- 11/12 . . using electromagnetic waves other than radio waves
- 11/125 . . {using gamma or X-rays}
- 11/14 . . using ultrasonic, sonic, or infrasonic waves
- 11/16 . . using difference in transit time between electrical and acoustic signals

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 (using acoustic waves [G01S 15/00](#); using electromagnetic waves other than radio waves [G01S 17/00](#))

NOTES**1. This group covers :**

- systems for detecting the presence of an object, e.g. by reflection or reradiation 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.

2. This group does not cover :

- systems for determining the direction of an object by means not employing reflection or reradiation, which are covered by groups [G01S 1/00](#) or [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](#).

- 13/003 . {Bistatic radar systems; Multistatic radar systems}
- 13/006 . {Theoretical aspects ([G01S 7/418](#), [G01S 13/9094](#), [G01S 13/958](#) take precedence)}
- 13/02 . Systems using reflection of radio waves, e.g. primary radar systems; Analogous systems
- 13/0209 . . {Systems with very large relative bandwidth, i.e. larger than 10 %, e.g. baseband, pulse, carrier-free, ultrawideband}
- 13/0218 . . {Very long range radars, e.g. surface wave radar, over-the-horizon or ionospheric propagation systems (for meteorological use [G01S 13/95](#))}
- 2013/0227 . . . {OTH, Over-The-Horizon radar}
- 2013/0236 . . {Special technical features}
- 2013/0245 . . . {Radar with phased array antenna}
- 2013/0254 {Active array antenna}
- 2013/0263 {Passive array antenna}
- 2013/0272 . . . {Multifunction radar}
- 2013/0281 . . . {LPI, Low Probability of Intercept radar}
- 2013/029 . . . {Antistealth radar}
- 13/04 . . Systems determining the presence of a target (based on relative movement of target [G01S 13/56](#))
- 13/06 . . Systems determining position data of a target
- 13/08 . . . Systems for measuring distance only (indirect measurement [G01S 13/46](#))
- 13/10 using transmission of interrupted pulse modulated waves (determination of distance by phase measurement [G01S 13/32](#))
- 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)}

- 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)}
- 13/12 wherein the pulse-recurrence frequency is varied to provide a desired time relationship between the transmission of a pulse and the receipt of the echo of a preceding pulse
- 13/14 wherein a voltage or current pulse is initiated and terminated in accordance respectively with the pulse transmission and echo reception
- 13/16 using counters
- 13/18 wherein range gates are used
- 13/20 whereby multiple time-around echoes are used or eliminated
- 13/22 using irregular pulse repetition frequency {([G01S 13/12](#) takes precedence)}
- 13/222 {using random or pseudorandom pulse repetition frequency}
- 13/225 {with cyclic repetition of a non-uniform pulse sequence, e.g. staggered PRF}
- 13/227 {with repetitive trains of uniform pulse sequences, each sequence having a different pulse repetition frequency}
- 13/24 using frequency agility of carrier wave
- 13/26 wherein the transmitted pulses use a frequency- or phase-modulated carrier wave
- 13/28 with time compression of received pulses
- 13/282 {using a frequency modulated carrier wave ([G01S 13/286](#) takes precedence)}
- 13/284 {using coded pulses}
- 13/286 {frequency shift keyed}
- 13/288 {phase modulated}
- 13/30 using more than one pulse per radar period
- 13/32 using transmission of continuous unmodulated waves, amplitude-, frequency- or phase-modulated waves
- 13/325 {using transmission of coded signals, e.g. P.S.K. signals}
- 13/34 using transmission of frequency-modulated waves and the received signal, or a signal derived therefrom, being heterodyned with a locally-generated signal related to the contemporaneous transmitted signal to give a beat-frequency signal
- 13/341 {wherein the rate of change of the transmitted frequency is adjusted to give a beat of predetermined constant frequency, e.g. by adjusting the amplitude or frequency of the frequency-modulating signal}
- 13/342 {using sinusoidal modulation}
- 13/343 {using sawtooth modulation}
- 13/345 {using triangular modulation}
- 13/346 {using noise modulation}
- 13/347 {using more than one modulation frequency}
- 13/348 {using square or rectangular modulation, e.g. duplex radar for ranging over short distances}
- 13/36 with phase comparison between the received signal and the contemporaneously transmitted signal
- 13/38 wherein more than one modulation frequency is used
- 13/40 wherein the frequency of transmitted signal is adjusted to give a predetermined phase relationship
- 13/42 Simultaneous measurement of distance and other co-ordinates ([indirect measurement G01S 13/46](#))
- 13/422 {sequential lobing, e.g. conical scan}
- 13/424 {Stacked beam radar}
- 13/426 {Scanning radar, e.g. 3D radar ([G01S 13/66](#) takes precedence)}
- 13/428 {within the pulse scanning systems}
- 13/44 Monopulse radar, i.e. simultaneous lobing
- 13/4409 {HF sub-systems particularly adapted therefor, e.g. circuits for signal combination ([multi-lobing aerials or aerial systems H01Q 25/00](#))}
- 13/4418 {with means for eliminating radar-dependent errors in angle measurements, e.g. multipath effects}
- 13/4427 {with means for eliminating the target-dependent errors in angle measurements, e.g. glint, scintillation effects}
- 13/4436 {with means specially adapted to maintain the same processing characteristics between the monopulse signals}
- 13/4445 {amplitude comparisons monopulse, i.e. comparing the echo signals received by an antenna arrangement with overlapping squinted beams}
- 13/4454 {phase comparisons monopulse, i.e. comparing the echo signals received by an interferometric antenna arrangement}
- 13/4463 {using phased arrays}
- 13/4472 {with means specially adapted to airborne monopulse systems ([clutter elimination using Doppler effect: G01S 13/449](#))}
- 13/4481 {Monopulse hybrid systems, e.g. conopulse}
- 13/449 {Combined with MTI or Doppler processing circuits}
- 13/46 Indirect determination of position data
- 2013/462 {using multipath signals}
- 2013/464 {using only the non-line-of-sight signal(s), e.g. to enable survey of scene 'behind' the target only the indirect signal is evaluated}
- 2013/466 {by Trilateration, i.e. two antennas or two sensors determine separately the distance to a target, whereby with the knowledge of the baseline length, i.e. the distance between the antennas or sensors, the position data of the target is determined}
- 2013/468 {by Triangulation, i.e. two antennas or two sensors determine separately the bearing, direction or angle to a target, whereby with the knowledge of the baseline length, the position data of the target is determined}

