CPC COOPERATIVE PATENT CLASSIFICATION

B60W CONJOINT CONTROL OF VEHICLE SUB-UNITS OF DIFFERENT TYPE OR DIFFERENT FUNCTION; CONTROL SYSTEMS SPECIALLY ADAPTED FOR HYBRID VEHICLES; ROAD VEHICLE DRIVE CONTROL SYSTEMS FOR PURPOSES NOT RELATED TO THE CONTROL OF A PARTICULAR SUB-UNIT

NOTE

(1) This subclass does not cover the control of a single sub-unit; such control is classified in the relevant place for the sub-unit, e.g. F02D , F16H . Where a single sub-unit is controlled by means of signals or commands from other sub-units, the control of this single sub-unit is classified in the relevant place for this sub-unit. For example, the control of variable-ratio gearing by means of signals from the engine or the accelerator is classified in the subclass for gearing, F16H .
(2) Conjoint control of driveline units, e.g. engines, and variable-ratio gearing occurring only transiently during ratio shift and being also characterised by the control of the gearing is also classified in the subclass for gearing, F16H .
(3) In groups B60W 20/00 - B60W 50/00, the first place priority rule is applied, i.e. at each hierarchical level, classification is made in the first appropriate place.
(4) When classifying in group B60W 10/00, classification must also be made in groups B60W 20/00-B60W 50/00 in order to identify the purpose or use of the control.
(5) In this subclass, the following terms are used with the meanings indicated:
- "conjoint control" means that a programmed or condition-responsive { main } automatic controller on board the vehicle, embodying control logic for vehicle sub-units of different type or different function, sends control signals to actuators of two or more vehicle sub-units, { three or more vehicle sub-units for groups B60W 30/00-30/16 }, so that the sub-units act together to solve a particular problem or in response to a paticular driving condition, { in order to improve stability, comfort or safety by managing the global dynamics of the vehicle };
- "drive control system" means an electronic system in a road vehicle for automatically controlling the movement { by managing the global dynamics } of that vehicle in order to take certain actions { in order to improve stability, comfort or safety };
- "road vehicle" means a { motorised passenger } vehicle normally under the control of a human driver for transportation on roads, e.g. an automobile, truck or bus;
- "sub-unit" means one of the following vehicle systems: { driveline systems, e.g. } propulsion system, clutch system, change-speed gearing system, system for distributing drive torque between front and rear axles, axle differential system, brake system, steering system, suspension system, { and, particularly for hybrid vehicles, } energy storage means, fuel cells, or auxiliary equipment.

Guidance heading:

B60W 10/00 **Conjoint control of vehicle sub-units of different type or different function** (for propulsion of purely electrically-propelled vehicles with power supplied within the vehicle B60L 11/00)

NOTE

When classifying in this group, each controlled sub-unit must be separately

identified by a classification in a relevant place in this group.

B60W 10/02 . including control of driveline clutches

B60W 10/023 . . { Fluid clutches, e.g. torque converters }

B60W 10/026 . . { Clutches for bridging a fluid gearing, e.g. lock-up }

B60W 10/04 . including control of propulsion units

B60W 10/06 . . including control of combustion engines

B60W 10/08 . . including control of electric propulsion units, e.g. motors or generators

B60W 10/10 . including control of change-speed gearings

B60W 10/101 . . Infinitely variable gearings

B60W 10/103 . . . of fluid type

B60W 10/105 . . . of electric type

B60W 10/107 . . . with endless flexible members

B60W 10/108 . . . Friction gearings

B60W 10/109 . . . . of the toroïd type

B60W 10/11 . . Stepped gearings

B60W 10/111 . . . with separate change-speed gear trains arranged in series

B60W 10/113 . . . with two input flow paths, e.g. double clutch transmission selection of one of the torque flow paths by the corresponding input clutch

B60W 10/115 . . . with planetary gears

B60W 10/119 . including control of all-wheel-driveline means, e.g. transfer gears or clutches for dividing torque between front and rear axle (B60W 10/14 takes precedence)

B60W 10/12 . including control of differentials

B60W 10/14 . . Central differentials for dividing torque between front and rear axles

B60W 10/16 . . Axle differentials, e.g. for dividing torque between left and right wheels

B60W 10/18 . including control of braking systems

B60W 10/182 . . { including control of parking brakes }

B60W 10/184 . . with wheel brakes

B60W 10/188 . . . hydraulic brakes

WARNING

this group is not complete pending a reorganisation, see also B60W 10/184

B60W 10/192 . . . electric brakes

WARNING

this group is not complete pending a reorganisation, see also

10/184

B60W 10/196 . . acting within the driveline, e.g. retarders

B60W 10/198 . . with exhaust brakes

B60W 10/20 . including control of steering systems

B60W 10/22 . including control of suspension systems

B60W 10/24 . including control of energy storage means

B60W 10/26 . . for electrical energy, e.g. batteries or capacitors

B60W 10/28 . including control of fuel cells

B60W 10/30 . including control of auxiliary equipment, e.g. air-conditioning compressors or oil pumps

B60W 20/00 **Control systems specially adapted for hybrid vehicles, i.e. vehicles having two or more prime movers of more than one type, e.g. electrical and internal combustion motors, all used for propulsion of the vehicle**

NOTE

Classification is also made in B60K 6/04 for the different types of hybrid electric vehicles

B60W 20/10 . { controlling the power contribution of each of the prime movers to meet required power demand }

B60W 20/102 . . { using model predictive control [MPC } strategies, i.e. control methods based on models predicting performance]

