

CPC**COOPERATIVE PATENT CLASSIFICATION****B60T**

VEHICLE BRAKE CONTROL SYSTEMS OR PARTS THEREOF; BRAKE CONTROL SYSTEMS OR PARTS THEREOF, IN GENERAL (electrodynamic brake systems for vehicle, in general [B60L](#); brakes per se, i.e. devices where braking effect occurs, including ultimate brake actuators, [F16D](#)); **ARRANGEMENT OF BRAKING ELEMENTS ON VEHICLES IN GENERAL; PORTABLE DEVICES FOR PREVENTING UNWANTED MOVEMENT OF VEHICLES; VEHICLE MODIFICATIONS TO FACILITATE COOLING OF BRAKES**

NOTE

In this subclass, the term "brake control systems" includes brake control systems for vehicles or of general applicability

WARNING

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

[B60T 8/20](#) covered by [B60T 8/18](#)

[B60T 8/22](#) covered by [B60T 8/18](#)

[B60T 8/60](#) - [B60T 8/70](#) covered by [B60T 8/17](#)

[B60T 8/78](#) - [B60T 8/84](#) covered by [B60T 8/17](#)

[B60T 13/122](#) covered by [B60T 13/147](#), [B60T 13/167](#)

[B60T 13/125](#) covered by [B60T 13/141](#)

[B60T 13/128](#) covered by [B60T 13/145](#), [B60T 13/165](#)

[B60T 13/13](#) covered by [B60T 13/146](#), [B60T 13/166](#)

[B60T 13/132](#) covered by [B60T 13/143](#), [B60T 13/162](#)

[B60T 13/135](#) covered by [B60T 13/144](#), [B60T 13/163](#)

[B60T 13/138](#) covered by [B60T 13/148](#), [B60T 13/168](#)

[B60T 13/60](#) covered by [B60T 13/58](#)

[B60T 15/06](#) covered by [B60T 15/04](#)

[B60T 15/08](#) covered by [B60T 15/04](#)

B60T 1/00

Arrangements of braking elements, i.e. of those parts where braking effect occurs {specially for vehicles}

B60T 1/005

. {by locking of wheel or transmission rotation}

B60T 1/02

. acting by retarding wheels

B60T 1/04

.. acting directly on tread

B60T 1/06

.. acting otherwise than on tread, e.g. employing rim, drum, disc, or transmission {or on double wheels}

B60T 1/062

... {acting on transmission parts}

B60T 1/065

... {employing disc ([B60T 1/062](#) takes precedence)}

B60T 1/067

... {employing drum ([B60T 1/062](#) takes precedence)}

- B60T 1/08 . . . using fluid or powdered medium
- B60T 1/087 in hydrodynamic, i.e. non-positive displacement, retarders
- B60T 1/093 in hydrostatic, i.e. positive displacement, retarders
- B60T 1/10 . . . by utilising wheel movement for accumulating energy, e.g. driving air compressors
(using propulsion unit as braking means, see the relevant class)
- B60T 1/12 . . acting otherwise than by retarding wheels, e.g. jet action
- B60T 1/14 . . . directly on road (portable devices, e.g. chocks B60T 3/00)
- B60T 1/16 . . . by increasing air resistance, e.g. flaps

B60T 3/00 Portable devices for preventing unwanted movement of vehicles, e.g. chocks

B60T 5/00 Vehicle modifications to facilitate cooling of brakes

Brake control systems or parts thereof

B60T 7/00 Brake-action initiating means

- B60T 7/02 . . . for personal initiation
- B60T 7/04 foot actuated
- B60T 7/042 {by electrical means, e.g. using travel or force sensors}
- B60T 7/045 {with locking and release means, e.g. providing parking brake application}
- B60T 7/047 {Hand-actuated release means}
- B60T 7/06 Disposition of pedal
- B60T 7/065 {with means to prevent injuries in case of collision (for vehicle pedals in general by moving them from an operative to an out-of-the way position B60R 21/09)}
- B60T 7/08 hand actuated
- B60T 7/085 {by electrical means, e.g. travel, force sensors}
- B60T 7/10 Disposition of hand control
- B60T 7/101 {by means of a pull rod}
- B60T 7/102 {by means of a tilting lever}
- B60T 7/104 {with a locking mechanism}
- B60T 7/105 {the lock being released by means of a push button}
- B60T 7/107 {with electrical power assistance}
- B60T 7/108 {with mechanisms to take up slack in the linkage to the brakes}
- B60T 7/12 . . . for automatic initiation; for initiation not subject to will of driver or passenger {(limiting speed of vehicles other than rail vehicles B60K 31/00)}
- B60T 7/122 {for locking of reverse movement}
- B60T 7/124 . . . {Brakes for railway vehicles coming into operation in case of accident, derailment or damage of rolling stock or superstructure (self-acting brakes in general F16D 59/00)}
- B60T 7/126 . . . {Brakes for railway vehicles coming into operation in case of exceeding a predetermined speed (self-acting brakes in general F16D 59/00)}

