

ECLA**EUROPEAN 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 ([N: 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**; [N: time-interval measuring G04F]; **aerials H01Q**) [C9504]

[N: **WARNING** [2012.05]

The following IPC group is not used in the internal ECLA classification scheme. Subject matter covered by this group is classified in the following ECLA groups: - [G01S7/26](#) covered by [G01S7/06](#)
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Notes

1. 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.

2. Attention is drawn to the Notes following the title of class G01 and to Note (1) following the title of subclass G09B.

G01S1/00

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 [G01S5/00](#))

G01S1/02

. using radio waves ([G01S19/00](#) takes precedence)

G01S1/02A

. . [N: Means for monitoring or calibrating] [C1012]

G01S1/02A1

. . . [N: of beacon transmitters]

G01S1/02A2

. . . [N: of associated receivers]

G01S1/02A3

. . . [N: Simulation means, e.g. of beacon signals therefor (for teaching or training purposes [G09B9/00](#))]

G01S1/04

. . Details [C1012]

G01S1/04A

. . . [N: Transmitters]

G01S1/04B

. . . [N: Receivers]

- G01S1/04D . . . [N: Displays or indicators ([G01S1/06](#) takes precedence)]
- G01S1/06 . . . Means for providing multiple indication, e.g. coarse and fine indications
- G01S1/08 . . . Systems for determining direction or position line [N: aerial arrangements for changing or varying the orientation or the shape of the directional pattern [H01Q3/00](#); combinations of different interacting units for giving a desired directional characteristic [H01Q21/29](#); aeriels or aerial systems providing at least two radiation patterns [H01Q25/00](#)]
- G01S1/10 . . . using amplitude comparison of signals transmitted sequentially from aeriels or aerial systems having differently-oriented overlapping directivity-characteristics, e.g. equi-signal A-N type
- G01S1/12 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
- G01S1/14 . . . using amplitude comparison of signals transmitted simultaneously from aeriels or aerial systems having differently-oriented overlapping directivity-characteristics
- G01S1/16 Azimuthal guidance systems, e.g. system for defining aircraft approach path, localiser system
- G01S1/18 Elevational guidance systems, e.g. system for defining aircraft glide path
- G01S1/20 . . . using a comparison of transit time of synchronised signals transmitted from non-directional aeriels or aerial systems spaced apart, i.e. path-difference systems [N: synchronisation in general [H03L7/00](#)]
- G01S1/22 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
- G01S1/24 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, [N: e.g. LORAN systems]
- G01S1/24B [N: Details of receivers cooperating therewith, e.g. determining positive zero crossing of third cycle in LORAN-C]
- G01S1/26 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 aeriels or aerial systems [N: contains no documents]
- G01S1/28 wherein the predetermined time-relationship is maintained automatically [N: contains no documents]
- G01S1/30 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
- G01S1/30B [N: Systems in which the direction is determined by using an interferometric type transmitting antenna array]
- G01S1/30C [N: 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]
- G01S1/30D [N: Analogous systems in which frequency-related signals (harmonics) are compared in phase, e.g. DECCA systems]
- G01S1/30M [N: particularly adapted to Omega systems]
- G01S1/32 Systems in which the signals received, with or without amplification, or

- signals derived therefrom, are compared in phase directly [N: contains no documents]
- G01S1/34 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 [N: contains no documents]
- G01S1/36 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 [N: contains no documents]
- G01S1/38 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
- G01S1/40 the apparent movement of the aerial being produced by cyclic sequential energisation of fixed aerials
- G01S1/42 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
- G01S1/44 Rotating or oscillating beam beacons defining directions in the plane of rotation or oscillation
- G01S1/46 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
- G01S1/46A [N: using time-varying interference fields] [C0407]
- G01S1/48 wherein the phase angle of the direction-dependent envelope signal is a multiple of the direction angle, e.g. for "fine" bearing indication [N: TACAN]
- G01S1/50 wherein the phase angle of the direction-dependent envelope signal is compared with a non-direction-dependent reference signal, [N: e.g. VOR]
- G01S1/52 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
- G01S1/54 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
- G01S1/56 Timing the pulse-type envelope signals derived by reception of the beam
- G01S1/58 wherein a characteristic of the beam transmitted or of an auxiliary signal is varied in time synchronously with rotation or oscillation of the beam
- G01S1/60 Varying frequency of beam signal or of auxiliary signal
- G01S1/62 Varying phase-relationship between beam and auxiliary signal
- G01S1/64 Varying pulse timing, e.g. varying interval between pulses radiated in pairs

- G01S1/66 Superimposing direction-indicating intelligence signals, e.g. speech, Morse
- G01S1/68 . . Marker, boundary, call-sign, or like beacons transmitting signals not carrying directional information [N1205]
- G01S1/68B . . . [N: using pulse modulation, e.g. pulse frequency modulation]
- G01S1/70 . using electromagnetic waves other than radio waves
- G01S1/70B . . [N: using gamma or X-rays] [C9506]
- G01S1/72 . using ultrasonic, sonic or infrasonic waves (signalling devices G08B)
- G01S1/72D . . [N: Marker, boundary, call-sign or like beacons transmitting signals not carrying directional information] [N1205]
- G01S1/74 . . Details
- G01S1/76 . . Systems for determining direction or position line (sound focusing or directing using electrical steering of transducer arrays, e.g. beam steering, in general G10K11/34)
- G01S1/76B . . . [N: using the Doppler shift introduced by the relative motion between beacon and receiver]
- G01S1/76C . . . [N: Conical-scan beam beacons transmitting signals which indicate at a mobile receiver any displacement of the receiver from the conical-scan axis]
- G01S1/78 . . . using amplitude comparison of signals transmitted from transducers or transducer systems having differently-oriented characteristics
- G01S1/78B [N: the signals being transmitted sequentially]
- G01S1/78C [N: the signals being transmitted simultaneously]
- G01S1/80 . . . using a comparison of transit time of synchronised signals transmitted from non-directional transducers or transducer systems spaced apart, i.e. path-difference systems
- G01S1/80B [N: 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]
- G01S1/80C [N: 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]
- G01S1/80D [N: 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]
- G01S1/82 . . . Rotating or oscillating beam beacons defining directions in the plane of rotation or oscillation

- G01S3/00** **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 G01S5/00; for geophysical measurement G01C; telescope mountings G02B)

- G01S3/02 . using radio waves
- G01S3/02A . . [N: Monitoring or calibrating]
- G01S3/02A1 . . . [N: Simulating means therefor]
- G01S3/04 . . Details

- G01S3/04B . . . [N: Receivers]
- G01S3/04D . . . [N: Displays or indicators]
- G01S3/06 . . . 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 [G01S3/16](#), [G01S3/28](#); modifications of aerials or aerial systems [H01Q](#))
- G01S3/06B [N: by using non-directional aerial]
- G01S3/08 . . . Means for reducing polarisation errors, e.g. by use of Adcock or spaced loop aerial systems
- G01S3/08B [N: by using spaced loop aerial systems]
- G01S3/10 . . . Means for reducing or compensating for quadrantal, site, or like errors
- G01S3/12 . . . Means for determining sense of direction, e.g. by combining signals from directional aerial or goniometer search coil with those from non-directional aerial (determining direction by amplitude comparison of signals derived by combining directional and non-directional signals [G01S3/24](#), [G01S3/34](#)) [N: [G01S3/06B](#) takes precedence]
- G01S3/14 . . Systems for determining direction or deviation from predetermined direction [N: aerial arrangements for changing or varying the orientation or the shape of the directional pattern [H01Q3/00](#); combinations of different interacting aerial units for giving a desired directional characteristic [H01Q21/29](#); aerials or aerial systems providing at least two radiation patterns [H01Q25/00](#)]
- G01S3/14B . . . [N: by vectorial combination of signals derived from differently oriented antennae]
- G01S3/14C . . . [N: by comparing linear polarisation components (polarisation details of antenna systems per se [H01Q21/24B](#))] [C0407]
- G01S3/16 . . . 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 [N: [G01S3/14C](#) takes precedence]
- G01S3/18 derived directly from separate directional aerials
- G01S3/20 derived by sampling signal received by an aerial system having periodically-varied orientation of directivity characteristic
- G01S3/22 derived from different combinations of signals from separate aerials, e.g. comparing sum with difference
- G01S3/24 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
- G01S3/26 the separate aerials having differently-oriented directivity characteristics
- G01S3/28 . . . using amplitude comparison of signals derived simultaneously from receiving aerials or aerial systems having differently-oriented directivity characteristics [N: [G01S3/14C](#) takes precedence]
- G01S3/30 derived directly from separate directional systems
- G01S3/32 derived from different combinations of signals from separate aerials, e.g. comparing sum with difference
- G01S3/32B [N: Automatic tracking systems]
- G01S3/34 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
- G01S3/36 the separate aerials having differently-oriented directivity characteristics