B60W 20/104 . . { using control strategies considering route information }

B60W 20/106 . . { in order to stay within battery power input and output limits or to prevent overcharging or over-discharging }

B60W 20/1062 . . . { in conjunction with braking regeneration }

B60W 20/108 . . { Special control strategies to achieve a particular effect }

B60W 20/1082 . . . { Control strategies to reduce engine exhaust emissions }

B60W 20/1084 . . . { Control strategies to reduce noise }

B60W 20/1086 . . . { Control strategies to avoid aging of fuel }

B60W 20/1088 . . . { Control strategies to achieve boost-effect }

B60W 20/20 . { Control strategies including selection of hybrid configuration, e.g. selection between series or parallel configuration }

B60W 20/30 . { Control strategies including selection of transmission gear ratio }

B60W 20/40 . { controlling the transition between prime movers, i.e. engaging or disengaging a prime mover }

B60W 20/50 . { Control strategies for fault diagnosis, failsafe operation or limp home mode }

B60W 30/00 **Purposes of road vehicle drive control systems not related to the control of a particular sub-unit, e.g. of systems using conjoint control of vehicle sub-units,** { or advanced driver assistance systems for ensuring comfort, stability and safety or drive control systems for propelling or retarding the vehicle (anti-lock brake systems (ABS) B60T 8/00) }

B60W 30/02 . Control of vehicle driving stability

B60W 30/025 . . { related to comfort of drivers or passengers }

B60W 30/04 . . related to roll-over prevention

B60W 30/045 . . Improving turning performance

WARNING

This group is not complete pending a reorganisation, see also B60W 30/02

B60W 30/06 . Automatic manoeuvring for parking (controlling only the steering B62D 15/0285)

WARNING

B60W 30/06 and subgroups are not complete pending a reorganisation; see provisionally also group B62D 15/0285

B60W 30/08 . { Active safety systems } predicting or avoiding probable or impending collision { or attempting to minimise its consequences }

B60W 30/085 . . Taking automatic action to adjust vehicle attitude in preparation for collision, e.g. braking for nose dropping

B60W 30/09 . . Taking automatic action to avoid collision, e.g. braking and steering

B60W 30/095 . . Predicting travel path or likelihood of collision

B60W 30/0953 . . . { the prediction being responsive to vehicle dynamic parameters }

B60W 30/0956 . . . { the prediction being responsive to traffic or environmental parameters }

B60W 30/10 . Path keeping { (cruise control for automatically following a preceding vehicle B60W 30/16B) }

B60W 30/12 . . Lane keeping

B60W 30/14 . { Adaptive } cruise control

B60W 30/143 . . { Speed control (B60W 30/16 takes precedence) }

B60W 30/146 . . . { Speed limiting }

B60W 30/16 . . Control of distance between vehicles, e.g. keeping a distance to preceding vehicle

B60W 30/162 . . . { Speed limiting therefor }

B60W 30/165 . . . Automatically following the path of a preceding lead vehicle, e.g. "electronic tow-bar"

B60W 30/17 . . . with provision for special action when the preceding vehicle comes to a halt, e.g. stop and go

B60W 30/18 . Propelling the vehicle

WARNING

Subgroups of B60W 30/18 are note complete. Documents from B60K 41/00 and B60W 30/18 are in the process of being reorganised to the new groups

B60W 30/18009	. .	{ related to particular drive situations }
B60W 30/18018	. . .	{ Start-stop drive, e.g. in a traffic jam }
B60W 30/18027	. . .	{ Drive off, accelerating from standstill }
B60W 30/18036	. . .	{ Reversing }
B60W 30/18045	. . . .	{Rocking, i.e. fast change between forward and reverse }
B60W 30/18054	. . .	{ at stand still, e.g. engine in idling state (hill holding B60W 30/18118) }
B60W 30/18063	. . .	{ Creeping }
B60W 30/18072	. . .	{ Coasting }
B60W 30/181	. . .	{ Preparing for stopping }
B60W 30/18109	. . .	{ Braking }
B60W 30/18118	. . . .	{ Hill holding }
B60W 30/18127	. . . .	{ Regenerative braking }
B60W 30/18136	. . . .	{ Engine braking }
B60W 30/18145	. . .	{ Cornering }
B60W 30/18154	. . .	{ Approaching an intersection }
B60W 30/18163	. . .	{ Lane change; Overtaking manoeuvres }
B60W 30/18172	. .	{ Preventing, or responsive to skidding of wheels }
B60W 30/18181	. .	{ Propulsion control with common controlling member for diffent functions }
B60W 30/1819	. .	N: Propulsion control with control means using analogue circuits, relays or mechanical links]
B60W 30/182	. .	Selecting between different operative modes, e.g. comfort and performance modes
B60W 30/184	. .	Preventing damage resulting from overload or excessive wear of the driveline
B60W 30/1843	. . .	{ Overheating of driveline components (B60W 30/186 takes precedence) }
B60W 30/1846	. . .	{ Preventing of breakage of drive line components, e.g. parts of the gearing }
B60W 30/186	. . .	excessive wear or burn out of friction elements, e.g. clutches
B60W 30/188	. .	Controlling power parameters of the driveline, e.g. determining the required power
B60W 30/1882	. . .	{ characterised by the working point of the engine, e.g. by using engine output chart }
B60W 30/1884	. . .	{ Avoiding stall or overspeed of the engine }
B60W 30/1886	. . .	{ Controlling power supply to auxiliary devices }
B60W 30/1888	. . . .	{ Control of power take off (PTO) }
B60W 30/19	. .	Improvement of gear change, e.g. by synchronisation or smoothing gear shift
B60W 30/192	. .	Mitigating problems related to power-up or power-down of the driveline, e.g. start-up of a cold engine
B60W 30/194	. . .	related to low temperature conditions, e.g. high viscosity of hydraulic fluid
B60W 30/20	. .	Reducing vibrations in the driveline