- 13/48 using multiple beams at emission or reception
- 13/50 . . Systems of measurement based on relative movement of target
- 13/505 . . . {using Doppler effect for determining closest range to a target or corresponding time, e.g. miss-distance indicator (proximity fuze see [F42C 13/04](#); miss-distance indicators in general [F41J 5/12](#))}
- 13/52 . . . Discriminating between fixed and moving objects or between objects moving at different speeds {(coherent receivers [G01S 7/288](#))}
- 13/522 using transmissions of interrupted pulse modulated waves
- 13/524 based upon the phase or frequency shift resulting from movement of objects, with reference to the transmitted signals, e.g. coherent MTI (coherent receivers [G01S 7/288](#))
- 13/5242 {with means for platform motion or scan motion compensation, e.g. airborne MTI}
- 13/5244 {Adaptive clutter cancellation (specially adapted for airborne MTI, [G01S 13/5242](#))}
- 13/5246 {post processors for coherent MTI discriminators, e.g. residue cancellers, CFAR after Doppler filters}
- 13/5248 {combining a coherent MTI processor with a zero Doppler processing channel and a clutter mapped memory, e.g. MTD (Moving target detector), (area MTI [G01S 13/538](#))}
- 13/526 performing filtering on the whole spectrum without loss of range information, e.g. using delay line cancellers or comb filters; {([G01S 13/5244](#) takes precedence)}
- 13/5265 {IF cancellers, e.g. TACCAR systems}
- 13/528 with elimination of blind speeds
- 13/53 performing filtering on a single spectral line and associated with one or more range gates with a phase detector or a frequency mixer to extract the Doppler information, e.g. pulse Doppler radar {([G01S 13/5244](#) takes precedence)}
- 13/532 using a bank of range gates or a memory matrix
- 13/534 based upon amplitude or phase shift resulting from movement of objects, with reference to the surrounding clutter echo signal, e.g. non coherent MTI, clutter referenced MTI, externally coherent MTI
- 13/536 using transmission of continuous unmodulated waves, amplitude-, frequency-, or phase-modulated waves
- 13/538 eliminating objects that have not moved between successive antenna scans, e.g. area MTI
- 13/56 for presence detection {(presence detection using near field arrangements [G01V 3/00](#), e.g. [G01V 3/08](#), [G01V 3/12](#); burglar, theft or intruder alarms with electrical actuation [G08B 13/22](#) - [G08B 13/26](#))}
- 13/58 . . . Velocity or trajectory determination systems; Sense-of-movement determination systems {(systems applied to the controlling of traffic [G01S 13/92](#))}
- 13/581 {using transmission of interrupted pulse modulated waves and based upon the Doppler effect resulting from movement of targets}
- 13/582 {adapted for simultaneous range and velocity measurements}
- 13/583 {using transmission of continuous unmodulated waves, amplitude-, frequency-, or phase-modulated waves and based upon the Doppler effect resulting from movement of targets}
- 13/584 {adapted for simultaneous range and velocity measurements}
- 13/585 {processing the video signal in order to evaluate or display the velocity value}
- 13/586 {using, or combined with, frequency tracking means}
- 13/587 {using optical means (optical computing devices in general [G06E](#))}
- 13/588 {deriving the velocity value from the range measurement}
- 13/589 {measuring the velocity vector}
- 13/60 wherein the transmitter and receiver are mounted on the moving object, e.g. for determining ground speed, drift angle, ground track ([G01S 13/64](#) takes precedence)
- 13/605 {using a pattern, backscattered from the ground, to determine speed or drift by measuring the time required to cover a fixed distance}
- 13/62 Sense-of-movement determination {([G01S 13/589](#) takes precedence)}
- 13/64 Velocity measuring systems using range gates
- 13/66 . Radar-tracking systems; Analogous systems where the wavelength or the kind of wave is irrelevant
- 13/68 . . for angle tracking only
- 13/685 . . . {using simultaneous lobing techniques}
- 13/70 . . for range tracking only
- 13/72 . . for two-dimensional tracking, e.g. combination of angle and range tracking, track-while-scan radar
- 13/723 . . . {by using numerical data}
- 13/726 {Multiple target tracking}
- 13/74 . Systems using reradiation of radio waves, e.g. secondary radar systems; Analogous systems
- 13/75 . . using transponders powered from received waves, e.g. using passive transponders, {or using passive reflectors}
- 13/751 . . . {wherein the responder or reflector radiates a coded signal}
- 13/753 {using frequency selective elements, e.g. resonator}
- 13/755 {using delay lines, e.g. acoustic delay lines}