- G01S3/38 . . . 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 ([G01S3/16](#), [G01S3/28](#) take precedence)
- G01S3/40 adjusting orientation of a single directivity characteristic to produce maximum or minimum signal, e.g. rotatable loop aerial, equivalent goniometer system
- G01S3/42 the desired condition being maintained automatically
- G01S3/44 the adjustment being varied periodically or continuously until it is halted automatically when the desired condition is attained
- G01S3/46 . . . using aerials spaced apart and measuring [N: frequency] phase or time difference between signals therefrom, i.e. path-difference systems
- G01S3/46B [N: the waves arriving at the aerials being frequency modulated and the frequency difference of signals therefrom being measured]
- G01S3/48 the waves arriving at the aerials being continuous or intermittent and the phase difference of signals derived therefrom being measured
- G01S3/50 the waves arriving at the aerials being pulse modulated and the time difference of their arrival being measured
- G01S3/52 . . . using a receiving aerial moving, or appearing to move, in a cyclic path to produce a Doppler variation of frequency of the received signal
- G01S3/54 the apparent movement of the aerial being produced by coupling the receiver cyclically and sequentially to each of several fixed spaced aerials
- G01S3/56 . . . Conical-scan beam systems using signals indicative of the deviation of the direction of reception from the scan axis
- G01S3/58 . . . 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 ([G01S3/14](#) takes precedence)
- G01S3/60 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
- G01S3/62 wherein the phase angle of the signal is indicated by a cathode-ray tube
- G01S3/64 wherein the phase angle of the signal is determined by phase comparison with a reference alternating signal varying in synchronism with the directivity variation
- G01S3/66 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
- G01S3/68 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 G01S7/10](#))
- G01S3/70 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
- G01S3/72 . . Diversity systems specially adapted for direction-finding
- G01S3/74 . . 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 [G01S3/04](#), [G01S3/14](#))

- G01S3/78 . using electromagnetic waves other than radio waves
- G01S3/78B . . [N: Means for monitoring or calibrating]
- G01S3/78D . . [N: using gamma or X-rays] [C9506]
- G01S3/781 . . Details
- G01S3/782 . . Systems for determining direction or deviation from predetermined direction
- G01S3/783 . . . using amplitude comparison of signals derived from static detectors or detector systems
- G01S3/783B [N: using coding masks]
- G01S3/784 using a mosaic of detectors
- G01S3/785 . . . 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
- G01S3/786 the desired condition being maintained automatically, [N: i.e. tracking systems; [G01S3/783](#) takes precedence]
- G01S3/786B [N: Solar tracking systems]
- G01S3/786B1 [N: mounted on a moving platform e.g. space vehicle]
- G01S3/786C [N: T.V. type tracking systems]
- G01S3/786C1 [N: using correlation of the live video image with a stored image]
- G01S3/786D [N: Star trackers (navigation using star trackers [G01C21/02A](#))]
- G01S3/786E [N: using horizon sensors]
- G01S3/787 . . . using rotating reticles producing a direction-dependant modulation characteristic
- G01S3/788 producing a frequency modulation characteristic
- G01S3/789 . . . using rotating or oscillating beam systems, e.g. using mirrors, prisms
- G01S3/80 . using ultrasonic, sonic or infrasonic waves
- G01S3/80V . . [N: Diversity systems specially adapted for direction finding]
- G01S3/80W . . [N: 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]
- G01S3/801 . . Details [N: [G01S3/82](#), [G01S3/84](#), [G01S3/86](#) take precedence]
- G01S3/802 . . 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 [G10K11/34](#))
- G01S3/802B . . . [N: using the Doppler shift introduced by the relative motion between source and receiver]
- G01S3/802C . . . [N: Conical-scan beam systems using signals indicative of the deviation of the direction of reception from the scan axis]
- G01S3/802D . . . [N: By vectorial composition of signals received by plural, differently-oriented transducers]
- G01S3/803 . . . using amplitude comparison of signals derived from receiving transducers or transducer systems having differently-oriented directivity characteristics
- G01S3/803B [N: wherein the signals are derived sequentially]
- G01S3/803C [N: wherein the signals are derived simultaneously]
- G01S3/803C1 [N: derived directly from separate directional systems]

- G01S3/803C2 [N: derived from different combinations of signals from separate transducers comparing sum with difference]
- G01S3/805 . . . 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
- G01S3/805B [N: adjusting orientation of a single directivity characteristic to produce maximum or minimum signal]
- G01S3/807 the desired condition being maintained automatically
- G01S3/808 . . . using transducers spaced apart and measuring phase or time difference between signals therefrom, i.e. path-difference systems
- G01S3/808B [N: determining direction of source]
- G01S3/808C [N: determining other position line of source]
- G01S3/809 . . . 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
- G01S3/82 . . with means for adjusting phase or compensating for time-lag errors
- G01S3/84 . . with indication presented on cathode-ray tubes
- G01S3/86 . . with means for eliminating undesired waves, e.g. disturbing noises

G01S5/00 **Position-fixing by co-ordinating two or more direction or position line determinations; Position-fixing by co-ordinating two or more distance determinations** [N: (using active systems [G01S13/00](#), [G01S15/00](#), [G01S17/00](#))]

- G01S5/00R . . [N: Transmission of position information to remote stations (transmission of measured values in general, G08C; services making use of location of users or terminals, H04W4/02)] [N1205]
- G01S5/00R1 . . [N: Transmission from mobile station to base station] [N9605]
- G01S5/00R1A . . . [N: of actual mobile position, i.e. position determined on mobile] [N9605]
- G01S5/00R1B . . . [N: of measured values, i.e. measurement on mobile and position calculation on base station] [N9605]
- G01S5/00R2 . . [N: Transmission from base station to mobile station ([G01S5/00R5](#) takes precedence)] [N9605]
- G01S5/00R2A . . . [N: of actual mobile position, i.e. position calculation on base station] [N9605]
- G01S5/00R2B . . . [N: of measured values, i.e. measurement on base station and position calculation on mobile] [N9605]
- G01S5/00R3 . . [N: Transmission between mobile stations, e.g. anti-collision systems] [N9605]
- G01S5/00R4 . . [N: Transmission between base stations] [N9605]
- G01S5/00R5 . . [N: Transmission of differential positioning data to mobile] [N9605]
- G01S5/02 . . using radio waves ([G01S19/00](#) takes precedence)
- G01S5/02A . . [N: Details] [N0404] [C1012]
- G01S5/02A1 . . . [N: Calibration, monitoring or correction ([G01S5/02D](#) takes precedence)][N0404]
- G01S5/02A2 . . . [N: interference or multipath issues related to signal reception] [N0404] [C1111]
- G01S5/02A3 . . . [N: of receivers or network of receivers][N0404]
- G01S5/02A4 . . . [N: of transmitters or network of transmitters (wireless system synchronisation per se [H04B7/26V](#))][N0404]

- G01S5/02A4B [N: Emergency, distress or locator beacons] [N1205]
- G01S5/02A5 [N: Receiving assistance data, e.g. base station almanac][N0404]
- G01S5/02A6 [N: locating transmitters to be used for positioning ([G01S5/02R1](#) takes precedence)] [N1111]
- G01S5/02B [N: Determination of attitude (using inertial means [G01C9/00](#); control of attitude [G05D1/08](#))] [C0706]
- G01S5/02D [N: by comparing measured values with pre-stored measured or simulated values] [N0305]
- [N: **WARNING**
This group is incomplete; see provisionally also group [G01S5/02](#)]
- G01S5/02H [N: Hybrid positioning solutions (by coordinating position lines of different shape [G01S5/12](#))] [N0404] [C2010.10]
- G01S5/02H1 [N: employing positioning solutions derived from one of several separate positioning systems][N0404]
- G01S5/02H2 [N: employing positioning solutions derived from a single positioning system][N0404]
- G01S5/02M [N: using multipath or indirect path propagation signals in position determination] [N1111]
- G01S5/02P [N: involving statistical or probabilistic considerations ([G01S5/02D](#), [G01S5/02T](#) take precedence)] [N1111]
- G01S5/02R [N: Relative positioning][N0404]
- G01S5/02R1 [N: of multiple transceivers, e.g. in ad hoc networks][N0404]
- G01S5/02T [N: Tracking, i.e. predictive filtering, e.g. Kalman filtering] [N1205]
- G01S5/04 Position of source determined by a plurality of spaced direction-finders
- G01S5/06 Position of source determined by co-ordinating a plurality of position lines defined by path-difference measurements ([G01S5/12](#) takes precedence)
- G01S5/08 Position of single direction-finder fixed by determining direction of a plurality of spaced sources of known location
- G01S5/10 Position of receiver fixed by co-ordinating a plurality of position lines defined by path-difference measurements [N: ,e.g. omega or decca systems] ([G01S5/12](#) takes precedence; [N: beacons and receivers cooperating therewith [G01S1/30D](#), [G01S1/30M](#)]) [C0407]
- G01S5/12 by co-ordinating position lines of different shape, e.g. hyperbolic, circular, elliptical, radial (radar indicators providing co-ordinated display of direction and distance [G01S7/10](#))
- G01S5/14 Determining absolute distances from a plurality of spaced points of known location
- G01S5/14B [N: Using a supplementary range measurement, e.g. based on pseudo-range measurements] [N1205]
- G01S5/16 using electromagnetic waves other than radio waves
- G01S5/16B [N: Determination of attitude (using inertial means [G01C9/00](#); control of attitude [G05D1/08](#))]
- G01S5/16C [N: using gamma or X-rays] [C9506]
- G01S5/18 using ultrasonic, sonic, or infrasonic waves
- G01S5/18B [N: Emergency, distress or locator beacons] [N1205]

- G01S5/18G . . [N: Determination of attitude (using inertial means [G01C9/00](#); control of attitude [G05D1/08](#))]
- G01S5/20 . . Position of source determined by a plurality of spaced direction-finders
- G01S5/22 . . Position of source determined by co-ordinating a plurality of position lines defined by path-difference measurements ([G01S5/28](#) takes precedence)
- G01S5/24 . . Position of single direction-finder fixed by determining direction of a plurality of spaced sources of known location
- G01S5/26 . . Position of receiver fixed by co-ordinating a plurality of position lines defined by path-difference measurements ([G01S5/28](#) takes precedence)
- G01S5/28 . . by co-ordinating position lines of different shape, e.g. hyperbolic, circular, elliptical, radial (sonar indicators providing co-ordinated display of direction and distance [G01S7/62](#))
- G01S5/30 . . Determining absolute distances from a plurality of spaced points of known location