B60W 40/00 **Estimation or calculation of** { non-directly measurable } **driving parameters for road vehicle drive control systems not related to the control of a particular sub unit,** {

e.g. by using mathematical models }

B60W 40/02 . related to ambient conditions
B60W 40/04 . . Traffic conditions [0605]
B60W 40/06 . . Road conditions [0605]
B60W 40/064 . . . Degree of grip
B60W 40/068 . . . Road friction coefficient
B60W 40/072 . . . Curvature of the road
B60W 40/076 . . . Slope angle of the road

B60W 40/08 . related to drivers or passengers
B60W 40/09 . . Driving style or behaviour

B60W 40/10 . related to vehicle motion
B60W 40/1005 . . { Driving resistance }
B60W 40/101 . . Side slip angle of tyre
B60W 40/103 . . Side slip angle of vehicle body
B60W 40/105 . . Speed
B60W 40/107 . . Longitudinal acceleration
B60W 40/109 . . Lateral acceleration
B60W 40/11 . . Pitch movement
B60W 40/112 . . Roll movement
B60W 40/114 . . Yaw movement

B60W 40/12 . related to parameters of the vehicle itself, { e.g. tyre models }
B60W 40/13 . . Load or weight

B60W 50/00 **Details of control systems for road vehicle drive control not related to the control of a particular sub-unit,** { e.g. process diagnostic or vehicle driver interfaces }

WARNING

New subgroups of IPC8 are not yet complete. Documents from B60K , in particular B60K 41/00 and subgroups, are in the process of being reclassified to the new groups

B60W 50/0097 . { Predicting future conditions }

B60W 50/0098 . { Details of control systems ensuring comfort, safety or stability not otherwise provided for }

B60W 50/02 . Ensuring safety in case of control system failures, e.g. by diagnosing, circumventing or fixing failures
B60W 50/0205 . . { Diagnosing or detecting failures; Failure detection models }
B60W 50/0225 . . { Failure correction strategy }

B60W 50/023 . . Avoiding failures by using redundant parts

B60W 50/029 . . Adapting to failures or work around with other constraints, e.g. circumvention by avoiding use of failed parts

B60W 50/032 . . Fixing failures by repairing failed parts, e.g. loosening a sticking valve

B60W 50/035 . . Bringing the control units into a predefined state, e.g. giving priority to particular actuators

B60W 50/038 . . Limiting the input power, torque or speed

B60W 50/04 . Monitoring the functioning of the control system

B60W 50/045 . . { Monitoring control system parameters }

B60W 50/06 . Improving the dynamic response of the control system, e.g. improving the speed of regulation or avoiding hunting or overshoot

B60W 50/08 . Interaction between the driver and the control system

B60W 50/082 . . { Selecting or switching between different modes of propelling (for selection of different gear shift modes B60W 30/18F) }

B60W 50/085 . . { Changing the parameters of the control units, e.g. changing limit values, working points by control input }

B60W 50/087 . . { where the control system corrects or modifies a request from the driver }

B60W 50/10 . . Interpretation of driver requests or demands

B60W 50/12 . . Limiting control by the driver depending on vehicle state, e.g. interlocking means for the control input for preventing unsafe operation

B60W 50/14 . . Means for informing the driver, warning the driver or prompting a driver intervention

B60W 50/16 . . . Tactile feedback to the driver, e.g. vibration or force feedback to the driver on the steering wheel or the accelerator pedal

Guidance heading:

B60W 2030/00 **Purposes of road vehicle drive control systems not related to the control of a particular sub-unit, e.g. of systems using conjoint control of vehicle sub-units,** { or advanced driver assistance systems for ensuring comfort, stability and safety or drive control systems for propelling or retarding the vehicle (anti-lock brake systems (ABS) B60T 8/00) }

B60W 2030/02 . Control of vehicle driving stability

B60W 2030/04 . . related to roll-over prevention

B60W 2030/041 . . . about the pitch axis

B60W 2030/043 . . . about the roll axis

B60W 2030/08 . { Active safety systems } predicting or avoiding probable or impending collision { or attempting to minimise its consequences }

B60W 2030/082 . . Vehicle operation after collision

B60W 2030/18 . Propelling the vehicle

WARNING

Subgroups of B60W 30/18 are note complete. Documents from B60K 41/00 and B60W 30/18 are in the process of being reorganised to the new groups

B60W 2030/18009 . . { related to particular drive situations }
B60W 2030/18072 . . . { Coasting }
B60W 2030/18081 . . . . With torque flow from driveshaft to engine, i.e. engine being driven by vehicle
B60W 2030/1809 . . . . Without torque flow between driveshaft and engine, e.g. with clutch disengaged or transmission in neutral
B60W 2030/20 . . Reducing vibrations in the driveline
B60W 2030/203 . . . related or induced by the clutch
B60W 2030/206 . . . related or induced by the engine

B60W 2040/00 **Estimation or calculation of** { non-directly measurable } **driving parameters for road vehicle drive control systems not related to the control of a particular sub unit,** { e.g. by using mathematical models }