- B60T 7/128 .. {Self-acting brakes of different types for railway vehicles ([B60T 7/12](#) takes precedence; self-acting brakes in general [F16D 59/00](#))}
- B60T 7/14 .. operated upon collapse of driver (deadman's devices for electrically propelled vehicles [B60L 3/02](#))
- B60T 7/16 .. operated by remote control, i.e. initiating means not mounted on vehicle
- B60T 7/18 ... operated by wayside apparatus
- B60T 7/20 .. specially for trailers, e.g. in case of uncoupling of {or overrunning by} trailer (inertia-actuated over-run brakes [B60T 13/08](#))
- B60T 7/203 ... {with automatic brake release or reduction in case of reverse travel, e.g. by means of mechanisms mounted on the draw bar}
- B60T 7/206 {by means of mechanisms mounted on trailer drum brakes}
- B60T 7/22 .. initiated by contact of vehicle, e.g. bumper, with an external object, e.g. another vehicle {, or by means of contactless obstacle detectors mounted on the vehicle}

B60T 8/00 Arrangements for adjusting wheel-braking force to meet varying vehicular or ground-surface conditions, e.g. limiting or varying distribution of braking force (by changing number of effective brake cylinders in power brake systems [B60T 17/10](#))

- B60T 8/17 . Using electrical or electronic regulation means to control braking {(detecting or indicating faulty operation [B60T 8/885](#))}
- B60T 8/1701 .. {Braking or traction control means specially adapted for particular types of vehicles (for vehicles having more than one drive axle [B60T 8/1769](#))}
- B60T 8/1703 ... {for aircrafts}
- B60T 8/1705 ... {for rail vehicles}
- B60T 8/1706 ... {for single-track vehicles, e.g. motorcycles}
- B60T 8/1708 ... {for lorries or tractor-trailer combinations}
- B60T 8/171 .. Detecting parameters used in the regulation; Measuring values used in the regulation
- B60T 8/172 .. Determining control parameters used in the regulation, e.g. by calculations involving measured or detected parameters {(B60T 8/17551 takes precedence)}
- B60T 8/1725 ... {Using tyre sensors, e.g. Sidewall Torsion sensors [SWT] (for tyre pressure and temperature detection [B60C 23/00](#))}
- B60T 8/173 .. Eliminating or reducing the effect of unwanted signals, e.g. due to vibrations or electrical noise
- B60T 8/174 .. characterised by using special control logic, e.g. fuzzy logic {,neural computing}
- B60T 8/175 .. Brake regulation specially adapted to prevent excessive wheel spin during vehicle acceleration, e.g. for traction control (safety devices for propulsion unit control responsive to, or preventing, skidding of wheels [B60K 28/16](#))
- B60T 8/1755 .. Brake regulation specially adapted to control the stability of the vehicle, e.g. taking into account yaw rate or transverse acceleration in a curve (road vehicle drive control systems for control of driving stability otherwise than by controlling a particular sub-unit [B60W 30/02](#))
- B60T 8/17551 ... {determining control parameters related to vehicle stability used in the regulation, e.g. by calculations involving measured or detected parameters}
- B60T 8/17552 ... {responsive to the tire sideslip angle or the vehicle body slip angle}

B60T 8/17554	...	{specially adapted for enhancing stability around the vehicles longitudinal axle, i.e. roll-over prevention (road vehicle drive control systems for roll-over prevention otherwise than by controlling a particular sub-unit B60W 30/04)}
B60T 8/17555	...	{specially adapted for enhancing driver or passenger comfort, e.g. soft intervention or pre-actuation strategies}
B60T 8/17557	...	{specially adapted for lane departure prevention (road vehicle drive control systems for lane keeping otherwise than by controlling a particular sub-unit B60W 30/12)}
B60T 8/17558	...	{specially adapted for collision avoidance or collision mitigation (road vehicle drive control systems for collision avoidance otherwise than by controlling a particular sub-unit B60W 30/09)}
B60T 8/176	..	Brake regulation specially adapted to prevent excessive wheel slip during vehicle deceleration, e.g. ABS (B60T 8/1755 takes precedence)
B60T 8/1761	...	responsive to wheel or brake dynamics, e.g. wheel slip, wheel acceleration or rate of change of brake fluid pressure
B60T 8/17613	....	{based on analogue circuits or digital circuits comprised of discrete electronic elements}
B60T 8/17616	....	{Microprocessor-based systems}
B60T 8/1763	...	responsive to the coefficient of friction between the wheels and the ground surface (B60T 8/1764 takes precedence)
B60T 8/17633	....	{based on analogue circuits or digital circuits comprised of discrete electronic elements}
B60T 8/17636	....	{Microprocessor-based systems}
B60T 8/1764	...	Regulation during travel on surface with different coefficients of friction, e.g. between left and right sides, mu-split {or between front and rear}
B60T 8/1766	...	Proportioning of brake forces according to vehicle axle loads, e.g. front to rear of vehicle
B60T 8/1769	...	specially adapted for vehicles having more than one driven axle, e.g. four-wheel drive vehicles
B60T 8/18	.	responsive to vehicle weight or load, e.g. load distribution ({using electrical circuitry on regulation means B60T 8/17 ; } B60T 8/30 takes precedence; responsive to weight and speed condition B60T 8/58)

NOTE

[B60T 8/1887](#) and [B60T 8/1893](#) take precedence over [B60T 8/1806](#) to [B60T 8/1881](#)