- G01S7/00** **Details of systems according to groups [G01S13/00](#), [G01S15/00](#), [G01S17/00](#) [N: (apparatus for measuring unknown time-intervals by electronic means, e.g. Vernier method [G04F10/00](#))]**

- G01S7/00R . [N: Transmission of data between radar, sonar or lidar systems and remote stations (in general [G08C](#))]
- G01S7/00R1 . . [N: using shared front-end circuitry, e.g. antennas ([G01S13/76D](#), [G01S13/82B](#) take precedence)] [[N0707](#)]

- G01S7/02 . of systems according to group [G01S13/00](#)
- G01S7/02A . . [N: Auxiliary means for detecting or identifying radar signals or the like, e.g. radar jamming signals (multi-channel PRF-analysers, per se [G01R23/15B](#))]
- G01S7/02A1 . . . [N: Road traffic radar detectors] [[N0201](#)]
- G01S7/02B . . [N: 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 [G01S7/36](#); auxiliary means for detecting or identifying radar signals or the like [G01S7/02A](#))] [[N1204](#)]

- G01S7/02P . . [N: using polarisation effects (in waveguides [H01P1/165](#); for aerials [H01Q](#), e.g. [H01Q15/22](#), [H01Q15/24](#), [H01Q19/195](#))]
- G01S7/02P1 . . . [N: involving the transmission of linearly polarised waves]
- G01S7/02P2 . . . [N: involving the transmission of elliptically or circularly polarised waves]
- G01S7/03 . . Details of HF subsystems specially adapted therefor, e.g. common to transmitter and receiver (TR boxes [H01J17/64](#); 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](#))

- G01S7/03B . . . [N: Constructional details for solid-state radar subsystems]
- G01S7/03C . . . [N: Duplexers (switching devices for waveguides [H01P1/10](#); transmit-receive switching in transceivers [H04B1/44](#))]
- G01S7/03C1 [N: involving a transfer mixer (mixers in general, [H03D7](#))] [[N1204](#)]
- G01S7/03D . . . [N: Feedthrough nulling circuits]
- G01S7/04 . . Display arrangements
- G01S7/04B . . . [N: Synchronising the display device with the scanning of the antenna]

- G01S7/04C . . . [N: using an intermediate storage device, e.g. a recording/reproducing device (video recording in general [H04N](#))]
- G01S7/06 . . . Cathode-ray tube displays [N: or other two-dimensional or three-dimensional displays (cathode ray oscilloscopes in general G01R 13/20)] [C1205]
- [N: **WARNING**
[N1205]Groups [G01S7/06D](#) - [G01S7/24](#) are not complete pending a reorganization. See provisionally [G01S7/06](#)]
- G01S7/06D [N: in which different colours are used]
- G01S7/06F [N: using a display memory for image processing ([G01S7/298](#) takes precedence)]
- G01S7/06F1 [N: with means for showing the history of the radar trails, e.g. artificial remanence]
- G01S7/06H [N: with data-rate converters preceding the display, e.g. flicker free display, constant brightness display ([G01S7/298](#) takes precedence)]
- G01S7/08 with vernier indication of distance, e.g. using two cathode-ray tubes
- G01S7/10 Providing two-dimensional and co-ordinated display of distance and direction [N: in general [G01R13/20E](#)]
- G01S7/12 Plan-position indicators, i.e. P.P.I.
- G01S7/14 Sector, off-centre, or expanded angle display
- G01S7/16 Signals displayed as intensity modulation with rectangular co-ordinates representing distance and bearing, e.g. type B
- G01S7/18 Distance-height displays; Distance-elevation displays, e.g. type RHI, type E
- G01S7/20 Stereoscopic displays; Three-dimensional displays; Pseudo-three-dimensional displays [N: in general [G01R13/20D](#)]
- G01S7/22 Producing cursor lines and indicia by electronic means [N: in general [G01R13/30](#)]
- G01S7/24 the display being orientated or displaced in accordance with movement of object carrying the transmitting and receiving apparatus, e.g. true-motion radar
- G01S7/28 . . Details of pulse systems
- G01S7/28B . . . [N: 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]
- G01S7/28K . . . [N: 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 [G01S13/76B](#); aerials or aerials systems [H01Q21/29](#), [H01Q25/00](#))]
- G01S7/282 . . . Transmitters
- G01S7/285 . . . Receivers
- G01S7/288 Coherent receivers
- G01S7/292 Extracting wanted echo-signals (Doppler systems [G01S13/50](#))
- G01S7/292B [N: based on data belonging to one radar period]
- G01S7/292B1 [N: by using a controlled threshold]
- G01S7/292C [N: based on data belonging to a number of consecutive radar periods]
- G01S7/292C1 [N: by using shape of radiation pattern]
- G01S7/292C2 [N: by integration]

- G01S7/292C3 [N: by deriving and controlling a threshold value]
- G01S7/292C4 [N: Random or non-synchronous interference pulse cancellers]
- G01S7/295 Means for transforming co-ordinates or for evaluating data, e.g. using computers
- G01S7/295B [N: Means for determining the position of the radar coordinate system for evaluating the position data of the target in another coordinate system ([G01S7/24](#) takes precedence; sighting devices adapted for indirect laying of fire [F41G3/16](#); Inertial navigation [G01C21/16](#))]
- G01S7/298 Scan converters
- G01S7/32 Shaping echo pulse signals; Deriving non-pulse signals from echo pulse signals
- G01S7/34 Gain of receiver varied automatically during pulse-recurrence period, e.g. anti-clutter gain control
- G01S7/35 Details of non-pulse systems
- G01S7/35B [N: Receivers]
- G01S7/35B1 [N: Extracting wanted echo-signals (Doppler systems [G01S13/50](#))] [[N1204](#)]
- G01S7/36 Means for anti-jamming (in general [H04K3/00](#)), [N: e.g. ECCM, i.e. electronic counter-counter measures (for irregular PRF see also [G01S13/22](#), [G01S13/528](#); for frequency agility of carrier wave see also [G01S13/24](#); [G01S7/28K](#) takes precedence); random interference pulse cancellers [G01S7/292C4](#); identification of radar jamming signals [G01S7/02A](#)]
- G01S7/38 Jamming means, e.g. producing false echoes (in general [H04K3/00](#)) [N: reflecting surfaces comprising a plurality of reflecting particles, e.g. chaff, [H01Q15/14C](#); identification of radar signals [G01S7/02A](#)]
- G01S7/40 Means for monitoring or calibrating
- G01S7/40A [N: of parts of a radar system (see provisionally also [G01S7/40](#))]
- G01S7/40A1 [N: of transmitters]
- G01S7/40A2 [N: of HF systems]
- G01S7/40A3 [N: of receivers]
- G01S7/40A4 [N: Antenna boresight] [[N0201](#)]
- G01S7/40R [N: by simulation of echoes (analogue simulators in general [G06G7/78](#))]
- G01S7/40R1 [N: specially adapted to FMCW]
- G01S7/41 using analysis of echo signal for target characterisation; Target signature; Target cross-section [[N9504](#)]
- G01S7/41A [N: Identification of targets based on measurements of radar reflectivity ([G01S7/41C](#) takes precedence)] [[N9504](#)]
- G01S7/41A1 [N: based on a comparison between measured values and known or stored values] [[N9504](#)]
- G01S7/41B [N: Discriminating targets with respect to background clutter] [[N9504](#)]
- G01S7/41C [N: Identification of targets based on measurements of movement associated with the target] [[N9504](#)]
- G01S7/41D [N: involving the use of neural networks] [[N9504](#)]
- G01S7/41T [N: Theoretical aspects] [[N9704](#)]
- G01S7/42 Diversity systems specially adapted for radar
- G01S7/48 of systems according to group [G01S17/00](#) [[C9506](#)]
- G01S7/48A [N: using analysis of echo signal for target characterisation; Target signature; Target cross-section] [[N9701](#)]