B60W 2040/08 . related to drivers or passengers
B60W 2040/0809 . . Driver authorisation; Driver identical check
B60W 2040/0818 . . Inactivity or incapacity of driver
B60W 2040/0827 . . . due to sleepiness
B60W 2040/0836 . . . due to alcohol
B60W 2040/0845 . . . due to drugs
B60W 2040/0854 . . . due to driver cheating, e.g. to circumvent driver tests
B60W 2040/0863 . . . due to erroneous selection or response of the driver
B60W 2040/0872 . . Driver physiology
B60W 2040/0881 . . Seat occupation; Driver or passenger presence
B60W 2040/089 . . Driver voice

B60W 2040/12 . related to parameters of the vehicle itself, { e.g. tyre models }
B60W 2040/13 . . Load or weight
B60W 2040/1307 . . . Load distribution on each wheel suspension
B60W 2040/1315 . . . Location of the centre of gravity
B60W 2040/1323 . . . Moment of inertia of the vehicle body
B60W 2040/133 . . . . about the roll axis
B60W 2040/1338 . . . . about the pitch axis
B60W 2040/1346 . . . . about the yaw axis
B60W 2040/1353 . . . Moment of inertia of a sub-unit
B60W 2040/1361 . . . . the component being the engine
B60W 2040/1369 . . . . the component being the clutch
B60W 2040/1376 . . . . the component being the transmission
B60W 2040/1384 . . . . the component being the wheel
B60W 2040/1392 . . . Natural frequency of components

B60W 2050/00 **Details of control systems for road vehicle drive control not related to the control of a particular sub-unit,** { e.g. process diagnostic or vehicle driver interfaces }

WARNING

New subgroups of IPC8 are not yet complete. Documents from B60K , in particular B60K 41/00 and subgroups, are in the process of being reclassified to the new groups

B60W 2050/0001 . Details of the control system
B60W 2050/0002 .. Automatic control, details of type of controller or control system architecture
B60W 2050/0003 ... In analogue systems, e.g. continuous systems
B60W 2050/0004 ... In digital systems, e.g. discrete-time systems involving sampling
B60W 2050/0005 .... Processor details or data handling, e.g. memory registers or chip architecture
B60W 2050/0006 .... Digital architecture hierarchy
B60W 2050/0008 ... Feedback, closed loop systems or details of feedback error signal
B60W 2050/0009 .... Proportional differential (PD) controller
B60W 2050/001 .... Proportional integral (PI) controller
B60W 2050/0011 .... Proportional Integral Differential (PID) controller
B60W 2050/0012 ... Feedforward or open loop systems
B60W 2050/0013 ... Optimal controllers
B60W 2050/0014 ... Adaptive controllers
B60W 2050/0016 ... State machine analysis
B60W 2050/0017 ... Modal analysis, e.g. for determining system stability
B60W 2050/0018 ... Method for the design of a control system
B60W 2050/0019 .. Control system elements or transfer functions
B60W 2050/002 ... Integrating means
B60W 2050/0021 ... Differentiating means
B60W 2050/0022 ... Gains, weighting coefficients or weighting functions
B60W 2050/0024 .... Variable gains
B60W 2050/0025 .... Transfer function weighting factor
B60W 2050/0026 ... Lookup tables or parameter maps
B60W 2050/0027 ... Minimum/maximum value selectors
B60W 2050/0028 ... Mathematical models, e.g. for simulation
B60W 2050/0029 .... Mathematical model of the driver
B60W 2050/0031 .... Mathematical model of the vehicle
B60W 2050/0032 ..... Quarter vehicle model, i.e. only one vehicle corner
B60W 2050/0033 ..... Single-track, 2D vehicle model, i.e. two-wheel bicycle model
B60W 2050/0034 ..... Multiple-track, 2D vehicle model, e.g. four-wheel model
B60W 2050/0035 ..... Multiple-track, 3D vehicle model, e.g. including roll and pitch conditions
B60W 2050/0036 ..... Multiple-track, 3D multi-body vehicle model, e.g. combination of models for vehicle sub-units

B60W 2050/0037 .... Mathematical models of vehicle sub-units
B60W 2050/0039 ..... of the propulsion unit
B60W 2050/004 ..... of the clutch
B60W 2050/0041 ..... of the drive line
B60W 2050/0042 ... Transfer function lag; delays
B60W 2050/0043 .. Signal treatments, identification of variables or parameters, parameter estimation or state estimation
B60W 2050/0044 ... In digital systems
B60W 2050/0045 .... using databus protocols
B60W 2050/0047 ... Digital-analogue (D/A) or analogue-digital (A/D) conversion
B60W 2050/0048 ... Addition or subtraction of signals
B60W 2050/0049 .... Signal offset
B60W 2050/005 ... Sampling
B60W 2050/0051 .... combined with averaging
B60W 2050/0052 ... Filtering, filters
B60W 2050/0054 .... Cut-off filters, retarders, delaying means, dead zones, threshold values or cut-off frequency
B60W 2050/0055 ..... High-pass filters
B60W 2050/0056 ..... Low-pass filters
B60W 2050/0057 ... Frequency analysis, spectral techniques or transforms
B60W 2050/0058 ... Signal modulation for data transmission
B60W 2050/0059 ... Signal noise suppression
B60W 2050/006 ... Interpolation; Extrapolation