B60T 8/1806	..	{characterised by the calibration process or the means therefor}
B60T 8/1812	..	{characterised by the means for pressure reduction}
B60T 8/1818	...	{Lever mechanism}
B60T 8/1825	...	{Means for changing the diaphragm area submitted to pressure}
B60T 8/1831	...	{pressure reducing or limiting valves}
B60T 8/1837	..	{characterised by the load-detecting arrangements}
B60T 8/1843	...	{Arrangements for detecting air spring pressure}
B60T 8/185	...	{Arrangements for detecting vehicle level}

- B60T 8/1856 . . . {Arrangements for detecting suspension spring load ([B60T 8/1843](#) takes precedence)}
- B60T 8/1862 {comprising sensors of the type providing a fluid output signal representing the load on the vehicle suspension}
- B60T 8/1868 {comprising sensors of the type providing a mechanical output signal representing the load on the vehicle suspension}
- B60T 8/1875 {comprising sensors of the type providing an electrical output signal representing the load on the vehicle suspension}
- B60T 8/1881 . . {characterised by failure-responsive means}
- B60T 8/1887 . . {especially adapted for tractor-trailer combinations}
- B60T 8/1893 . . {especially adapted for railway vehicles}
- B60T 8/24 . responsive to vehicle inclination or change of direction, e.g. negotiating bends {(using electrical circuitry or regulation means [B60T 8/17](#))}
- B60T 8/241 . . {Lateral vehicle inclination}
- B60T 8/243 . . . {for roll-over protection}
- B60T 8/245 . . {Longitudinal vehicle inclination}
- B60T 8/246 . . {Change of direction}
- B60T 8/248 . . {Trailer sway, e.g. for preventing jackknifing}
- B60T 8/26 . responsive to vehicle inclination or change of direction, e.g. negotiating bends {(using electrical circuitry or regulation means [B60T 8/17](#))}
- B60T 8/261 . . {specially adapted for use in motorcycles}
- B60T 8/262 . . {using valves with stepped characteristics ([B60T 8/261](#), [B60T 8/266](#) take precedence)}
- B60T 8/263 . . . {for pneumatic brake systems}
- B60T 8/265 . . . {for hydraulic brake systems}
- B60T 8/266 . . {using valves or actuators with external control means ([B60T 8/261](#) takes precedence)}
- B60T 8/267 . . . {for hybrid systems with different kind of brakes on different axles}
- B60T 8/268 . . . {using the valves of an ABS, ASR or ESP system}
- B60T 8/28 . responsive to deceleration {([B60T 8/261](#), [B60T 8/262](#), [B60T 8/266](#) take precedence)}
- B60T 8/282 . . . {using ball and ramp}
- B60T 8/285 . . . {using horizontal moving mass}
- B60T 8/287 . . . {using pendulums}
- B60T 8/30 . responsive to load {([B60T 8/261](#), [B60T 8/262](#), [B60T 8/266](#) take precedence)}
- B60T 8/303 . . . {using pneumatic valves}
- B60T 8/306 . . . {using hydraulic valves}
- B60T 8/32 . responsive to a speed condition, e.g. acceleration or deceleration {(using electrical circuitry or regulation means [B60T 8/17](#)) ; [B60T 8/28](#) takes precedence; electric devices on electrically propelled vehicles indicating the wheel slip [B60L 3/10](#); measuring linear or angular speed per se [G01P 3/00](#)}
- B60T 8/3205 . . {acceleration ([B60T 8/34](#), [B60T 8/52](#), [B60T 8/54](#), [B60T 8/56](#), [B60T 8/58](#), [B60T 8/72](#), [B60T 8/86](#), [B60T 8/88](#) take precedence)}

B60T 8/321	..	{deceleration (B60T 8/34 , B60T 8/52 , B60T 8/54 , B60T 8/56 , B60T 8/58 , B60T 8/72 , B60T 8/86 , B60T 8/88 take precedence)}
B60T 8/3215	...	{Systems characterised by having means acting on components of the drive line, e.g. retarder, clutch or differential gear (B60T 8/322 takes precedence)}
B60T 8/322	...	{Systems specially adapted for vehicles driven by more than one axle, e.g. Four Wheel-Drive vehicles}
B60T 8/3225	...	{Systems specially adapted for single-track vehicles, e.g. motorcycles (B60T 8/3235 takes precedence)}
B60T 8/323	...	{Systems specially adapted for tractor-trailer combinations}
B60T 8/3235	...	{Systems specially adapted for rail vehicles}
B60T 8/324	....	{Speed measurement by means of centrifugal governors or the like}
B60T 8/3245	....	{responsive to the speed difference between wheels and rail, or between two wheels or two axles}
B60T 8/325	...	{Systems specially adapted for aircraft}
B60T 8/3255	...	{Systems in which the braking action is dependent on brake pedal data}
B60T 8/326	....	{Hydraulic systems}
B60T 8/3265	.....	{with control of the booster (B60T 8/3275 takes precedence)}
B60T 8/327	....	{Pneumatic systems}
B60T 8/3275	....	{Systems with a braking assistant function, i.e. automatic full braking initiation in dependence of brake pedal velocity}
B60T 8/328	...	{Systems sharing components with other fluid systems onboard the vehicle}
B60T 8/3285	....	{the other fluid systems being suspension elements}
B60T 8/329	...	{Systems characterised by their speed sensor arrangements}
B60T 8/3295	...	{Systems in which there is a pulsating signal superposed on the command signal}
B60T 8/34	..	having a fluid pressure regulator responsive to a speed condition
B60T 8/341	...	{Systems characterised by their valves (B60T 8/36 , B60T 8/38 take precedence)}
B60T 8/342	....	{Pneumatic systems}
B60T 8/343	...	{Systems characterised by their lay-out (B60T 8/349 takes precedence)}
B60T 8/344	....	{Hydraulic systems}
B60T 8/345	.....	{having more than one brake circuit per wheel}
B60T 8/346	.....	{2 Channel systems (B60T 8/345 takes precedence)}
B60T 8/347	.....	{3 Channel systems (B60T 8/345 takes precedence)}
B60T 8/348	.....	{4 Channel systems (B60T 8/345 takes precedence)}
B60T 8/349	...	{Systems adapted to control a set of axles, e.g. tandem axles}
B60T 8/36	...	including a pilot valve responding to an electromagnetic force
B60T 8/3605	....	{wherein the pilot valve is mounted in a circuit controlling the working fluid system}
B60T 8/361	....	{wherein the pilot valve is mounted in a circuit controlling an auxiliary fluid system}
B60T 8/3615	....	{Electromagnetic valves specially adapted for anti-lock brake and traction control systems (electromagnetic valves in general F16K 31/06)}