- G01S7/48C . . [N: Auxiliary means for detecting or identifying lidar signals or the like, e.g. laser illuminators] [N9612]
- G01S7/48C1 . . . [N: Road traffic laser detectors] [N1012]
- G01S7/48E . . [N: Evaluating distance, position or velocity data] [N1203]
- G01S7/481 . . Constructional features, e.g. arrangements of optical elements [N9506]
- G01S7/481B . . . [N: common to transmitter and receiver] [N9506]
- G01S7/481B1 [N: transmitted and received beams following a coaxial path] [N9506]
- G01S7/481B2 [N: Housing arrangements] [N9506]
- G01S7/481C . . . [N: of transmitters alone] [N9506]
- G01S7/481C1 [N: using multiple transmitters] [N1203]
- G01S7/481D . . . [N: of receivers alone] [N9506]
- G01S7/481E . . . [N: relating to scanning] [N1203]
- G01S7/481F . . . [N: using optical fibres] [N1203]
- G01S7/483 . . Details of pulse systems [N9506]
- G01S7/484 . . . Transmitters [N9506]
- G01S7/486 . . . Receivers [N9506]
- G01S7/486B [N: Details of detection, sampling, integration or read-out circuits] [N1203]
- G01S7/486B1 [N: of detector arrays] [N1203]
- G01S7/486D [N: Details of time delay measurement, e.g. time of flight or time of arrival measurement, determining the exact position of a peak] [N1203]
- G01S7/486D1 [N: by fitting a model or function to the received signal] [N1203]
- G01S7/486E [N: Controlling received signal intensity or exposure of sensor] [N1203]
- G01S7/487 Extracting wanted echo signals, [N: e.g. pulse detection] [N9506] [C1203]
- G01S7/487B [N: by deriving and controlling a threshold value] [N1203]
- G01S7/487D [N: by removing unwanted signals ([G01S7/495](#) takes precedence)] [N1203]
- G01S7/489 Gain of receiver varied automatically during pulse-recurrence period [N9506]
- G01S7/491 . . Details of non-pulse systems [N9506]
- G01S7/491A . . . [N: Transmitters] [N1203]
- G01S7/491B . . . [N: Receivers] [N1203]
- G01S7/491B1 [N: Details of detection, sampling, integration or read-out circuits] [N1203]
- G01S7/491B1A [N: of detector arrays] [N1203]
- G01S7/491B2 [N: Details of time delay measurement or phase measurement] [N1203]
- G01S7/491B3 [N: using self-mixing in the laser cavity] [N1203]
- G01S7/491B4 [N: superposing optical signals in a photodetector, e.g. optical heterodyne detection] [N1203]
- G01S7/491B5 [N: Controlling received signal intensity, gain or exposure of sensor] [N1203]
- G01S7/493 . . . Extracting wanted echo signals [N9506]
- G01S7/495 . . Counter-measures or counter-counter-measures [N: using electronic or electro-optical means] [N9506] [C9509]
- G01S7/497 . . Means for monitoring or calibrating [N9506]
- G01S7/497A . . . [N: Alignment of sensor] [N0201]
- G01S7/499 . . using polarisation effects ([measuring polarisation of light G01J](#)) [N9506]
- G01S7/51 . . Display arrangements [N9506]

- G01S7/52 . . . of systems according to group [G01S15/00](#)
- G01S7/52A . . . [N: Auxiliary means for detecting or identifying sonar signals or the like, e.g. sonar jamming signals (multi-channel PRF-analysers per se [G01R23/15B](#))] [N0405]
- G01S7/52D . . . [N: Techniques for enhancing spatial resolution of targets (beam formers in general [G10K11/34](#); [G01S7/52S4](#) takes precedence)]
- G01S7/52G . . . [N: Means for monitoring or calibrating (short-range imaging 7/52S6)]
- G01S7/52G1 [N: with provision for compensating the effects of temperature]
- G01S7/52H . . . [N: Diversity systems]
- G01S7/52S . . . [N: particularly adapted to short-range imaging ([G01S7/53](#) takes precedence)] [C9509]
- G01S7/52S1 [N: Details of transmitters] [N1204]
- G01S7/52S1B [N: for pulse systems] [N1204]
- G01S7/52S1B1 [N: using a sequence of pulses, at least one pulse manipulating the transmissivity or reflexivity of the medium] [N1204]
- G01S7/52S2 [N: Details of receivers]
- G01S7/52S2B [N: for pulse systems ([G01S7/52S2E](#) takes precedence)]
- G01S7/52S2B1 [N: Extracting wanted echo signals (Doppler systems G01S15/50; Doppler short range imaging systems G01S15/89D7)] [N1204]
- G01S7/52S2B1A [N: using digital techniques]
- G01S7/52S2C [N: for non-pulse systems, e.g. CW systems ([G01S7/52S2E](#) takes precedence)]
- G01S7/52S2C1 [N: Extracting wanted echo signals] [C9509]
- G01S7/52S2D [N: Gain control of receivers (for seismic signals [G01V1/24C](#))] [C9509]
- G01S7/52S2E [N: Data rate converters]
- G01S7/52S2F [N: using analysis of echo signal for target characterisation] [C9509]
- G01S7/52S2F1 [N: involving non-linear properties of the propagation medium or of the reflective target] [N1204]
- G01S7/52S2F1B [N: exploiting the non-linear response of a contrast enhancer; e.g. a contrast agent (diagnostic techniques involving the use of contrast agents A61B8/48B)] [N1204]
- G01S7/52S2F1C [N: 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 A61B8/48B)] [N1204]
- G01S7/52S2F2 [N: determining elastic properties of the propagation medium or of the reflective target (diagnostic techniques involving the measurement of strain A61B8/48F)] [N1204]
- G01S7/52S2G [N: Scan converters] [N1204]
- G01S7/52S4 [N: Techniques for image enhancement involving transmitter or receiver (image enhancement by image data processing [G06T5/00](#))] [C9509]
- G01S7/52S4A [N: for elimination of side lobes or of grating lobes; for increasing resolving power (beam formers in general [G10K11/34](#))]
- G01S7/52S4C [N: using correction of medium-induced phase aberration]
- G01S7/52S6 [N: Means for monitoring or calibrating]
- G01S7/52S6A [N: with simulation of echoes]
- G01S7/52S8 [N: Display arrangements]

G01S7/52S8A	. . . .	[N: in association with ancillary recording equipment]
G01S7/52S8B	. . . .	[N: Cathode ray tube displays (cathode ray oscilloscopes in general G01R13/20)]
G01S7/52S8B1	. . . . .	[N: displaying one measured variable; A-scan display]
G01S7/52S8B2	. . . . .	[N: Two-dimensional coordinated display of distance and direction; B-scan display]
G01S7/52S8B2A	. . . . .	[N: Plan position indication (PPI display); C-scan display]
G01S7/52S8B2B	. . . . .	[N: Sector scan display]
G01S7/52S8B2C	. . . . .	[N: Compound scan display, e.g. panoramic imaging] [N1204]
G01S7/52S8B2D	. . . . .	[N: Time-position or time-motion displays]
G01S7/52S8B3	. . . . .	[N: Stereoscopic displays; Three-dimensional displays; Pseudo 3D displays (G01S15/89D9 takes precedence)] [C9811]
G01S7/52S8B3A	. . . . .	[N: Grey-scale displays]
G01S7/52S8B4	. . . . .	[N: Multicolour displays; using colour coding; Optimising colour or information content in displays, e.g. parametric imaging] [N1204]
G01S7/52S8B5	. . . . .	[N: Production of cursor lines, markers or indicia by electronic means]
G01S7/52S8B6	. . . . .	[N: Composite displays, e.g. split-screen displays; Combination of multiple images or of images and alphanumeric tabular information]
G01S7/52S10	. . . .	[N: Luminous indicators]
G01S7/52S12	. . . .	[N: with means for elimination of unwanted signals, e.g. noise or interference]
G01S7/52S13	. . . .	[N: Constructional features (constructional features of transducers B06B; mounting transducers G10K11/00; constructional features of ultrasonic medical diagnostic devices A61B8/44)] [N1204]
G01S7/52S13B	. . . . .	[N: with integration of processing functions inside probe or scanhead] [N1204]
G01S7/52S13D	. . . . .	[N: involving a modular construction, e.g. a computer with short range imaging equipment (modular ultrasonic medical diagnostic devices A61B8/44D)] [N1204]
G01S7/52S13F	. . . . .	[N: related to particular user interfaces (special user input means for ultrasonic medical diagnostic devices A61B8/46D)] [N1204]
G01S7/52S14	. . . .	[N: Details related to the ultrasound signal acquisition, e.g. scan sequences (control of medical diagnostic ultrasound devices A61B8/54)] [N1204]
G01S7/52S14B	. . . . .	[N: using synchronization techniques (control of medical diagnostic ultrasound devices involving acquisition triggered by a physiological signal A61B8/54B)] [N1204]
G01S7/52S14B1	. . . . .	[N: involving retrospective scan line rearrangements (medical diagnostic ultrasound devices involving retrospective matching to a physiological signal A61B8/52H)] [N1204]
G01S7/52S14D	. . . . .	[N: using multibeam transmission] [N1204]
G01S7/52S14D2	. . . . .	[N: using frequency diversity] [N1204]
G01S7/52S14D4	. . . . .	[N: using coded signals (G01S15/89D4 takes precedence)] [N1204]
G01S7/52S14F	. . . . .	[N: using multiline receive beamforming] [N1204]
G01S7/52S16	. . . .	[N: related to power management, e.g. saving power or prolonging life of electronic components (details of power supplies for ultrasonic medical diagnostic imaging devices A61B8/56)] [N1204]
G01S7/52S18	. . . .	[N: related to workflow protocols] [N1204]
G01S7/521	. . . .	[N: Constructional features (constructional features of transducers B06B; mounting transducers G10K11/00)] [N9509]