- 13/756 {using a signal generator for modifying the reflectivity of the reflector ([G01S 13/758](#) takes precedence)}
- 13/758 {using a signal generator powered by the interrogation signal}
- 13/76 . . wherein pulse-type signals are transmitted
- 13/762 . . . {with special measures concerning the radiation pattern, e.g. S.L.S. (aerials or aerial systems providing at least two radiation patterns, e.g. providing sum and difference patterns, [H01Q 25/00](#))}
- 13/765 . . . {with exchange of information between interrogator and responder}
- 13/767 . . . {Responders; Transponders (teaching or practice apparatus for gun-aiming or gun-laying using reflecting targets or active targets [F41G 3/26](#))}
- 13/78 . . . discriminating between different kinds of targets, e.g. IFF-radar, i.e. identification of friend or foe ([G01S 13/75](#), [G01S 13/767](#) take precedence)}
- 13/781 {Secondary Surveillance Radar [SSR] in general}
- 13/782 {using multimoding or selective addressing}
- 13/784 {Coders or decoders therefor; Degarbling systems; Defruiting systems}
- 13/785 {Distance Measuring Equipment [DME] systems}
- 13/787 {co-operating with direction defining beacons}
- 13/788 {Coders or decoders therefor; Special detection circuits}
- 13/79 . . Systems using random coded signals or random pulse repetition frequencies, {e.g. "Separation and Control of Aircraft using Non synchronous Techniques" [SECANT]}
- 13/82 . . wherein continuous-type signals are transmitted
- 13/825 . . . {with exchange of information between interrogator and responder}
- 13/84 . . . for distance determination by phase measurement
- 13/86 . Combinations of radar systems with non-radar systems, e.g. sonar, direction finder ({[Combination of sonar systems with non-sonar or non-radar systems G01S 15/025](#); combination of lidar systems with systems other than lidar, radar or sonar [G01S 17/023](#))}
- 13/862 . . {Combination of radar systems with sonar systems}
- 13/865 . . {Combination of radar systems with lidar systems}
- 13/867 . . {Combination of radar systems with cameras}
- 13/87 . Combinations of radar systems, e.g. primary radar and secondary radar
- 13/872 . . {Combinations of primary radar and secondary radar}
- 13/874 . . {Combination of several systems for attitude determination (in general [G01C](#), control of attitude [G05D 1/08](#))}
- 13/876 . . {Combination of several spaced transponders or reflectors of known location for determining the position of a receiver ([G01S 13/874](#) takes precedence)}
- 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)}
- 13/88 . Radar or analogous systems specially adapted for specific applications ([electromagnetic prospecting or detecting of objects, e.g. near-field detection, G01V 3/00](#))
- 13/881 . . {for robotics}
- 13/882 . . {for altimeters (measuring height using barometric means [G01C 5/06](#))}
- 13/883 . . {for missile homing, autodirectors (missile guidance systems [F41G 7/22](#))}
- 13/885 . . {for ground probing (prospecting or detecting using electromagnetic waves [G01V 3/12](#))}
- 13/886 . . {for alarm systems (alarms with electrical actuation [G08B 13/22](#))}
- 13/887 . . {for detection of concealed objects, e.g. contraband or weapons}
- 13/888 . . . {through wall detection}
- 13/89 . . for mapping or imaging
- 13/90 . . . using synthetic aperture techniques, {e.g. correcting range migration errors ([compression in range per se G01S 13/28](#); platform motion compensation for AMTI [G01S 13/5242](#))}
- 13/9005 {with optical processing of the SAR signals}
- 13/9011 {with frequency domain processing of the SAR signals in azimuth ([G01S 13/9005](#) takes precedence)}
- 13/9017 {with time domain processing of the SAR signals in azimuth, e.g. time focusing ([G01S 13/9005](#) takes precedence)}
- 13/9023 {combined with monopulse or interferometric techniques ([monopulse hybrid systems G01S 13/4481](#))}
- 13/9029 {specially adapted for moving target detection ([MTI per se G01S 13/52](#))}
- 13/9035 {Particular SAR processing techniques not provided for elsewhere, e.g. squint mode, doppler beam-sharpening mode, spotlight mode, bistatic SAR, inverse SAR}
- 2013/9041 {Squint mode}
- 2013/9047 {Doppler beam-sharpening mode}
- 2013/9052 {Spotlight mode}
- 2013/9058 {Bistatic SAR}
- 2013/9064 {Inverse SAR [ISAR]}
- 2013/907 {Forward looking SAR}
- 2013/9076 {Polarimetric features in SAR ([see also G01S 7/024](#))}
- 2013/9082 {rotating SAR[ROSAR], i.e. antennas rotatably mounted}
- 2013/9088 {circular SAR [CSAR, C-SAR]}
- 13/9094 {Theoretical aspects}
- 13/91 . . for traffic control ([G01S 13/93](#) takes precedence)
- 13/913 . . . {for landing purposes}
- 2013/916 . . . {Airport surface monitoring [ASDE]}
- 13/92 . . . for velocity measurement
- 13/93 . . . for anti-collision purposes
- 13/9303 . . . {between aircraft or spacecraft in flight, e.g. secant (terrain-avoidance systems [G01S 13/94](#))}
- 13/9307 . . . {between marine crafts; between marine crafts and fixed obstacles}