B60W 2050/0062 . Adapting control system settings
B60W 2050/0063 .. Manual parameter input, manual setting means, manual initialising or calibrating means (for vehicle control input means, control panels see B60K 37/00)
B60W 2050/0064 ... using a remote, e.g. cordless, transmitter or receiver unit, e.g. remote keypad or mobile phone
B60W 2050/0065 ... using a personalised data carrier, e.g. magnetic card, memory card or electronic ignition key
B60W 2050/0066 ... using buttons or a keyboard connected to the on-board processor
B60W 2050/0067 .... Confirmation by the driver
B60W 2050/0068 ... Giving intention of direction, e.g. by indicator lights, steering input
B60W 2050/007 .. Switching between manual and automatic parameter input, and vice versa
B60W 2050/0071 ... Controller overrides driver automatically
B60W 2050/0072 ... Controller asks driver to take over
B60W 2050/0073 ... Driver overrides controller
B60W 2050/0074 ... Driver shifts control to the controller, e.g. by pressing a button
B60W 2050/0075 .. Automatic parameter input, automatic initialising or calibrating means
B60W 2050/0077 ... involving external transmission of data to or from the vehicle
B60W 2050/0078 .... using Global Position System data
B60W 2050/0079 .... using telemetry
B60W 2050/008 ..... using data transmitted between vehicles, e.g. for platooning, control of

inter-vehicle distance

B60W 2050/0081 . . . . . using satellite communication

B60W 2050/0082 . . . for initialising the control system

B60W 2050/0083 . . . Setting, resetting, calibration

B60W 2050/0085 . . . . Setting or resetting initial positions

B60W 2050/0086 . . . . Recalibrating datum positions, e.g. by using check cycles

B60W 2050/0087 . . . . Resetting start and end points of actuator travel

B60W 2050/0088 . . . . Adaptive recalibration

B60W 2050/0089 . . . Historical data record of previous events

B60W 2050/009 . . . Priority selection

B60W 2050/0091 . . . . of control inputs

B60W 2050/0093 . . . . . of the engine

B60W 2050/0094 . . . . of control units

B60W 2050/0095 . . . Automatic control mode change

B60W 2050/0096 . . . . Control during transition between modes

B60W 2050/02 . Ensuring safety in case of control system failures, e.g. by diagnosing, circumventing or fixing failures

B60W 2050/0205 . . { Diagnosing or detecting failures; Failure detection models }

B60W 2050/021 . . . Means for detecting failure or malfunction

B60W 2050/0215 . . . Sensor drifts or sensor failures

B60W 2050/022 . . . Actuator failures

B60W 2050/029 . . Adapting to failures or work around with other constraints, e.g. circumvention by avoiding use of failed parts

B60W 2050/0292 . . . Fail-safe or redundant systems, e.g. limp-home or backup systems

B60W 2050/0295 . . . Inhibiting action of specific actuators or systems

B60W 2050/0297 . . . Control Giving priority to different actuators or systems

B60W 2050/04 . Monitoring the functioning of the control system

B60W 2050/041 . . Built in Test Equipment (BITE)

B60W 2050/043 . . . Testing equipment at KEY-ON

B60W 2050/045 . . { Monitoring control system parameters }

B60W 2050/046 . . . involving external transmission of data to or from the vehicle, e.g. via telemetry, satellite, Global Positioning System (GPS)

B60W 2050/048 . . . . displaying data transmitted between vehicles, e.g. for platooning, control of inter-vehicle distance

B60W 2050/06 . Improving the dynamic response of the control system, e.g. improving the speed of regulation or avoiding hunting or overshoot

B60W 2050/065 . . by reducing the computational load on the digital processor of the control computer

B60W 2050/08 . Interaction between the driver and the control system

B60W 2050/14 . . Means for informing the driver, warning the driver or prompting a driver intervention

B60W 2050/143 . . . Alarm means (B60W 50/16 takes precedence)

B60W 2050/146 . . . Display means

Guidance heading:

B60W 2300/00 **Indexing codes relating to the type of vehicle**

B60W 2300/10 . Buses
B60W 2300/105 . . Ambulances

B60W 2300/12 . Trucks; Load vehicles
B60W 2300/121 . . Fork lift trucks, Clarks
B60W 2300/123 . . Light trucks
B60W 2300/125 . . Heavy duty trucks
B60W 2300/126 . . . Multi-axles trucks
B60W 2300/128 . . . Silo or fluid transporting vehicles

B60W 2300/13 . Independent Multi-axle long vehicles
B60W 2300/135 . . Vehicles having wheels mounted on a vertical steerable column

B60W 2300/14 . Trailers, e.g. full trailers, caravans (relation between towing and towed vehicle L60W 410/96)
B60W 2300/145 . . Semi-trailers

B60W 2300/15 . Agricultural vehicles
B60W 2300/152 . . Tractors
B60W 2300/154 . . Boom carrying vehicles, e.g. for crop spraying
B60W 2300/156 . . Ridable lawn mowers
B60W 2300/158 . . Harvesters

B60W 2300/16 . Cranes

B60W 2300/17 . Construction vehicles, e.g. graders, excavators

B60W 2300/18 . Four-wheel drive vehicles
B60W 2300/185 . . Off-road vehicles

B60W 2300/26 . Military

B60W 2300/28 . Racing vehicles, e.g. Formula one cars
B60W 2300/285 . . Go-karts

B60W 2300/30 . Toys

B60W 2300/32 . Amphibious vehicles

B60W 2300/34 . Compact city vehicles
B60W 2300/345 . . Three wheelers not including single track vehicles

B60W 2300/36 . Cycles; Motorcycles; Scooters

B60W 2300/362 . . Buggies; Quads
B60W 2300/365 . . Scooters
B60W 2300/367 . . Tricycles