- G01S7/523 . . . Details of pulse systems [N: (short-range imaging [G01S7/52S](#); methods or devices for transmitting, conducting or directing sound [G10K11/18](#))] [N9509]
- G01S7/524 . . . Transmitters [N9509]
- G01S7/526 . . . Receivers [N9509]
- G01S7/527 Extracting wanted echo signals [N: (Doppler systems [G01S15/50](#))] [N9509]
- G01S7/527A [N: using digital techniques] [N9509]
- G01S7/527B [N: using analogue techniques] [N9509]
- G01S7/529 Gain of receiver varied automatically during pulse-recurrence period [N: (for seismic signals [G01V1/24C](#))] [N9509]
- G01S7/53 Means for transforming coordinates or for evaluating data, e.g. using computers [N9509]
- G01S7/531 Scan converters [N9509]
- G01S7/533 Data rate converters [N9509]
- G01S7/534 . . . Details of non-pulse systems [N: (short-range imaging [G01S7/52S](#))] [N9509]
- G01S7/534A [N: Gain control of receivers (for seismic signals [G01V1/24C](#))] [N9509]
- G01S7/536 Extracting wanted echo signals [N9509]
- G01S7/537 . . . Counter-measures or counter-counter-measures, e.g. jamming, anti-jamming [N: (in general [H04K](#))] [N9509]
- G01S7/539 . . . using analysis of echo signal for target characterisation; Target signature; Target cross-section [N9509]
- G01S7/54 . . . with receivers spaced apart
- G01S7/56 . . . Display arrangements [N: (short-range imaging [G01S7/52S8](#))]
- G01S7/58 for providing variable ranges
- G01S7/60 for providing a permanent recording
- G01S7/62 Cathode-ray tube displays [N: or other two-dimensional or three-dimensional displays (cathode ray oscilloscopes in general [G01R 13/20](#))] [C1205]
- G01S7/62A [N: providing display of one measured variable]
- G01S7/62B [N: providing two-dimensional coordinated display of distance and direction]
- G01S7/62B1 [N: Plan-position indicators, i.e. P.P.I.]
- G01S7/62B2 [N: Sector-scan displays]
- G01S7/62C [N: Stereoscopic displays; Three-dimensional displays; Pseudo-three dimensional displays]
- G01S7/62C2 [N: Grey-scale displays]
- G01S7/62D [N: in which different colours are used]
- G01S7/62E [N: producing cursor lines and indicia by electronic means]
- G01S7/62F [N: Composite displays, e.g. split-screen, multiple images]
- G01S7/62G [N: the display being oriented or displaced in accordance with the movement of object carrying the transmitting and receiving apparatus]
- G01S7/64 Luminous indications ([G01S7/62](#) takes precedence) [N: (short-range imaging [G01S7/52S10](#))]

- G01S11/00** . . . **Systems for determining distance or velocity not using reflection or reradiation** (direction-finders [G01S3/00](#); position-fixing by co-ordinating two or more distance determinations [G01S5/00](#))

- G01S11/02 . . . using radio waves ([G01S19/00](#) takes precedence)

- G01S11/02B . . [N: using impedance elements varying with distance]
- G01S11/02C . . [N: using moving transmitters]
- G01S11/04 . . using angle measurements
- G01S11/06 . . using intensity measurements
- G01S11/08 . . using synchronised clocks ([synchronisation of electronic clocks G04G7/02](#))
- G01S11/10 . . using Doppler effect

- G01S11/12 . using electromagnetic waves other than radio waves
- G01S11/12B . . [N: using gamma or X-rays]

- G01S11/14 . using ultrasonic, sonic, or infrasonic waves

- G01S11/16 . using difference in transit time between electrical and acoustic signals

G01S13/00 **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 G01S15/00](#); [using electromagnetic waves other than radio waves G01S17/00](#))

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 [G01S1/00](#) or [G01S3/00](#);
- systems for determining distance or velocity of an object by means not employing reflection or reradiation, which are covered by group [G01S11/00](#).

- G01S13/00B . [N: Bistatic radar systems; Multistatic radar systems]

- G01S13/00T . [N: Theoretical aspects ([G01S7/41T](#), [G01S13/90T](#), [G01S13/95T](#) take precedence)]
[N9610] [C9704]

- G01S13/02 . Systems using reflection of radio waves, e.g. primary radar systems; Analogous systems

- G01S13/02B . . [N: Systems with very large relative bandwidth, i.e. larger than 10 %, e.g. baseband, pulse, carrier-free, ultrawideband]

- G01S13/02H . . . [N: Very long range radars, e.g. surface wave radar, over-the-horizon or ionospheric propagation systems (for meteorological use G01S13/95)] [N1204]
- G01S13/04 . . . Systems determining the presence of a target (based on relative movement of target G01S13/56)
- G01S13/06 . . . Systems determining position data of a target
- G01S13/08 Systems for measuring distance only (indirect measurement G01S13/46)
- G01S13/10 using transmission of interrupted pulse modulated waves (determination of distance by phase measurement G01S13/32)
- G01S13/10D [N: particularities of the measurement of the distance (G01S13/12, G01S13/14, G01S13/16, G01S13/18 and G01S13/20 take precedence)]
- G01S13/10F [N: using transmission of pulses having some particular characteristics (G01S13/12, G01S13/22, G01S13/24, G01S13/26, G01S13/28 and G01S13/30 take precedence)]
- G01S13/12 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
- G01S13/14 wherein a voltage or current pulse is initiated and terminated in accordance respectively with the pulse transmission and echo reception
- G01S13/16 using counters
- G01S13/18 wherein range gates are used
- G01S13/20 whereby multiple time-around echoes are used or eliminated
- G01S13/22 using irregular pulse repetition frequency [N: G01S13/12 takes precedence]
- G01S13/22B [N: using random or pseudorandom pulse repetition frequency]
- G01S13/22C [N: with cyclic repetition of a non-uniform pulse sequence, e.g. staggered PRF]
- G01S13/22D [N: with repetitive trains of uniform pulse sequences, each sequence having a different pulse repetition frequency]
- G01S13/24 using frequency agility of carrier wave
- G01S13/26 wherein the transmitted pulses use a frequency- or phase-modulated carrier wave
- G01S13/28 with time compression of received pulses
- G01S13/28B {7 dots} [N: using a frequency modulated carrier wave (G01S13/28C1 takes precedence)]
- G01S13/28C {7 dots} [N: using coded pulses]
- G01S13/28C1 {8 dots} [N: frequency shift keyed]
- G01S13/28C3 {8 dots} [N: phase modulated]
- G01S13/30 using more than one pulse per radar period
- G01S13/32 using transmission of continuous unmodulated waves, amplitude-, frequency- or phase-modulated waves
- G01S13/32C [N: using transmission of coded signals, e.g. P.S.K. signals]
- G01S13/34 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
- G01S13/34B [N: 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]

G01S13/34C	. . . . .	[N: using sinusoidal modulation]
G01S13/34D	. . . . .	[N: using sawtooth modulation]
G01S13/34E	. . . . .	[N: using triangular modulation]
G01S13/34F	. . . . .	[N: using noise modulation]
G01S13/34H	. . . . .	[N: using more than one modulation frequency]
G01S13/34L	. . . . .	[N: using square or rectangular modulation, e.g. duplex radar for ranging over short distances]
G01S13/36	. . . . .	with phase comparison between the received signal and the contemporaneously transmitted signal
G01S13/38	. . . . .	wherein more than one modulation frequency is used
G01S13/40	. . . . .	wherein the frequency of transmitted signal is adjusted to give a predetermined phase relationship
G01S13/42	. . . . .	Simultaneous measurement of distance and other co-ordinates (indirect measurement G01S13/46)
G01S13/42B	. . . . .	[N: sequential lobing e.g. conical scan]
G01S13/42H	. . . . .	[N: Stacked beam radar]
G01S13/42S	. . . . .	[N: Scanning radar, e.g. 3D radar (G01S13/66 takes precedence)]
G01S13/42S3	. . . . .	[N: within the pulse scanning systems]
G01S13/44	. . . . .	Monopulse radar, i.e. simultaneous lobing
G01S13/44B	. . . . .	[N: HF sub-systems particularly adapted therefor, e.g. circuits for signal combination (multi-lobing aeriels or aerial systems H01Q25/00)]
G01S13/44C	. . . . .	[N: with means for eliminating radar-dependent errors in angle measurements, e.g. multipath effects]
G01S13/44D	. . . . .	[N: with means for eliminating the target-dependent errors in angle measurements, e.g. glint, scintillation effects]
G01S13/44E	. . . . .	[N: with means specially adapted to maintain the same processing characteristics between the monopulse signals]
G01S13/44F	. . . . .	[N: amplitude comparisons monopulse, i.e. comparing the echo signals received by an antenna arrangement with overlapping squinted beams]
G01S13/44G	. . . . .	[N: phase comparisons monopulse, i.e. comparing the echo signals received by an interferometric antenna arrangement]
G01S13/44H	. . . . .	[N: using phased arrays]
G01S13/44I	. . . . .	[N: with means specially adapted to airborne monopulse systems (clutter elimination using Doppler effect: G01S13/44L)]
G01S13/44K	. . . . .	[N: Monopulse hybrid systems, e.g. conopulse]
G01S13/44L	. . . . .	[N: Combined with MTI or Doppler processing circuits]
G01S13/46	. . . . .	Indirect determination of position data
G01S13/48	. . . . .	using multiple beams at emission or reception
G01S13/50	. . . . .	Systems of measurement based on relative movement of target
G01S13/50A	. . . . .	[N: using Doppler effect for determining closest range to a target or corresponding time, e.g. miss-distance indicator (proximity fuze see F42C13/04; miss-distance indicators in general F41J5/12)]
G01S13/52	. . . . .	Discriminating between fixed and moving objects or between objects moving at different speeds [N: (coherent receivers G01S7/288)]
G01S13/522	. . . . .	using transmissions of interrupted pulse modulated waves
G01S13/524	. . . . .	based upon the phase or frequency shift resulting from movement of objects, with reference to the transmitted signals, e.g. coherent MTI

coherent receivers [G01S7/288](#))