B60T 8/362	.....	{in pneumatic systems (B60T 8/3655 , B60T 8/3675 and B60T 8/369 take precedence)}
B60T 8/3625	.....	{having at least one vacuum connection}
B60T 8/363	.....	{in hydraulic systems (B60T 8/3655 , B60T 8/3675 and B60T 8/369 take precedence)}
B60T 8/3635	.....	{switching between more than two connections, e.g. 3/2-valves (B60T 8/364 , B60T 8/3645 and B60T 8/365 take precedence)}
B60T 8/364	.....	{switching between a number of discrete positions as a function of the applied signal, e.g. 3/3-valves (B60T 8/3645 takes precedence)}
B60T 8/3645	.....	{having more than one electromagnetic coil inside a common housing}
B60T 8/365	.....	{combining a plurality of functions in one unit, e.g. pressure relief}
B60T 8/3655	.....	{Continuously controlled electromagnetic valves}
B60T 8/366	.....	{Valve details}
B60T 8/3665	.....	{Sliding valves}
B60T 8/367	.....	{Seat valves, e.g. poppet valves}
B60T 8/3675	.....	{integrated in modulator units}
B60T 8/368	.....	{combined with other mechanical components, e.g. pump units, master cylinders}
B60T 8/3685	.....	{characterised by the mounting of the modulator unit onto the vehicle}
B60T 8/369	.....	{Valves using piezo-electric elements (in general F16K 31/004)}
B60T 8/3695	....	{wherein the pilot valve is mounted separately from its power section (B60T 8/3605 , B60T 8/361 and B60T 8/3615 take precedence)}
B60T 8/38	...	including valve means of the relay or driver controlled type
B60T 8/40	...	comprising an additional fluid circuit including fluid pressurising means for modifying the pressure of the braking fluid, e.g. including wheel driven pumps for detecting a speed condition, or pumps which are controlled by means independent of the braking system
B60T 8/4004	....	{Repositioning the piston(s) of the brake control means by means of a fluid pressurising means in order to reduce the brake pressure}
B60T 8/4009	.....	{the brake control means being the wheel cylinders}
B60T 8/4013	....	{Fluid pressurising means for more than one fluid circuit, e.g. separate pump units used for hydraulic booster and anti-lock braking}
B60T 8/4018	....	{Pump units characterised by their drive mechanisms (B60T 8/4095 takes precedence)}
B60T 8/4022	.....	{Pump units driven by an individual electric motor (B60T 8/4027 takes precedence)}
B60T 8/4027	.....	{Pump units driven by (parts of) the vehicle propulsion unit}
B60T 8/4031	....	{Pump units characterised by their construction or mounting (pump units in combination with valve blocks B60T 8/36)}
B60T 8/4036	....	{Pump units characterised by their failure-responsive means (B60T 8/88 takes precedence)}
B60T 8/404	....	{Control of the pump unit}
B60T 8/4045	.....	{involving ON/OFF switching}
B60T 8/405	.....	{involving the start-up phase}