13/931	. . . {between land vehicles; between land vehicles and fixed obstacles}	– systems for determining the direction of an object by means not employing reflection or reradiation, which are covered by groups G01S 1/00 or G01S 3/00 ;
2013/9314	. . . . {for parking operations}	– systems for determining distance or velocity of an object by means not employing reflection or reradiation, which are covered by group G01S 11/00 .
2013/9317	. . . . {for driving backwards}	
2013/9321	. . . . {for velocity regulation, e.g. cruise control}	
2013/9325	. . . . {for intervehicle distance regulation, e.g. navigating in platoons}	
2013/9328	. . . . {for vehicles on rails}	
2013/9332	. . . . {for monitoring blind spots}	15/003 . {Bistatic sonar systems; Multistatic sonar systems}
2013/9335	. . . . {on airport surface (taxiing)}	15/006 . {Theoretical aspects}
2013/9339	. . . . {co-operating with reflectors or transponders}	15/02 . using reflection of acoustic waves (G01S 15/66 takes precedence)
2013/9342	. . . . {controlling the steering}	15/025 . . {Combination of sonar systems with non-sonar or non-radar systems, e.g. with direction finder}
2013/9346	. . . . {controlling the brakes}	15/04 . . Systems determining presence of a target
2013/935	. . . . {controlling the accelerator}	15/06 . . Systems determining the position data of a target
2013/9353	. . . . {using own vehicle data, e.g. ground speed, steering wheel direction}	15/08 . . . Systems for measuring distance only (indirect measurement G01S 15/46)
2013/9357	. . . . {using additional data, e.g. driver condition, road state, weather data}	15/10 using transmission of interrupted pulse-modulated waves (determination of distance by phase measurement G01S 15/32)
2013/936	. . . . {combined with communication equipment with other vehicles and/or with base stations(s)}	15/101 {Particularities of the measurement of distance (G01S 15/12 , G01S 15/14 , and G01S 15/18 take precedence)}
2013/9364	. . . . {Alternative operation using ultrasonic waves}	15/102 {using transmission of pulses having some particular characteristics}
2013/9367	. . . . {Alternative operation using light waves}	15/104 {wherein the transmitted pulses use a frequency- or phase-modulated carrier wave}
2013/9371	. . . . {Sensor installation details}	15/105 {using irregular pulse repetition frequency}
2013/9375	. . . . . {in the front of the vehicle}	15/107 {using frequency agility of carrier wave}
2013/9378	. . . . . {in the back of the vehicle}	15/108 {using more than one pulse per sonar period}
2013/9382	. . . . . {on the top of the vehicle}	15/12 wherein the pulse-recurrence frequency is varied to provide a desired time relationship between the transmission of a pulse and the receipt of the echo of a preceding pulse
2013/9385	. . . . . {on the side(s) of the vehicle}	15/14 wherein a voltage or current pulse is initiated and terminated in accordance respectively with the pulse transmission and echo reception
2013/9389	. . . . . {in the bumper area (ultrasonic transducer in bumper area G01S 2015/938 ; bumper with obstacle sensor of electric or electronic type B60R 19/483)}	15/18 wherein range gates are used
2013/9392	. . . . . {in the windshield area}	15/32 using transmission of continuous unmodulated waves, amplitude-, frequency-, or phase-modulated waves
2013/9396	. . . . . {in the lights}	15/325 {using transmission of coded signals, e.g. of phase-shift keyed [PSK] signals}
13/94	. . for terrain-avoidance	15/34 using transmission of frequency-modulated waves and the received signal, or a signal derived therefrom, being heterodyned with a locally-generated signal related to the contemporaneous transmitted signal to give a beat-frequency signal
13/95	. . for meteorological use	15/36 with phase comparison between the received signal and the contemporaneously transmitted signal
13/951	. . . {ground based}	15/42 . . . Simultaneous measurement of distance and other co-ordinates (indirect measurement G01S 15/46)
13/953	. . . {mounted on aircraft}	15/46 . . . Indirect determination of position data
13/955	. . . {mounted on satellite}	
13/956	. . . {mounted on ship or other platform}	
13/958	. . . {Theoretical aspects}	
15/00	Systems using the reflection or reradiation of acoustic waves, e.g. sonar systems	
NOTES		
1. This group <u>covers</u> :		
– systems for detecting the presence of an object, e.g. by reflection or reradiation 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.		
2. This group <u>does not cover</u> :		