B60W 2300/38 . Wheelchairs; Perambulators

B60W 2300/40 . Carts, e.g. trolleys
B60W 2300/405 . . Golf carts

B60W 2300/42 . Loading ramps

B60W 2300/43 . Snowmobile

B60W 2300/44 . Tracked vehicles

B60W 2300/45 . Skid-steer

B60W 2300/46 . Variable track or wheelbase vehicles

B60W 2300/48 . Low or lowerable bed vehicles

B60W 2300/50 . Tilting frame vehicles

Guidance heading:

B60W 2400/00 Indexing codes relating to detected, measured or calculated conditions or factors

B60W 2420/00 Indexing codes relating to the type of sensors based on the principle of their operation

B60W 2420/10 . Transducer, e.g. piezoelectric elements

B60W 2420/20 . Resistance type, e.g. potentiometer as level indicator

B60W 2420/22 . Strain gauge
B60W 2420/225 . . Wheatstone bridge circuit

B60W 2420/24 . Capacitance type, e.g. as level indicator

B60W 2420/30 . Switches, e.g. mercury or ball type switches

B60W 2420/40 . Photo or light sensitive means, e.g. infrared sensors
B60W 2420/403 . . Image sensing, e.g. optical camera
B60W 2420/406 . . Fiber optic sensor

B60W 2420/42 . Image sensing, e.g. optical camera

B60W 2420/50 . Magnetic or electromagnetic sensors

B60W 2420/503 . . Hall effect or magnetoresistive, i.e. active wheel speed sensors
B60W 2420/506 . . Inductive sensors, i.e. passive wheel sensors

B60W 2420/52 . Radar, Lidar

B60W 2420/54 . Audio sensitive means, e.g. ultrasound

B60W 2420/60 . Doppler effect

B60W 2420/62 . Laser

B60W 2420/90 . Single sensor for two or more measurements
B60W 2420/905 . . the sensor being an xyz axis sensor

B60W 2422/00 Indexing codes relating to the special location or mounting of sensors

B60W 2422/10 . on a suspension arm

B60W 2422/20 . on or inside a spring
B60W 2422/202 . . the spring being a coil spring
B60W 2422/205 . . the spring being a pneumatic spring
B60W 2422/207 . . the spring being a leaf spring

B60W 2422/40 . on a damper

B60W 2422/50 . on a steering column

B60W 2422/70 . on the wheel or the tire

B60W 2422/80 . on wheel hub bearing

B60W 2422/90 . on bumper, e.g. collision sensor

B60W 2422/95 . Measuring the same parameter at multiple locations of the vehicle

B60W 2510/00 Input parameters relating to a particular sub-units

B60W 2510/02 . Clutches
B60W 2510/0208 . . Clutch engagement state, e.g. engaged or disengaged
B60W 2510/0216 . . . Clutch engagement rate
B60W 2510/0225 . . . Clutch actuator position
B60W 2510/0233 . . . of torque converter lock-up clutch
B60W 2510/0241 . . Clutch slip, i.e. difference between input and output speeds
B60W 2510/025 . . . Slip change rate
B60W 2510/0258 . . Clutch friction coefficient
B60W 2510/0266 . . Moment of inertia
B60W 2510/0275 . . Clutch torque

B60W 2510/0283 . . Clutch input shaft speed
B60W 2510/0291 . . Clutch temperature

B60W 2510/06 . Combustion engines, Gas turbines
B60W 2510/0604 . . Throttle position
B60W 2510/0609 . . . Throttle change rate
B60W 2510/0614 . . Position of fuel or air injector
B60W 2510/0619 . . . Air-fuel ratio
B60W 2510/0623 . . . Fuel flow rate
B60W 2510/0628 . . . Inlet air flow rate
B60W 2510/0633 . . Turbocharger state
B60W 2510/0638 . . Engine speed
B60W 2510/0642 . . . Idle condition
B60W 2510/0647 . . . Coasting condition
B60W 2510/0652 . . . Speed change rate
B60W 2510/0657 . . Engine torque
B60W 2510/0661 . . . Torque change rate
B60W 2510/0666 . . Engine power
B60W 2510/0671 . . Engine manifold pressure
B60W 2510/0676 . . Engine temperature
B60W 2510/068 . . Engine exhaust temperature
B60W 2510/0685 . . Engine crank angle
B60W 2510/069 . . Engine braking signal
B60W 2510/0695 . . Inertia

B60W 2510/08 . Electric propulsion units
B60W 2510/081 . . Speed
B60W 2510/082 . . . Speed change rate
B60W 2510/083 . . Torque
B60W 2510/084 . . . Torque change rate
B60W 2510/085 . . Power
B60W 2510/086 . . . Power change rate
B60W 2510/087 . . Temperature
B60W 2510/088 . . Inertia

B60W 2510/09 . Other types of propulsion units, e.g. fluid motors, or type not specified

B60W 2510/10 . Change speed gearings
B60W 2510/1005 . . Transmission ratio engaged
B60W 2510/101 . . . Transmission neutral state
B60W 2510/1015 . . Input shaft speed, e.g. turbine speed
B60W 2510/102 . . . Input speed change rate
B60W 2510/1025 . . Input torque
B60W 2510/103 . . . Input torque change rate