B60T 8/4054	.....	{involving the delivery pressure control (B60T 8/4072 takes precedence)}
B60T 8/4059	.....	{involving the rate of delivery}
B60T 8/4063	.....	{involving the direction of fluid flow}
B60T 8/4068	....	{the additional fluid circuit comprising means for attenuating pressure pulsations}
B60T 8/4072	....	{Systems in which a driver input signal is used as a control signal for the additional fluid circuit which is normally used for braking}
B60T 8/4077	.....	{Systems in which the booster is used as an auxiliary pressure source}
B60T 8/4081	.....	{Systems with stroke simulating devices for driver input (B60T 8/4077 takes precedence)}
B60T 8/4086	.....	{the stroke simulating device being connected to, or integrated in the driver input device}
B60T 8/409	.....	{characterised by details of the stroke simulating device}
B60T 8/4095	....	{including wheel driven pumps for detecting a speed condition}
B60T 8/42	...	having expanding chambers for controlling pressure {i.e. closed systems}
B60T 8/4208	....	{Debooster systems}
B60T 8/4216	.....	{having a mechanically actuated expansion unit (B60T 8/4225 and B60T 8/4266 take precedence)}
B60T 8/4225	.....	{having a fluid actuated expansion unit}
B60T 8/4233	.....	{with brake pressure relief by introducing fluid pressure into the expansion unit (B60T 8/4241 takes precedence)}
B60T 8/4241	.....	{pneumatically}
B60T 8/425	.....	{using a vacuum}
B60T 8/4258	.....	{with brake pressure relief by creating vacuum inside the expansion unit}
B60T 8/4266	.....	{having an electro-mechanically actuated expansion unit, e.g. solenoid, electric motor, piezo stack}
B60T 8/4275	....	{Pump-back systems}
B60T 8/4283	.....	{having a pressure sensitive inlet valve}
B60T 8/4291	.....	{having means to reduce or eliminate pedal kick-back}
B60T 8/44	...	co-operating with a power-assist booster means associated with a master cylinder for controlling the release and reapplication of brake pressure through an interaction with the power assist device {i.e. open systems}
B60T 8/441	....	{using hydraulic boosters (B60T 8/445 , B60T 8/446 , B60T 8/447 take precedence)}
B60T 8/442	.....	{the booster being a fluid return pump, e.g. in combination with a brake pedal force booster}
B60T 8/443	....	{using compressed air (B60T 8/445 , B60T 8/446 , B60T 8/448 take precedence)}
B60T 8/444	....	{using vacuum (B60T 8/445 , B60T 8/446 , B60T 8/448 take precedence)}
B60T 8/445	....	{replenishing the released brake fluid volume into the brake piping}
B60T 8/446	....	{replenishing the released brake fluid volume via the master cylinder}
B60T 8/447	....	{Reducing the boost of the power-assist booster means to reduce brake pressure}

B60T 8/448	.....	{the power-assist booster means being a vacuum or compressed air booster}
B60T 8/449	.....	{of the multiple booster type}
B60T 8/46	...	the pressure being reduced by exhausting fluid
B60T 8/48	...	connecting the brake actuator to an alternative or additional source of fluid pressure {e.g. traction control systems}
B60T 8/4809	....	{Traction control, stability control, using both the wheel brakes and other automatic braking systems}
B60T 8/4818	.....	{in pneumatic brake systems}
B60T 8/4827	.....	{in hydraulic brake systems}
B60T 8/4836	.....	{wherein a booster output pressure is used for normal or anti lock braking (B60T 8/4845 , B60T 8/4863 , B60T 8/489 take precedence)}
B60T 8/4845	.....	{using a booster or a master cylinder for traction control}
B60T 8/4854	.....	{pneumatic boosters}
B60T 8/4863	.....	{closed systems (B60T 8/4845 , B60T 8/489 take precedence)}
B60T 8/4872	.....	{pump-back systems}
B60T 8/4881	.....	{having priming means}
B60T 8/489	.....	{using separate traction control modulators}
B60T 8/50	...	having means for controlling the rate at which pressure is reapplied to {or released from} the brake
B60T 8/5006	....	{Pressure reapplication by pulsing of valves (B60T 8/5012 , B60T 8/5018 , B60T 8/505 , B60T 8/5056 take precedence)}
B60T 8/5012	....	{Pressure reapplication using a plurality of valves in parallel}
B60T 8/5018	....	{Pressure reapplication using restrictions (B60T 8/5012 , B60T 8/505 take precedence)}
B60T 8/5025	.....	{in hydraulic brake systems}
B60T 8/5031	.....	{open systems}
B60T 8/5037	.....	{closed systems}
B60T 8/5043	.....	{debooster systems}
B60T 8/505	....	{Pressure reapplication in a mu-split situation, i.e. a situation with different coefficients of friction on both sides of the vehicle}
B60T 8/5056	....	{Pressure reapplication using memory devices}
B60T 8/5062	.....	{using memory chambers}
B60T 8/5068	.....	{having decay means}
B60T 8/5075	....	{Pressure release by pulsing of valves (B60T 8/5081 , B60T 8/5087 take precedence)}
B60T 8/5081	....	{Pressure release using a plurality of valves in parallel}
B60T 8/5087	....	{Pressure release using restrictions (B60T 8/5081 takes precedence)}
B60T 8/5093	.....	{in hydraulic brake systems}
B60T 8/52	..	Torque sensing, i.e. wherein the braking action is controlled by forces producing or tending to produce a twisting or rotating motion on a braked rotating member
B60T 8/54	..	by mechanical means
B60T 8/56	..	having means for changing the coefficient of friction

B60T 8/58 . . responsive to speed and another condition or to plural speed conditions

NOTE

In this group, a single condition which is itself responsive to, or representative of, another single condition is not regarded as plural conditions

B60T 8/72 . . responsive to a difference between a speed condition, e.g. deceleration, and a fixed reference