- 2015/465 {by Trilateration, i.e. two transducers determine separately the distance to a target, whereby with the knowledge of the baseline length, i.e. the distance between the transducers, the position data of the target is determined}
- 15/50 . . Systems of measurement, based on relative movement of the target
- 15/52 . . . Discriminating between fixed and moving objects or between objects moving at different speeds
- 15/523 {for presence detection (burglar, theft or intruder alarms [G08B 13/00](#), e.g. [G08B 13/16](#))}
- 15/526 {by comparing echos in different sonar periods}
- 15/58 . . . Velocity or trajectory determination systems; Sense-of-movement determination systems {(velocity measurement in imaging systems [G01S 15/8979](#))}
- 15/582 {using transmission of interrupted pulse-modulated waves and based upon the Doppler effect resulting from movement of targets}
- 15/584 {with measures taken for suppressing velocity ambiguities, i.e. anti-aliasing}
- 15/586 {using transmission of continuous unmodulated waves, amplitude-, frequency-, or phase-modulated waves and based upon the Doppler effect resulting from movement of targets}
- 15/588 {measuring the velocity vector}
- 15/60 wherein the transmitter and receiver are mounted on the moving object, e.g. for determining ground speed, drift angle, ground track
- 15/62 Sense-of-movement determination {([G01S 15/588](#) takes precedence)}
- 15/66 . Sonar tracking systems
- 15/74 . Systems using reradiation of acoustic waves, e.g. IFF, i.e. identification of friend or foe {(teaching or practice apparatus for gun-arming or gun-laying using reflecting targets or active targets [F41G 3/26](#))}
- 15/87 . Combinations of sonar systems
- 15/872 . . {Combination of several systems for attitude determination (using inertial means [G01C 9/00](#), control of attitude [G05D 1/08](#))}
- 15/874 . . {Combination of several spaced transponders or reflectors of known location for determining the position of a receiver ([G01S 15/872](#) takes precedence)}
- 15/876 . . {Combination of several spaced transmitters or receivers of known location for determining the position of a transponder or a reflector ([G01S 15/872](#) takes precedence)}
- 15/878 . . . {wherein transceivers are operated, either sequentially or simultaneously, both in bi-static and in mono-static mode, e.g. cross-echo mode}
- 15/88 . Sonar systems specially adapted for specific applications (seismic or acoustic prospecting or detecting [G01V 1/00](#))
- 15/885 . . {Meteorological systems}
- 15/89 . . for mapping or imaging
- 15/8902 . . . {Side-looking sonar}
- 15/8904 {using synthetic aperture techniques}
- 15/8906 . . . {Short-range imaging systems; Acoustic microscope systems using pulse-echo techniques}
- 15/8909 {using a static transducer configuration (sound-focusing or directing [per se G10K 11/26](#))}
- 15/8911 {using a single transducer for transmission and reception}
- 15/8913 {using separate transducers for transmission and reception}
- 15/8915 {using a transducer array}
- 15/8918 {the array being linear}
- 15/892 {the array being curvilinear}
- 15/8922 {the array being concentric or annular}
- 15/8925 {the array being a two-dimensional transducer configuration, i.e. matrix or orthogonal linear arrays}
- 15/8927 {using simultaneously or sequentially two or more subarrays or subapertures}
- 15/8929 {using a three-dimensional transducer configuration}
- 15/8931 {co-operating with moving reflectors}
- 15/8934 {using a dynamic transducer configuration (mounting transducers, e.g. provided with mechanical moving or orienting device [per se G10K 11/004](#))}
- 15/8936 {using transducers mounted for mechanical movement in three dimensions}
- 15/8938 {using transducers mounted for mechanical movement in two dimensions}
- 15/894 {by rotation about a single axis}
- 15/8943 {co-operating with reflectors}
- 15/8945 {using transducers mounted for linear mechanical movement}
- 15/8947 {using transducers movable by (electro)magnetic means}
- 15/895 {characterised by the transmitted frequency spectrum}
- 15/8952 {using discrete, multiple frequencies}
- 15/8954 {using a broad-band spectrum}
- 15/8956 {using frequencies at or above 20 MHz}
- 15/8959 {using coded signals for correlation purposes}
- 15/8961 {using pulse compression}
- 15/8963 {using pulse inversion}
- 15/8965 {using acousto-optical or acousto-electronic conversion techniques}
- 15/8968 {using acoustical modulation of a light beam (acousto-optical light control devices [G02F 1/11](#), [G02F 1/33](#))}
- 15/897 {using application of holographic techniques (holography [per se G03H](#))}
- 15/8972 {with optical reconstruction of the image}
- 15/8975 {using acoustical image/electron beam converter tubes (tubes therefor [H01J 31/495](#))}