G01S13/524B	. . . . .	[N: with means for platform motion or scan motion compensation, e.g. airborne MTI]
G01S13/524C	. . . . .	[N: Adaptive clutter cancellation (specially adapted for airborne MTI, G01S13/524B)]
G01S13/524D	. . . . .	[N: post processors for coherent MTI discriminators, e.g. residue cancellers, CFAR after Doppler filters]
G01S13/524E	. . . . .	[N: combining a coherent MTI processor with a zero Doppler processing channel and a clutter mapped memory, e.g. MTD (Moving target detector), (area MTI G01S13/538)]
G01S13/526	. . . . .	performing filtering on the whole spectrum without loss of range information, e.g. using delay line cancellers or comb filters; [N: G01S13/524C takes precedence]
G01S13/526B	. . . . .	{7 dots} [N: IF cancellers, e.g. TACCAR systems]
G01S13/528	. . . . .	{7 dots} with elimination of blind speeds
G01S13/53	. . . . .	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 [N: G01S13/524C takes precedence]
G01S13/532	. . . . .	{7 dots} using a bank of range gates or a memory matrix [C0407]
G01S13/534	. . . . .	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
G01S13/536	. . . . .	using transmission of continuous unmodulated waves, amplitude-, frequency-, or phase-modulated waves
G01S13/538	. . . . .	eliminating objects that have not moved between successive antenna scans, e.g. area MTI
G01S13/56	. . . . .	for presence detection [N: presence detection using near field arrangements G01V3/00 , e.g. G01V3/08 , G01V3/12 ; burglar, theft or intruder alarms with electrical actuation G08B13/22-G08B13/26]
G01S13/58	. . . . .	Velocity or trajectory determination systems; Sense-of-movement determination systems [N: (systems applied to the controlling of traffic G01S13/92)] [C0407]
G01S13/58E	. . . . .	[N: using transmission of interrupted pulse modulated waves and based upon the Doppler effect resulting from movement of targets]
G01S13/58E1	. . . . .	[N: adapted for simultaneous range and velocity measurements]
G01S13/58F	. . . . .	[N: using transmission of continuous unmodulated waves, amplitude-, frequency-, or phase-modulated waves and based upon the Doppler effect resulting from movement of targets]
G01S13/58F1	. . . . .	[N: adapted for simultaneous range and velocity measurements]
G01S13/58G	. . . . .	[N: processing the video signal in order to evaluate or display the velocity value]
G01S13/58G2	. . . . .	[N: using, or combined with, frequency tracking means]
G01S13/58G3	. . . . .	[N: using optical means (optical computing devices in general G06E)]
G01S13/58H	. . . . .	[N: deriving the velocity value from the range measurement]
G01S13/58L	. . . . .	[N: measuring the velocity vector]
G01S13/60	. . . . .	wherein the transmitter and receiver are mounted on the moving object, e.g. for determining ground speed, drift angle, ground track (G01S13/64 takes precedence)
G01S13/60A	. . . . .	[N: using a pattern, backscattered from the ground, to determine speed or

- drift by measuring the time required to cover a fixed distance]
- G01S13/62 Sense-of-movement determination [N: ([G01S13/58L](#) takes precedence)] [C9411]
- G01S13/64 Velocity measuring systems using range gates
- G01S13/66 . Radar-tracking systems; Analogous systems where the wavelength or the kind of wave is irrelevant
- G01S13/68 . . for angle tracking only
- G01S13/68B . . . [N: using simultaneous lobing techniques]
- G01S13/70 . . for range tracking only
- G01S13/72 . . for two-dimensional tracking, e.g. combination of angle and range tracking, track-while-scan radar
- G01S13/72B . . . [N: by using numerical data]
- G01S13/72B1 [N: Multiple target tracking] [N0611]
- G01S13/74 . Systems using reradiation of radio waves, e.g. secondary radar systems; Analogous systems [C0410]
- G01S13/75 . . using transponders powered from received waves, e.g. using passive transponders, [N: or using passive reflectors] [N0410]
- G01S13/75C . . . [N: wherein the responder or reflector radiates a coded signal] [N0410]
- G01S13/75C2 [N: using frequency selective elements, e.g. resonator] [N0410]
- G01S13/75C4 [N: using delay lines, e.g. acoustic delay lines] [N0410]
- G01S13/75C6 [N: using a signal generator for modifying the reflectivity of the reflector ([G01S13/75C8](#) takes precedence)] [N0410]
- G01S13/75C8 [N: using a signal generator powered by the interrogation signal] [N0410]
- G01S13/76 . . wherein pulse-type signals are transmitted
- G01S13/76B . . . [N: 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, [H01Q25/00](#))]
- G01S13/76D . . . [N: with exchange of information between interrogator and responder]
- G01S13/76R . . . [N: Responders; Transponders (teaching or practice apparatus for gun-aiming or gun-laying using reflecting targets or active targets [F41G3/26](#))] [N9504]
- G01S13/78 . . . discriminating between different kinds of targets, e.g. IFF-radar, i.e. identification of friend or foe [N: ([G01S13/75](#), [G01S13/76R](#) take precedence)] [C0410]
- G01S13/78B [N: Secondary Surveillance Radar (SSR) in general]
- G01S13/78B2 [N: using multimoding or selective addressing]
- G01S13/78B3 [N: Coders or decoders therefor; Degarbling systems; Defruiting systems]
- G01S13/78D [N: Distance Measuring Equipment (DME) systems] [C0410]
- G01S13/78D2 [N: co-operating with direction defining beacons]
- G01S13/78D3 [N: Coders or decoders therefor; Special detection circuits]
- G01S13/79 . . Systems using random coded signals or random pulse repetition frequencies, [N: e.g. "Separation and Control of Aircraft using Non synchronous Techniques" (SECANT)] [N0410]
- G01S13/82 . . wherein continuous-type signals are transmitted
- G01S13/82B . . . [N: with exchange of information between interrogator and responder]
- G01S13/84 . . . for distance determination by phase measurement

- G01S13/86 . Combinations of radar systems with non-radar systems, e.g. sonar, direction finder [N: (Combination of sonar systems with non-sonar or non-radar systems [G01S15/02C](#); combination of lidar systems with systems other than lidar, radar or sonar [G01S17/02C](#))] [M1207]
- G01S13/86A . . [N: Combination of radar systems with sonar systems] [N1204]
- G01S13/86B . . [N: Combination of radar systems with lidar systems] [N1204]
- G01S13/86C . . [N: Combination of radar systems with cameras] [N1204]
- G01S13/87 . Combinations of radar systems, e.g. primary radar and secondary radar
- G01S13/87B . . [N: Combinations of primary radar and secondary radar]
- G01S13/87C . . [N: Combination of several systems for attitude determination (in general [G01C](#), control of attitude [G05D1/08](#))]
- G01S13/87D . . [N: Combination of several spaced transponders or reflectors of known location for determining the position of a receiver ([G01S13/87C](#) takes precedence)]
- G01S13/87E . . [N: Combination of several spaced transmitters or receivers of known location for determining the position of a transponder or a reflector ([G01S13/87C](#) takes precedence)]
- G01S13/88 . Radar or analogous systems specially adapted for specific applications (electromagnetic prospecting or detecting of objects, e.g. near-field detection, [G01V3/00](#)) [C9504]
- G01S13/88A . . [N: for robotics] [N0906]
- G01S13/88B . . [N: for altimeters (measuring height using barometric means [G01C5/06](#))] [N0906]
- G01S13/88C . . [N: for missile homing, autodirectors (missile guidance systems [F41G7/22](#))] [N0906]
- G01S13/88D . . [N: for ground probing (prospecting or detecting using electromagnetic waves [G01V3/12](#))] [N0906]
- G01S13/88E . . [N: for alarm systems (alarms with electrical actuation [G08B13/22](#))] [N0906]
- G01S13/88F . . [N: for detection of concealed objects, e.g. contraband or weapons] [N0905]
- G01S13/88F1 . . . [N: through wall detection] [N0905]
- G01S13/89 . . for mapping or imaging [C9504]
- G01S13/90 . . . using synthetic aperture techniques, [N: e.g. correcting range migration errors (compression in range per se [G01S13/28](#); platform motion compensation for AMTI [G01S13/524B](#))]
- G01S13/90B [N: with optical processing of the SAR signals]
- G01S13/90C [N: with frequency domain processing of the SAR signals in azimuth ([G01S13/90B](#) takes precedence)]
- G01S13/90D [N: with time domain processing of the SAR signals in azimuth, e.g. time focusing ([G01S13/90B](#) takes precedence)]
- G01S13/90E [N: combined with monopulse or interferometric techniques (monopulse hybrid systems [G01S13/44K](#))]
- G01S13/90F [N: specially adapted for moving target detection (MTI per se [G01S13/52](#))]
- G01S13/90S [N: Particular SAR processing techniques not provided for elsewhere, e.g. squint mode, doppler beam-sharpening mode, spotlight mode, bistatic SAR, inverse SAR]
- G01S13/90T [N: Theoretical aspects] [N9610]
- G01S13/91 . . for traffic control ([G01S13/93](#) takes precedence) [C9504]
- G01S13/91B . . . [N: for landing purposes]

- G01S13/92 . . . for velocity measurement [C9504]
- G01S13/93 . . . for anti-collision purposes [C9504]
- G01S13/93A . . . [N: between aircraft or spacecraft in flight, e.g. secant (terrain-avoidance systems [G01S13/94](#))]
- G01S13/93B . . . [N: between marine crafts; between marine crafts and fixed obstacles]
- G01S13/93C . . . [N: between land vehicles; between land vehicles and fixed obstacles]
- G01S13/94 . . . for terrain-avoidance [C9504]
- G01S13/95 . . . for meteorological use [C9504]
- G01S13/95A . . . [N: ground based]
- G01S13/95B . . . [N: mounted on aircraft]
- G01S13/95C . . . [N: mounted on satellite]
- G01S13/95D . . . [N: mounted on ship or other platform]
- G01S13/95T . . . [N: Theoretical aspects] [N9610]