B60T 8/74 . . . sensing a rate of change of velocity

B60T 8/76 . . . two or more sensing means from different wheels indicative of the same type of speed condition

B60T 8/86 . . wherein the brakes are automatically applied in accordance with a speed condition and having means for overriding the automatic braking device when a skid condition occurs

B60T 8/88 . . with failure responsive means, i.e. means for detecting and indicating faulty operation of the speed responsive control means

B60T 8/885 . . . {using electrical circuitry}

B60T 8/90 . . . using a simulated speed signal to test speed responsive control means

B60T 8/92 . . . automatically taking corrective action

B60T 8/94 on a fluid pressure regulator

B60T 8/96 on speed responsive control means

B60T 10/00 Control or regulation for continuous braking making use of fluid or powdered medium, e.g. for use when descending a long slope

B60T 10/02 . with hydrodynamic brake

B60T 10/04 . with hydrostatic brake

B60T 11/00 Transmitting braking action from initiating means to ultimate brake actuator without power assistance or drive or where such assistance or drive is irrelevant (the power assistance or drive being essential [B60T 13/00](#))

B60T 11/04 . transmitting mechanically

B60T 11/043 . . {in case of steerable wheels}

B60T 11/046 . . {Using cables ([B60T 11/043](#) takes precedence)}

B60T 11/06 . . Equalising arrangements

B60T 11/08 . . providing variable leverage

B60T 11/10 . transmitting by fluid means, e.g. hydraulic

B60T 11/101 . . {equalising arrangements}

B60T 11/102 . . {in combination with mechanical elements}

B60T 11/103 . . {in combination with other control devices (conjoint control of brake system and at least another sub-unit [B60K 41/00](#))}

B60T 11/105 . . . {with brake locking after actuation, release of the brake by a different control device, e.g. gear lever}

B60T 11/106 {locking and release of the brake by the clutch}

B60T 11/107 . . {overrun brakes with fluid means}

B60T 11/108 . . {to a trailer fluid system}

- B60T 11/12 .. the transmitted force being varied therein ([B60T 11/16](#) to [B60T 11/26](#) take precedence)
- B60T 11/14 .. the transmitted force being substantially unchanged
- B60T 11/16 .. Master control, e.g. master cylinders ([master cylinders associated with vacuum boosters B60T 13/565](#))
- B60T 11/165 ... {[Single master cylinders for pressurised systems](#)}
- B60T 11/18 ... Connection thereof to initiating means
- B60T 11/20 ... Tandem, side-by-side, or other multiple master cylinder units
- B60T 11/203 {[Side-by-side configuration](#)}
- B60T 11/206 {[with control by a force distributing lever](#)}
- B60T 11/21 with two pedals operating on respective circuits, pressures therein being equalised when both pedals are operated together, e.g. for steering ([steering non-deflectable wheels or endless tracks by differentially driving ground-engaging elements on opposite vehicle sides using brakes as main steering effecting means B62D 11/08](#))
- B60T 11/22 ... characterised by being integral with reservoir
- B60T 11/224 ... with pressure-varying means, e.g. with two stage operation provided by use of different piston diameters including continuous variation from one diameter to another
- B60T 11/228 ... Pressure-maintaining arrangements, e.g. for replenishing the master cylinder chamber with fluid from a reservoir ([B60T 11/232 takes precedence](#))
- B60T 11/232 ... Recuperation valves
- B60T 11/236 ... Piston sealing arrangements
- B60T 11/24 .. Single initiating means operating on more than one circuit e.g. dual circuits ([multiple master cylinder units B60T 11/20](#))
- B60T 11/26 .. Reservoirs ([integral with master controls B60T 11/22](#))
- B60T 11/28 .. Valves specially adapted therefor ([recuperation valves B60T 11/232](#))
- B60T 11/30 ... Bleed valves for hydraulic brake systems
- B60T 11/32 ... Automatic cut-off valves for defective pipes
- B60T 11/323 {[in hydraulic systems](#)}
- B60T 11/326 {[in pneumatic systems](#)}
- B60T 11/34 ... Pressure reducing or limiting valves {([for arrangements for adjusting wheel-braking force responsive to vehicle weight or load B60T 8/1831](#))}
- B60T 13/00** **Transmitting braking action from initiating means to ultimate brake actuator with power assistance or drive; Brake systems incorporating such transmitting means, e.g. air-pressure brake systems** ([arrangements for adjusting wheel-braking force to meet varying vehicular or ground-surface conditions B60T 8/00](#); [valves incorporated in such systems B60T 15/00](#))
- B60T 13/02 . with mechanical assistance or drive {([combined with fluid pressure B60T 13/588](#))}
- B60T 13/04 .. by spring or weight ([fluid released B60T 13/10](#))
- B60T 13/06 .. by inertia, e.g. flywheel
- B60T 13/065 ... {[of the propulsion system](#)}
- B60T 13/08 ... Over-run brakes
- B60T 13/10 . with fluid assistance, drive, or release