B60W 2510/1035 . . Input power
B60W 2510/104 . . Output speed
B60W 2510/1045 . . . Output speed change rate
B60W 2510/105 . . Output torque
B60W 2510/1055 . . . Output torque change rate
B60W 2510/106 . . Output power
B60W 2510/1065 . . . Transmission of zero torque
B60W 2510/107 . . Temperature
B60W 2510/1075 . . fluid pressure, e.g. oil pressure
B60W 2510/108 . . . pressure of control fluid
B60W 2510/1085 . . . pressure of working fluid
B60W 2510/109 . . Direction of power flow
B60W 2510/1095 . . Inertia

B60W 2510/12 . Differentials
B60W 2510/125 . . Locking status

B60W 2510/18 . Braking system
B60W 2510/182 . . Brake pressure, e.g. of fluid or between pad and disc
B60W 2510/184 . . Brake temperature, e.g. of fluid, pads or discs
B60W 2510/186 . . Status of parking brakes
B60W 2510/188 . . Parking lock mechanisms

B60W 2510/20 . Steering systems
B60W 2510/202 . . Steering torque
B60W 2510/205 . . Steering speed
B60W 2510/207 . . Oversteer or understeer

B60W 2510/22 . Suspension systems
B60W 2510/222 . . Stiffness
B60W 2510/225 . . Damping
B60W 2510/227 . . Oscillation frequency

B60W 2510/24 . Energy storage means
B60W 2510/242 . . for electrical energy
B60W 2510/244 . . . Charge state
B60W 2510/246 . . . Temperature
B60W 2510/248 . . . Age of storage means

B60W 2510/28 . Fuel cells
B60W 2510/285 . . Temperature

B60W 2510/30 . Auxiliary equipments
B60W 2510/305 . . Power absorbed by auxiliaries

B60W 2520/00 Input parameters relating to overall vehicle dynamics

B60W 2520/04 . Vehicle stop

B60W 2520/06 . Direction of travel

B60W 2520/10 . Longitudinal speed
B60W 2520/105 . . Longitudinal acceleration

B60W 2520/12 . Lateral speed
B60W 2520/125 . . Lateral acceleration

B60W 2520/14 . Yaw

B60W 2520/16 . Pitch

B60W 2520/18 . Roll

B60W 2520/20 . Sideslip angle

B60W 2520/22 . Articulation angle, e.g. between tractor and trailer

B60W 2520/26 . Wheel slip
B60W 2520/263 . . Slip values between front and rear axle
B60W 2520/266 . . Slip values between left and right wheel

B60W 2520/28 . Wheel speed

B60W 2520/30 . Wheel torque

B60W 2520/40 . Torque distribution
B60W 2520/403 . . between front and rear axle
B60W 2520/406 . . between left and right wheel

B60W 2530/00 Input parameters relating to other vehicle conditions or values

B60W 2530/10 . Weight

B60W 2530/12 . Catalyst or filter state

B60W 2530/14 . Historical data
B60W 2530/145 . . Mileage

B60W 2530/16 . Driving resistance

B60W 2530/18 . Distance travelled

B60W 2530/20 . Tyre data

B60W 2530/22 . Towing force

B60W 2540/00 **Input parameters relating to the driver**

B60W 2540/02 . Driver's voice

B60W 2540/04 . Driver selection, e.g. driver confirmation

B60W 2540/06 . Ignition switch

B60W 2540/10 . Accelerator pedal position
B60W 2540/103 . . Accelerator thresholds , e.g. kickdown
B60W 2540/106 . . Rate of change

B60W 2540/12 . Brake pedal position

B60W 2540/14 . Clutch pedal position

B60W 2540/16 . Ratio selector position
B60W 2540/165 . . Rate of change

B60W 2540/18 . Steering angle

B60W 2540/20 . Direction indicator values

B60W 2540/22 . Psychological state; Stress level or workload

B60W 2540/24 . Drug level, e.g. alcohol

B60W 2540/26 . Incapacity of driver

B60W 2540/28 . Identity of driver

B60W 2540/30 . Driving style

B60W 2550/00 **Input parameters relating to exterior conditions**

B60W 2550/10 . from obstacle detection

B60W 2550/12 . Ambient conditions, e.g. wind or rain

B60W 2550/13 . Altitude

B60W 2550/14 . Road conditions, road types or road features
B60W 2550/141 . . Type of road
B60W 2550/142 . . Road slope
B60W 2550/143 . . Road profile
B60W 2550/145 . . Road altitude
B60W 2550/146 . . Road curve radius

B60W 2550/147 . . Road bumpiness, e.g. pavement or potholes
B60W 2550/148 . . Coefficient of friction

B60W 2550/16 . Country codes

B60W 2550/20 . Traffic related input parameters
B60W 2550/22 . . Traffic rules, e.g. traffic signs
B60W 2550/30 . . Distance or speed relative to other vehicles
B60W 2550/302 . . . the longitudinal speed of preceding vehicle
B60W 2550/304 . . . the lateral speed of preceding vehicle
B60W 2550/306 . . . the position of preceding vehicle
B60W 2550/308 . . . Distance between vehicles

B60W 2550/40 . Involving external transmission of data to or from the vehicle
B60W 2550/402 . . for navigation systems
B60W 2550/404 . . using telemetry
B60W 2550/406 . . using satellite communication
B60W 2550/408 . . Data transmitted between vehicles

B60W 2560/00 Other vehicle related input parameters not covered by groups B60W 2510/00 to B60W 2550/00

B60W 2560/02 . Remaining fuel quantity in tank

B60W 2560/04 . Fuel quality, e.g. water content due to age of fuel

B60W 2560/06 . Fuel type

B60W 2600/00 Indexing codes relating to automatic control systems or control processes