G01S15/00 **Systems using the reflection or reradiation of acoustic waves, e.g. sonar systems**
[C9411]

Note

The note after group [G01S13/00](#) also applies to this group

- G01S15/00B . . . [N: Bistatic sonar systems; Multistatic sonar systems] [N0505]
- G01S15/00T . . . [N: Theoretical aspects] [N9611]
- G01S15/02 . . . using reflection of acoustic waves ([G01S15/66](#) takes precedence) [C9411]
- G01S15/02C . . . [N: Combination of sonar systems with non-sonar or non-radar systems, e.g. with direction finder]
- G01S15/04 . . . Systems determining presence of a target
- G01S15/06 . . . Systems determining the position data of a target
- G01S15/08 Systems for measuring distance only (indirect measurement [G01S15/46](#))
- G01S15/10 using transmission of interrupted pulse-modulated waves (determination of distance by phase measurement [G01S15/32](#))
- G01S15/10D [N: Particularities of the measurement of distance ([G01S15/12](#), [G01S15/14](#), and [G01S15/18](#) take precedence)]
- G01S15/10F [N: using transmission of pulses having some particular characteristics]
- G01S15/10F1 [N: wherein the transmitted pulses use a frequency- or phase-modulated carrier wave]
- G01S15/10F2 [N: using irregular pulse repetition frequency]
- G01S15/10F3 [N: using frequency agility of carrier wave]
- G01S15/10F4 [N: using more than one pulse per sonar period]
- G01S15/12 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
- G01S15/14 wherein a voltage or current pulse is initiated and terminated in accordance respectively with the pulse transmission and echo reception
- G01S15/18 wherein range gates are used

- G01S15/32 using transmission of continuous unmodulated waves, amplitude-, frequency-, or phase-modulated waves
- G01S15/32C [N: using transmission of coded signals, e.g. of phase-shift keyed (PSK) signals] [N0210]
- G01S15/34 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
- G01S15/36 with phase comparison between the received signal and the contemporaneously transmitted signal
- G01S15/42 Simultaneous measurement of distance and other co-ordinates ([indirect measurement G01S15/46](#))
- G01S15/46 Indirect determination of position data
- G01S15/50 Systems of measurement, based on relative movement of the target
- G01S15/52 Discriminating between fixed and moving objects or between objects moving at different speeds
- G01S15/52B [N: for presence detection (burglar, theft or intruder alarms [G08B13/00](#), e.g. [G08B13/16](#))]
- G01S15/52B1 [N: by comparing echos in different sonar periods]
- G01S15/58 Velocity or trajectory determination systems; Sense-of-movement determination systems [N: ([velocity measurement in imaging systems G01S15/89D7](#))] [C9411]
- G01S15/58E [N: using transmission of interrupted pulse-modulated waves and based upon the Doppler effect resulting from movement of targets] [N9411]
- G01S15/58E2 [N: with measures taken for suppressing velocity ambiguities, i.e. anti-aliasing] [N9411]
- G01S15/58F [N: using transmission of continuous unmodulated waves, amplitude-, frequency-, or phase-modulated waves and based upon the Doppler effect resulting from movement of targets] [N9411]
- G01S15/58L [N: measuring the velocity vector] [N9411]
- G01S15/60 wherein the transmitter and receiver are mounted on the moving object, e.g. for determining ground speed, drift angle, ground track
- G01S15/62 Sense-of-movement determination [N: ([G01S15/58L takes precedence](#))] [C9411]
- G01S15/66 Sonar tracking systems
- G01S15/74 Systems using reradiation of acoustic waves, e.g. IFF, i.e. identification of friend or foe [N: ([teaching or practice apparatus for gun-arming or gun-laying using reflecting targets or active targets F41G3/26](#))]
- G01S15/87 Combinations of sonar systems
- G01S15/87C [N: Combination of several systems for attitude determination ([using inertial means G01C9/00](#), [control of attitude G05D1/08](#))]
- G01S15/87D [N: Combination of several spaced transponders or reflectors of known location for determining the position of a receiver ([G01S15/87C takes precedence](#))]
- G01S15/87E [N: Combination of several spaced transmitters or receivers of known location for determining the position of a transponder or a reflector ([G01S15/87C takes precedence](#))]
- G01S15/87E1 [N: wherein transceivers are operated, either sequentially or simultaneously, both in bi-static and in mono-static mode, e.g. cross-echo mode] [N1204]

- G01S15/88 Sonar systems specially adapted for specific applications ([seismic or acoustic prospecting or detecting G01V1/00](#)) [C9411]
- G01S15/88B [N: Meteorological systems]
- G01S15/89 for mapping or imaging [C9411]
- G01S15/89B [N: Side-looking sonar]
- G01S15/89B1 [N: using synthetic aperture techniques]
- G01S15/89D [N: Short-range imaging systems; Acoustic microscope systems using pulse-echo techniques]
- G01S15/89D1 [N: using a static transducer configuration ([sound-focusing or directing per se G10K11/26](#))] [C0208]
- G01S15/89D1A [N: using a single transducer for transmission and reception]
- G01S15/89D1B [N: using separate transducers for transmission and reception]
- G01S15/89D1C [N: using a transducer array] [N1204]
- G01S15/89D1C1 [N: the array being linear] [N1204]
- G01S15/89D1C2 [N: the array being curvilinear] [N1204]
- G01S15/89D1C3 [N: the array being concentric or annular] [N1204]
- G01S15/89D1C4 [N: the array being a two-dimensional transducer configuration, i.e. matrix or orthogonal linear arrays] [N1204]
- G01S15/89D1C5 [N: using simultaneously or sequentially two or more subarrays or subapertures] [N1204]
- G01S15/89D1G [N: using a three-dimensional transducer configuration]
- G01S15/89D1H [N: co-operating with moving reflectors]
- G01S15/89D2 [N: using a dynamic transducer configuration ([mounting transducers, e.g. provided with mechanical moving or orienting device per se G10K11/00G](#))]
- G01S15/89D2A [N: using transducers mounted for mechanical movement in three dimensions]
- G01S15/89D2B [N: using transducers mounted for mechanical movement in two dimensions]
- G01S15/89D2B1 [N: by rotation about a single axis]
- G01S15/89D2B1A {7 dots} [N: co-operating with reflectors]
- G01S15/89D2C [N: using transducers mounted for linear mechanical movement]
- G01S15/89D2D [N: using transducers movable by (electro)magnetic means]
- G01S15/89D3 [N: characterised by the transmitted frequency spectrum]
- G01S15/89D3A [N: using discrete, multiple frequencies]
- G01S15/89D3B [N: using a broad-band spectrum]
- G01S15/89D3C [N: using frequencies at or above 20 MHz] [N1204]
- G01S15/89D4 [N: using coded signals for correlation purposes]
- G01S15/89D4B [N: using pulse compression] [N1204]
- G01S15/89D4D [N: using pulse inversion] [N1204]
- G01S15/89D5 [N: using acousto-optical or acousto-electronic conversion techniques]
- G01S15/89D5A [N: using acoustical modulation of a light beam ([acousto-optical light control devices G02F1/11, G02F1/33](#))]
- G01S15/89D5B [N: using application of holographic techniques (holography per se G03H)]

- G01S15/89D5B1 [N: with optical reconstruction of the image]
- G01S15/89D5C [N: using acoustical image/electron beam converter tubes (tubes therefor [H01J31/495](#))]
- G01S15/89D6 [N: using special techniques for image reconstruction, e.g. FFT, geometrical transformations, spatial deconvolution, time deconvolution (digital image processing per se [G06T1/00](#))]
- G01S15/89D7 [N: Combined Doppler and pulse-echo imaging systems]
- G01S15/89D7A [N: Discriminating between fixed and moving objects or between objects moving at different speeds, e.g. wall clutter filter] [N0304]
- G01S15/89D7B [N: Measuring the velocity vector] [N1204]
- G01S15/89D7C [N: with measures taken for suppressing velocity ambiguities, i.e. anti-aliasing] [N1204]
- G01S15/89D7D [N: Colour Doppler imaging] [N1204]
- G01S15/89D8 [N: Combination of imaging systems with ancillary equipment]
- G01S15/89D9 [N: Three dimensional imaging systems] [N9811]
- G01S15/89D10 [N: Combining images from different aspect angles, e.g. spatial compounding] [N0201]
- G01S15/89D11 [N: using synthetic aperture techniques] [N1204]
- G01S15/93 . . . for anti-collision purposes [C9411]
- G01S15/93C . . . [N: between land vehicles; between land vehicles and fixed obstacles][N0505]
- G01S15/96 . . . for locating fish [C9411]

G01S17/00 **Systems using the reflection or reradiation of electromagnetic waves other than radio waves, e.g. lidar systems** (photogrammetry or videogrammetry [G01C11/00](#)) [C0410]

Note

The note after group [G01S13/00](#) also applies to this group.