- 15/8977 {using special techniques for image reconstruction, e.g. FFT, geometrical transformations, spatial deconvolution, time deconvolution ([digital image processing per se G06T 1/00](#))}
- 15/8979 {Combined Doppler and pulse-echo imaging systems}
- 15/8981 {Discriminating between fixed and moving objects or between objects moving at different speeds, e.g. wall clutter filter}
- 15/8984 {Measuring the velocity vector}
- 15/8986 {with measures taken for suppressing velocity ambiguities, i.e. anti-aliasing}
- 15/8988 {Colour Doppler imaging}
- 15/899 {Combination of imaging systems with ancillary equipment}
- 15/8993 {Three dimensional imaging systems}
- 15/8995 {Combining images from different aspect angles, e.g. spatial compounding}
- 15/8997 {using synthetic aperture techniques}
- 15/93 . . for anti-collision purposes
- 15/931 . . . {between land vehicles; between land vehicles and fixed obstacles}
- 2015/932 {for parking operations}
- 2015/933 {for measuring the dimensions of the parking space when driving past}
- 2015/934 {for measuring the depth, i.e. width, not length, of the parking space}
- 2015/935 {for measuring the contour, e.g. a trajectory of measurement points, representing the boundary of the parking space}
- 2015/936 {for measuring parking spaces extending transverse or diagonal to the driving direction, i.e. not parallel to the driving direction}
- 2015/937 {sensor installation details ([constructional features of transducers G01S 7/521 and B06B](#); casing of transducers, e.g. housing, cover or filler details, [G10K 9/22](#); mounting of transducers, i.e. fixture, fitting or holder details, [G10K 11/004](#))}
- 2015/938 {in the bumper area ([radar in bumper area G01S 2013/9389](#); bumper with obstacle sensor of electric or electronic type [B60R 19/483](#))}
- 2015/939 {vertical stacking of sensors, e.g. to enable obstacle height determination}
- 15/96 . . for locating fish
- 17/00 Systems using the reflection or reradiation of electromagnetic waves other than radio waves, e.g. lidar systems ([photogrammetry or videogrammetry G01C 11/00](#))**
- NOTE**
- The note after group [G01S 13/00](#) also applies to this group.
- 17/003 . {Bistatic lidar systems; Multistatic lidar systems}
- 17/006 . {Theoretical aspects}
- 17/02 . Systems using the reflection of electromagnetic waves other than radio waves ([G01S 17/66 takes precedence](#))
- 17/023 . . {Combination of lidar systems, with systems other than lidar, radar or sonar, e.g. with direction finder}
- 17/026 . . {for detecting the presence of an object}
- 17/06 . . Systems determining position data of a target
- 17/08 . . . for measuring distance only ([indirect measurement G01S 17/46](#); active triangulation systems [G01S 17/48](#); passive systems using a parallax triangle [G01C 3/10](#), [G01C 3/22](#), [G01C 3/24](#), [G01C 3/26](#))
- 17/10 using transmission of interrupted pulse-modulated waves ([determination of distance by phase measurements G01S 17/32](#))
- 17/102 {wherein the transmitted pulses use a frequency- or phase modulated carrier wave, e.g. for pulse compression of received signals}
- 17/105 {wherein a voltage or current pulse is initiated and terminated in accordance respectively with the pulse transmission and echo-reception, e.g. using counters}
- 17/107 {wherein range gates are used}
- 17/32 using transmission of continuous unmodulated waves, amplitude-, frequency-, or phase-modulated waves
- 17/325 {using transmission of frequency-modulated waves and the received signal, or a signal derived therefrom, being heterodyned with a locally-generated signal related to the contemporaneous transmitted signal to give a beat-frequency signal}
- 17/36 with phase comparison between the received signal and the contemporaneously transmitted signal
- 17/42 . . . Simultaneous measurement of distance and other co-ordinates ([indirect measurement G01S 17/46](#))
- 17/46 . . . Indirect determination of position data
- 17/48 Active triangulation systems, i.e. using the transmission and reflection of electromagnetic waves other than radio waves ([passive systems using a parallax triangle G01C 3/10](#), [G01C 3/22](#), [G01C 3/24](#), [G01C 3/26](#); active systems for automatic generation of focusing signals [G02B 7/32](#))
- 17/50 . . Systems of measurement based on relative movement of target
- 17/58 . . . Velocity or trajectory determination systems; Sense-of-movement determination systems
- 17/66 . Tracking systems using electromagnetic waves other than radio waves
- 17/74 . Systems using reradiation of electromagnetic waves other than radio waves, e.g. IFF, i.e. identification of friend or foe ([teaching or practice apparatus for gun-arming or gun-laying using reflecting targets or active targets F41G 3/26](#))}
- 17/87 . Combinations of systems using electromagnetic waves other than radio waves
- 17/875 . . {Combination of several systems for attitude determination}
- 17/88 . Lidar systems specially adapted for specific applications
- 17/89 . . for mapping or imaging
- 17/895 . . . {using synthetic aperture techniques}