B60T 13/12	..	the fluid being liquid
B60T 13/14	...	using accumulators or reservoirs {fed by pumps}
B60T 13/141	....	{Systems with distributor valve (B60T 13/147 takes precedence)}
B60T 13/142	....	{Systems with master cylinder}
B60T 13/143	.....	{Master cylinder mechanically coupled with booster}
B60T 13/144	.....	{Pilot valve provided inside booster piston}
B60T 13/145	.....	{Master cylinder integrated or hydraulically coupled with booster}
B60T 13/146	.....	{Part of the system directly actuated by booster pressure}
B60T 13/147	.....	{In combination with distributor valve}
B60T 13/148	....	{Arrangements for pressure supply}
B60T 13/16	...	using pumps directly, i.e. without interposition of accumulators or reservoirs
B60T 13/161	....	{Systems with master cylinder}
B60T 13/162	.....	{Master cylinder mechanically coupled with booster}
B60T 13/163	.....	{Pilot valve provided inside booster piston}
B60T 13/165	.....	{Master cylinder integrated or hydraulically coupled with booster}
B60T 13/166	.....	{Part of the system directly actuated by booster pressure}
B60T 13/167	.....	{In combination with distributor valve}
B60T 13/168	....	{Arrangements for pressure supply}
B60T 13/18	....	with control of pump output delivery {e.g. by distributor valves (B60T 13/167 takes precedence)}
B60T 13/20	....	with control of pump driving means
B60T 13/22	...	Brakes applied by springs or weights and released hydraulically
B60T 13/24	..	the fluid being gaseous
B60T 13/241	...	{Differential pressure systems}
B60T 13/242	....	{The control valve is provided as one unit with the servomotor cylinder}
B60T 13/243	.....	{Mechanical command of the control valve, mechanical transmission to the brakes}
B60T 13/244	.....	{Mechanical command of the control valve, hydraulic transmission to the brakes}
B60T 13/245	.....	{Hydraulic command of the control valve, hydraulic transmission to the brake}
B60T 13/246	....	{The control valve is provided apart from the servomotor cylinder}
B60T 13/247	.....	{Mechanical command of the control valve, mechanical transmission to the brakes}
B60T 13/248	.....	{Mechanical command of the control valve, hydraulic transmission to the brakes}
B60T 13/249	.....	{Hydraulic command of the control valve, hydraulic transmission to the brakes}
B60T 13/26	...	Compressed-air systems
B60T 13/261	....	{systems with both indirect application and application by springs or weights and released by compressed air}

B60T 13/263	.....	{specially adapted for coupling with dependent systems, e.g. tractor-trailer systems}
B60T 13/265	.....	{dependent systems e.g. trailer systems}
B60T 13/266	....	{Systems with both direct and indirect application, e.g. in railway vehicles}
B60T 13/268	....	{using accumulators or reservoirs}
B60T 13/36	....	direct, i.e. brakes applied directly by compressed air
B60T 13/365	.....	{for railway vehicles}
B60T 13/38	....	Brakes applied by springs or weights and released by compressed air {(B60T 13/261 takes precedence)}
B60T 13/385	.....	{Control arrangements therefor}
B60T 13/40	....	indirect i.e. compressed air booster units {indirect systems}
B60T 13/403	.....	{specially adapted for coupling with dependent systems, e.g. tractor-trailer systems}
B60T 13/406	.....	{specially adapted for transfer of two or more command signals e.g. railway systems (with electrical control B60T 13/665)}
B60T 13/44	.....	with two-chamber booster units
B60T 13/45	.....	with multiple booster units, e.g. tandem booster units
B60T 13/46	...	Vacuum systems
B60T 13/465	....	{for railway vehicles}
B60T 13/48	....	direct, i.e. brakes applied directly by vacuum
B60T 13/50	....	Brakes applied by springs or weights and released by vacuum
B60T 13/52	....	indirect, i.e. vacuum booster units
B60T 13/56	.....	with two-chamber booster units
B60T 13/563	.....	with multiple booster units, e.g. tandem booster units
B60T 13/565	.....	characterised by being associated with master cylinders, e.g. integrally formed
B60T 13/567	.....	characterised by constructional features of the casing or by its strengthening or mounting arrangements
B60T 13/5675	.....	{Supportstruts}
B60T 13/569	.....	characterised by piston details, e.g. construction, mounting of diaphragm
B60T 13/57	.....	characterised by constructional features of control valves
B60T 13/573	.....	characterised by reaction devices
B60T 13/575	.....	using resilient discs or pads
B60T 13/577	.....	using levers
B60T 13/58	..	Combined or convertible systems
B60T 13/581	...	{both hydraulic and pneumatic}
B60T 13/583	....	{using converters}
B60T 13/585	...	{comprising friction brakes and retarders}
B60T 13/586	....	{the retarders being of the electric type}
B60T 13/588	...	{both fluid and mechanical assistance or drive}
B60T 13/62	...	both straight and automatic
B60T 13/64	...	both single and multiple, e.g. single and tandem