B60W 2710/00 Output or target parameters relating to a particular sub-units

B60W 2710/02 . Clutches
B60W 2710/021 . . Clutch engagement state
B60W 2710/022 . . . Clutch actuator position
B60W 2710/023 . . . Clutch engagement rate
B60W 2710/024 . . . of torque converter lock-up clutch
B60W 2710/025 . . Clutch slip, i.e. difference between input and output speeds
B60W 2710/026 . . . Slip change rate
B60W 2710/027 . . Clutch torque
B60W 2710/028 . . Clutch input shaft speed
B60W 2710/029 . . Clutch temperature

B60W 2710/06 . Combustion engines, Gas turbines
B60W 2710/0605 . . Throttle position

B60W 2710/0611 . . . Throttle change rate
B60W 2710/0616 . . Position of fuel or air injector
B60W 2710/0622 . . . Air-fuel ratio
B60W 2710/0627 . . . Fuel flow rate
B60W 2710/0633 . . . Inlet air flow rate
B60W 2710/0638 . . Turbocharger state
B60W 2710/0644 . . Engine speed
B60W 2710/065 . . . Idle condition
B60W 2710/0655 . . . Coasting condition
B60W 2710/0661 . . . Speed change rate
B60W 2710/0666 . . Engine torque
B60W 2710/0672 . . . Torque change rate
B60W 2710/0677 . . Engine power
B60W 2710/0683 . . Engine manifold pressure
B60W 2710/0688 . . Engine temperature
B60W 2710/0694 . . Engine exhaust temperature

B60W 2710/08 . Electric propulsion units
B60W 2710/081 . . Speed
B60W 2710/082 . . . Speed change rate
B60W 2710/083 . . Torque
B60W 2710/085 . . . Torque change rate
B60W 2710/086 . . Power
B60W 2710/087 . . . Power change rate
B60W 2710/088 . . Temperature

B60W 2710/09 . Other types of propulsion units, e.g. fluid motors, or type not specified

B60W 2710/10 . Change speed gearings
B60W 2710/1005 . . Transmission ratio engaged
B60W 2710/1011 . . Input shaft speed, e.g. turbine speed
B60W 2710/1016 . . . Input speed change rate
B60W 2710/1022 . . Input torque
B60W 2710/1027 . . . Input torque change rate
B60W 2710/1033 . . Input power
B60W 2710/1038 . . Output speed
B60W 2710/1044 . . . Output speed change rate
B60W 2710/105 . . Output torque
B60W 2710/1055 . . . Output torque change rate
B60W 2710/1061 . . Output power
B60W 2710/1066 . . . Transmission of zero torque
B60W 2710/1072 . . Temperature
B60W 2710/1077 . . fluid pressure, e.g.oil pressure

B60W 2710/1083 . . . pressure of control fluid
B60W 2710/1088 . . . pressure of working fluid
B60W 2710/1094 . . Direction of power flow

B60W 2710/12 . Differentials
B60W 2710/125 . . Locking status

B60W 2710/18 . Braking system
B60W 2710/182 . . Brake pressure e.g. of fluid or between pad and disc
B60W 2710/184 . . Brake temperature, e.g. of fluid, pads or discs
B60W 2710/186 . . Status of parking brakes
B60W 2710/188 . . Parking lock mechanisms

B60W 2710/20 . Steering systems
B60W 2710/202 . . Steering torque
B60W 2710/205 . . Steering speed
B60W 2710/207 . . Steering angle of wheels

B60W 2710/22 . Suspension systems
B60W 2710/223 . . Stiffness
B60W 2710/226 . . Damping

B60W 2710/24 . Energy storage means
B60W 2710/242 . . for electrical energy
B60W 2710/244 . . . Charge state
B60W 2710/246 . . . Temperature
B60W 2710/248 . . . Current for loading or unloading

B60W 2710/28 . Fuel cells
B60W 2710/285 . . Temperature

B60W 2710/30 . Auxiliary equipments
B60W 2710/305 . . target power to auxiliaries

B60W 2720/00 Output or target parameters relating to overall vehicle dynamics

B60W 2720/10 . Longitudinal speed
B60W 2720/103 . . Speed profile
B60W 2720/106 . . Longitudinal acceleration

B60W 2720/12 . Lateral speed
B60W 2720/125 . . Lateral acceleration

B60W 2720/14 . Yaw

B60W 2720/16 . Pitch

B60W 2720/18 . Roll

B60W 2720/20 . Sideslip angle

B60W 2720/22 . Articulation angle, e.g. between tractor and trailer

B60W 2720/24 . Direction of travel

B60W 2720/26 . Wheel slip
B60W 2720/263 . . Slip values between front and rear axle
B60W 2720/266 . . Slip values between left and right wheel

B60W 2720/28 . Wheel speed

B60W 2720/30 . Wheel torque

B60W 2720/40 . Torque distribution
B60W 2720/403 . . between front and rear axle
B60W 2720/406 . . between left and right wheel

B60W 2750/00 Output or target parameters relating to exterior, e.g. between vehicles

B60W 2750/30 . Distance or speed in relation to other vehicles
B60W 2750/302 . . the longitudinal speed of preceding vehicle
B60W 2750/304 . . the lateral speed of preceding vehicle
B60W 2750/306 . . the position of preceding vehicle
B60W 2750/308 . . the distance between vehicles

B60W 2750/40 . Involving external transmission of data to or from the vehicle

B60W 2900/00 Indexing codes relating to the purpose of, or problem solved of road vehicle drive control systems not otherwise provided for in groups B60W 30/00