- 17/93 . . for anti-collision purposes
- 17/933 . . . {between aircrafts or spacecrafts; between aircrafts or spacecrafts and fixed obstacles}
- 17/936 . . . {between land vehicles; between land vehicles and fixed obstacles}
- 17/95 . . for meteorological use
- 19/00 Satellite radio beacon positioning systems; Determining position, velocity or attitude using signals transmitted by such systems**
- NOTE**
- In this group, or in the patent documents classified in this group, the following abbreviations are often used:
- PDOP = Position Dilution of Precision
 - RAIM = Receiver Autonomous Integrity Monitoring
- 19/01 . Satellite radio beacon positioning systems transmitting time-stamped messages, e.g. GPS [Global Positioning System], GLONASS [Global Orbiting Navigation Satellite System] or GALILEO
- 19/015 . . {Arrangements for jamming, spoofing or other methods of denial of service of such systems}
- 19/02 . . Details of the space or ground control segments
- 19/03 . . Cooperating elements; Interaction or communication between different cooperating elements or between cooperating elements and receivers
- NOTE**
- The term "cooperating elements" designates additional elements or subsystems, including receivers of other users, which interact or communicate with the receiver or the satellite positioning system.
- 19/04 . . . providing carrier phase data
- 19/05 . . . providing aiding information
- 19/06 . . . employing an initial estimate of the location of the receiver as aiding data or in generating aiding data
- 19/07 . . . providing data for correcting measured positioning data, e.g. DGPS [differential GPS] or ionosphere corrections
- 19/08 . . . providing integrity information, e.g. health of satellites or quality of ephemeris data
- 19/09 . . . providing processing capability normally carried out by the receiver
- 19/10 . . . providing dedicated supplementary positioning signals
- 19/11 . . . wherein the cooperating elements are pseudolites or satellite radio beacon positioning system signal repeaters
- 19/12 . . . wherein the cooperating elements are telecommunication base stations
- 19/13 . . Receivers
- 19/14 . . . specially adapted for specific applications
- 19/15 Aircraft landing systems
- 19/16 Anti-theft; Abduction
- 19/17 Emergency applications
- 19/18 Military applications
- 19/19 Sporting applications
- 19/20 . . . Integrity monitoring, fault detection or fault isolation of space segment
- 19/21 . . . interference related issues; {Issues related to cross-correlation, spoofing or other methods of denial of service (interference-related aspects in spread spectrum receivers [per se H04B 1/7097](#))}
- 19/215 {issues related to spoofing}
- 19/22 . . . Multipath-related issues
- 19/23 . . . Testing, monitoring, correcting or calibrating of receiver elements
- 19/235 {Calibration of receiver components}
- 19/24 . . . Acquisition or tracking {or demodulation} of signals transmitted by the system {(synchronisation aspects of direct sequence spread spectrum modulation [H04B 1/7073](#))}
- 19/243 {Demodulation of navigation message}
- 19/246 {involving long acquisition integration times, extended snapshots of signals or methods specifically directed towards weak signal acquisition}
- 19/25 involving aiding data received from a cooperating element, e.g. assisted GPS
- 19/252 {Employing an initial estimate of location in generating assistance data}
- 19/254 {relating to Doppler shift of satellite signals}
- 19/256 {relating to timing, e.g. time of week, code phase, timing offset}
- 19/258 {relating to the satellite constellation, e.g. almanac, ephemeris data, lists of satellites in view}
- 19/26 involving a sensor measurement for aiding acquisition or tracking
- 19/27 creating, predicting or correcting ephemeris or almanac data within the receiver
- 19/28 Satellite selection
- 19/29 carrier, {including Doppler,} related {(G01S 19/246 takes precedence)}
- 19/30 code related {(G01S 19/246 takes precedence)}
- 19/31 . . . Acquisition or tracking of other signals for positioning
- 19/32 . . . Multimode operation in a single same satellite system, e.g. GPS L1/L2
- 19/33 . . . Multimode operation in different systems which transmit time stamped messages, e.g. GPS/GLONASS
- 19/34 . . . Power consumption
- 19/35 . . . Constructional details or hardware or software details of the signal processing chain
- 19/36 relating to the receiver frond end
- 19/37 Hardware or software details of the signal processing chain
- 19/38 . Determining a navigation solution using signals transmitted by a satellite radio beacon positioning system
- 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
- 19/40 . . . Correcting position, velocity or attitude
- 19/41 Differential correction, e.g. DGPS [differential GPS]
- 19/42 . . . Determining position