- G01S17/00B . . [N: Bistatic lidar systems; Multistatic lidar systems] [N0505]
- G01S17/00T . . [N: Theoretical aspects] [N9611]
- G01S17/02 . . Systems using the reflection of electromagnetic waves other than radio waves ([G01S17/66](#) takes precedence)
- G01S17/02C . . [N: Combination of lidar systems, with systems other than lidar, radar or sonar, e.g. with direction finder]
- G01S17/02D . . [N: for detecting the presence of an object]
- G01S17/06 . . Systems determining position data of a target
- G01S17/08 . . . for measuring distance only (indirect measurement [G01S17/46](#); active triangulation systems [G01S17/48](#); passive systems using a parallactic triangle [G01C3/10](#), [G01C3/22](#), [G01C3/24](#), [G01C3/26](#)) [C0410]
- G01S17/10 using transmission of interrupted pulse-modulated waves (determination of distance by phase measurements [G01S17/32](#))
- G01S17/10B [N: wherein the transmitted pulses use a frequency- or phase modulated carrier wave, e.g. for pulse compression of received signals]
- G01S17/10C [N: wherein a voltage or current pulse is initiated and terminated in accordance respectively with the pulse transmission and echo-reception, e.g. using counters]

- G01S17/10G [N: wherein range gates are used]
- G01S17/32 using transmission of continuous unmodulated waves, amplitude-, frequency-, or phase-modulated waves
- G01S17/32B [N: 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]
- G01S17/36 with phase comparison between the received signal and the contemporaneously transmitted signal
- G01S17/42 Simultaneous measurement of distance and other co-ordinates (indirect measurement [G01S17/46](#))
- G01S17/46 Indirect determination of position data
- G01S17/48 Active triangulation systems, i.e. using the transmission and reflection of electromagnetic waves other than radio waves (passive systems using a parallactic triangle [G01C3/10](#), [G01C3/22](#), [G01C3/24](#), [G01C3/26](#); active systems for automatic generation of focusing signals [G02B7/32](#)) [N0410]
- G01S17/50 Systems of measurement based on relative movement of target
- G01S17/58 Velocity or trajectory determination systems; Sense-of-movement determination systems
- G01S17/66 Tracking systems using electromagnetic waves other than radio waves
- G01S17/74 Systems using reradiation of electromagnetic waves other than radio waves, e.g. IFF, i.e. identification of friend or foe [N: (teaching or practice apparatus for gun-arming or gun-laying using reflecting targets or active targets [F41G3/26](#))]
- G01S17/87 Combinations of systems using electromagnetic waves other than radio waves
- G01S17/87C [N: Combination of several systems for attitude determination]
- G01S17/88 Lidar systems specially adapted for specific applications [C9509]
- G01S17/89 for mapping or imaging [N9509]
- G01S17/89S [N: using synthetic aperture techniques] [N0707]
- G01S17/93 for anti-collision purposes [N9509]
- G01S17/93A [N: between aircrafts or spacecrafts; between aircrafts or spacecrafts and fixed obstacles] [N0505]
- G01S17/93C [N: between land vehicles; between land vehicles and fixed obstacles] [N0505]
- G01S17/95 for meteorological use [N9509]

G01S19/00 **Satellite radio beacon positioning systems; Determining position, velocity or attitude using signals transmitted by such systems [N1003]**

[N: **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
-]

- G01S19/01 Satellite radio beacon positioning systems transmitting time-stamped messages, e.g. GPS [Global Positioning System], GLONASS [Global Orbiting Navigation Satellite

- System] or GALILEO [N1003]
- G01S19/01J . . [N: Arrangements for jamming, spoofing or other methods of denial of service of such systems] [N1111]
 - G01S19/02 . . Details of the space or ground control segments [N1003]
 - G01S19/03 . . Cooperating elements; Interaction or communication between different cooperating elements or between cooperating elements and receivers [N1003]
- Notes**
- 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.
- G01S19/04 . . . providing carrier phase data [N1003]
 - G01S19/05 . . . providing aiding information [N1003]
 - G01S19/06 employing an initial estimate of the location of the receiver as aiding data or in generating aiding data [N1003]
 - G01S19/07 . . . providing data for correcting measured positioning data, e.g. DGPS [differential GPS] or ionosphere corrections [N1003]
 - G01S19/08 . . . providing integrity information, e.g. health of satellites or quality of ephemeris data [N1003]
 - G01S19/09 . . . providing processing capability normally carried out by the receiver [N1003]
 - G01S19/10 . . . providing dedicated supplementary positioning signals [N1003]
 - G01S19/11 wherein the cooperating elements are pseudolites or satellite radio beacon positioning system signal repeaters [N1003]
 - G01S19/12 wherein the cooperating elements are telecommunication base stations [N1003]
 - G01S19/13 . . Receivers [N1003]
 - G01S19/14 . . . specially adapted for specific applications [N1003]
 - G01S19/15 Aircraft landing systems [N1003]
 - G01S19/16 Anti-theft; Abduction [N1003]
 - G01S19/17 Emergency applications [N1003]
 - G01S19/18 Military applications [N1003]
 - G01S19/19 Sporting applications [N1003]
 - G01S19/20 . . . Integrity monitoring, fault detection or fault isolation of space segment [N1003]
 - G01S19/21 . . . interference related issues; [N: Issues related to cross-correlation, spoofing or other methods of denial of service (interference-related aspects in spread spectrum receivers per se [H04B1/7097](#))] [N1003] [C1111]
 - G01S19/21S [N: issues related to spoofing] [N1205]
 - G01S19/22 . . . Multipath-related issues [N1003]
 - G01S19/23 . . . Testing, monitoring, correcting or calibrating of receiver elements [N1003]
 - G01S19/23C [N: Calibration of receiver components] [N1003]
 - G01S19/24 . . . Acquisition or tracking [N: or demodulation] of signals transmitted by the system [N: (synchronisation aspects of direct sequence spread spectrum modulation [H04B1/7073](#))] [N1003] [C1111]
 - G01S19/24D [N: Demodulation of navigation message] [N1111]
 - G01S19/24W [N: involving long acquisition integration times, extended snapshots of signals or methods specifically directed towards weak signal acquisition] [N1111]

- G01S19/25 involving aiding data received from a cooperating element, e.g. assisted GPS [N1003]
- G01S19/25A [N: Employing an initial estimate of location in generating assistance data] [N1003]
- G01S19/25B [N: relating to Doppler shift of satellite signals] [N1003]
- G01S19/25C [N: relating to timing, e.g. time of week, code phase, timing offset] [N1003]
- G01S19/25D [N: relating to the satellite constellation, e.g. almanac, ephemeris data, lists of satellites in view] [N1003]
- G01S19/26 involving a sensor measurement for aiding acquisition or tracking [N1003]
- G01S19/27 creating, predicting or correcting ephemeris or almanac data within the receiver [N1003]
- G01S19/28 Satellite selection [N1003]
- G01S19/29 carrier, [N: including Doppler,] related [N: (G01S19/24W takes precedence)] [N1003] [C1111]
- G01S19/30 code related [N: (G01S19/24W takes precedence)] [N1003] [C1111]
- G01S19/31 Acquisition or tracking of other signals for positioning [N1003]
- G01S19/32 Multimode operation in a single same satellite system, e.g. GPS L1/L2 [N1003]
- G01S19/33 Multimode operation in different systems which transmit time stamped messages, e.g. GPS/GLONASS [N1003]
- G01S19/34 Power consumption [N1003]
- G01S19/35 Constructional details or hardware or software details of the signal processing chain [N1003]
- G01S19/36 relating to the receiver frond end [N1003]
- G01S19/37 Hardware or software details of the signal processing chain [N1003]
- G01S19/38 Determining a navigation solution using signals transmitted by a satellite radio beacon positioning system [N1003]
- G01S19/39 the satellite radio beacon positioning system transmitting time-stamped messages, e.g. GPS [Global Positioning System], GLONASS [Global Orbiting Navigation Satellite System] or GALILEO [N1003]
- G01S19/40 Correcting position, velocity or attitude [N1003]
- G01S19/41 Differential correction, e.g. DGPS [differential GPS] [N1003]
- G01S19/42 Determining position [N1003]
- G01S19/42A [N: 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] [N1111]
- G01S19/42A1 [N: by combining or switching between position solutions derived from different satellite radio beacon positioning systems] [N1111]
- G01S19/42A2 [N: by combining or switching between signals derived from different satellite radio beacon positioning systems] [N1111]
- G01S19/42A3 [N: by combining or switching between position solutions or signals derived from different modes of operation in a single system] [N1111]
- G01S19/42M [N: using multipath or indirect path propagation signals in position determination] [N1111]
- G01S19/43 using carrier phase measurements, e.g. kinematic positioning; using long or short baseline interferometry [N1003]

- G01S19/44 Carrier phase ambiguity resolution; Floating ambiguity; LAMBDA [Least-squares AMBiguity Decorrelation Adjustment] method [N1003]
- G01S19/45 by combining measurements of signals from the satellite radio beacon positioning system with a supplementary measurement [N1003]
- G01S19/46 the supplementary measurement being of a radio-wave signal type [N1003]
- G01S19/47 the supplementary measurement being an inertial measurement, e.g. tightly coupled inertial [N1003]
- G01S19/48 by combining or switching between position solutions derived from the satellite radio beacon positioning system and position solutions derived from a further system [N1003]
- G01S19/49 whereby the further system is an inertial position system, e.g. loosely-coupled [N1003]
- G01S19/50 whereby the position solution is constrained to lie upon a particular curve or surface, e.g. for locomotives on railway tracks [N1003]
- G01S19/51 Relative positioning [N1003]
- G01S19/52 Determining velocity [N1003]
- G01S19/53 Determining attitude [N1003]
- G01S19/54 using carrier phase measurements; using long or short baseline interferometry [N1003]
- G01S19/55 Carrier phase ambiguity resolution; Floating ambiguity; LAMBDA [Least-squares AMBiguity Decorrelation Adjustment] method [N1003]