- 19/421 {by combining or switching between position solutions or signals derived from different satellite radio beacon positioning systems; by combining or switching between position solutions or signals derived from different modes of operation in a single system}
- 19/423 {by combining or switching between position solutions derived from different satellite radio beacon positioning systems}
- 19/425 {by combining or switching between signals derived from different satellite radio beacon positioning systems}
- 19/426 {by combining or switching between position solutions or signals derived from different modes of operation in a single system}
- 19/428 {using multipath or indirect path propagation signals in position determination}
- 19/43 using carrier phase measurements, e.g. kinematic positioning; using long or short baseline interferometry
- 19/44 Carrier phase ambiguity resolution; Floating ambiguity; LAMBDA [Least-squares AMBIGUITY Decorrelation Adjustment] method
- 19/45 by combining measurements of signals from the satellite radio beacon positioning system with a supplementary measurement
- 19/46 the supplementary measurement being of a radio-wave signal type
- 19/47 the supplementary measurement being an inertial measurement, e.g. tightly coupled inertial
- 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
- 19/49 whereby the further system is an inertial position system, e.g. loosely-coupled
- 19/50 whereby the position solution is constrained to lie upon a particular curve or surface, e.g. for locomotives on railway tracks
- 19/51 Relative positioning
- 19/52 . . . Determining velocity
- 19/53 . . . Determining attitude
- 19/54 using carrier phase measurements; using long or short baseline interferometry
- 19/55 Carrier phase ambiguity resolution; Floating ambiguity; LAMBDA [Least-squares AMBIGUITY Decorrelation Adjustment] method

2205/008 . . . using a mobile telephone network

2205/00 Position-fixing by co-ordinating two or more direction or position line determinations; Position-fixing by co-ordinating two or more distance determinations (not used)

- 2205/001 . Transmission of position information to remote stations (not used)
- 2205/002 . . for traffic control, mobile tracking, guidance, surveillance or anti-collision
- 2205/003 . . . for aircraft positioning relative to the ground
- 2205/005 . . . for aircraft positioning relative to other aircraft
- 2205/006 . . for emergency situations
- 2205/007 . . for management of a communication system