- B60T 13/66 . . . Electrical control in fluid-pressure brake systems
- B60T 13/662 . . . {characterised by specified functions of the control system components}
- B60T 13/665 . . . {the systems being specially adapted for transferring two or more command signals, e.g. railway systems ([B60T 13/662](#) takes precedence)}
- B60T 13/667 {and combined with electro-magnetic brakes}
- B60T 13/68 . . . by electrically-controlled valves {([B60T 13/662](#) and [B60T 13/665](#) take precedence)}
- B60T 13/683 {in pneumatic systems or parts thereof (in vacuum systems [B60T 13/72](#))}
- B60T 13/686 {in hydraulic systems or parts thereof}
- B60T 13/70 . . . by fluid-controlled switches
- B60T 13/72 . . . in vacuum systems {or vacuum booster units}
- B60T 13/74 . . with electrical assistance or drive
- B60T 13/741 . . {acting on an ultimate actuator}
- B60T 13/743 . . . {with a spring accumulator}
- B60T 13/745 . . {acting on a hydraulic system, e.g. a master cylinder}
- B60T 13/746 . . {and mechanical transmission of the braking action}
- B60T 13/748 . . {acting on electro-magnetic brakes (combined with fluid-pressure brake systems [B60T 13/667](#))}

B60T 15/00 Construction arrangement, or operation of valves incorporated in power brake systems and not covered by groups [B60T 11/00](#) or [B60T 13/00](#) (valve structures responsive to a speed condition [B60T 8/34](#); valves in general [F16K](#))

- B60T 15/02 . . Application and release valves
- B60T 15/021 . . {Railway control or brake valves}
- B60T 15/022 . . . {with one slide valve, e.g. an emergency slide valve}
- B60T 15/024 {with quick braking action and evacuation of air to a reservoir, to the atmosphere or to the brake cylinder}
- B60T 15/025 . . {Electrically controlled valves}
- B60T 15/027 . . . {in pneumatic systems}
- B60T 15/028 . . . {in hydraulic systems}
- B60T 15/04 . . Driver's valves
- B60T 15/041 . . . {controlling auxiliary pressure brakes, e.g. parking or emergency brakes ([B60T 15/048](#) takes precedence)}
- B60T 15/043 . . . {controlling service pressure brakes ([B60T 15/048](#) takes precedence)}
- B60T 15/045 {in multiple circuit systems, e.g. dual circuit systems}
- B60T 15/046 {with valves mounted in tandem}
- B60T 15/048 . . . {Controlling pressure brakes of railway vehicles}
- B60T 15/10 . . . for vacuum brakes
- B60T 15/12 . . . combined with relay valves or the like
- B60T 15/14 . . . influencing electric control means
- B60T 15/16 . . . Arrangements enabling systems to be controlled from two or more positions

B60T 15/18	..	Triple or other relay valves which allow step-wise application or release and which are actuated by brake-pipe pressure variation to connect brake cylinders or equivalent to compressed air or vacuum source or atmosphere
B60T 15/181	...	{Trailer control valves (B60T 15/20 and B60T 15/243 take precedence)}
B60T 15/182	...	{Trailer brake valves (B60T 15/20 and B60T 15/246 take precedence)}
B60T 15/184	...	{Railway control or brake valves}
B60T 15/185	....	{with one slide valve}
B60T 15/187	.....	{with a slide valve for initiation and a second slide valve for control of the braking}
B60T 15/188	.....	{with a slide valve for initiation and annular valves for control of the braking}
B60T 15/20	...	controlled by two fluid pressures
B60T 15/203	....	{Trailer control valves (B60T 15/223 takes precedence)}
B60T 15/206	....	{Trailer brake valves (B60T 15/226 takes precedence)}
B60T 15/22	....	with one or more auxiliary valves, for braking, releasing, filling reservoirs
B60T 15/223	.....	{Trailer control valves}
B60T 15/226	.....	{Trailer brake valves}
B60T 15/24	...	controlled by three fluid pressures
B60T 15/243	....	{Trailer control valves}
B60T 15/246	....	{Trailer brake valves}
B60T 15/26	....	without a quick braking action
B60T 15/28	.....	and having auxiliary valves
B60T 15/30	....	with a quick braking action
B60T 15/302	.....	{Railway control or brake valves with evacuation of air to a reservoir, to the atmosphere or to the brake cylinder}
B60T 15/304	.....	{with one slide valve}
B60T 15/306	.....	{with a slide valve for initiation and a second slide valve for control of the braking}
B60T 15/308	.....	{with a slide valve for initiation and annular valves for control of the braking}
B60T 15/32	.....	and having auxiliary valves
B60T 15/34	...	controlled alternatively by two or three fluid pressures
B60T 15/36	..	Other control devices or valves characterised by definite functions {(electrically controlled valves in fluid-pressure brake systems B60T 15/027 , B60T 15/028)}
B60T 15/38	...	for quick take-up and heavy braking, e.g. with auxiliary reservoir for taking-up slack
B60T 15/40	....	with separate take-up and applying cylinders
B60T 15/42	...	with a quick braking action, i.e. with accelerating valves actuated by brake-pipe pressure variation
B60T 15/44	....	and operating independently of the main control device
B60T 15/46	...	for retarding braking action to prevent rear vehicles of a vehicle train overtaking the forward ones
B60T 15/48	...	for filling reservoirs

- B60T 15/50 with means for limiting or relieving pressure in reservoirs
- B60T 15/52 . . . for quick release of brakes, e.g. for influencing counter- pressure in triple valve or recirculating air from reservoir or brake cylinder to brake pipe
- B60T 15/54 . . . for controlling exhaust from triple valve or from brake cylinder
- B60T 15/56 . . . for filling reservoirs by means of a secondary supply pipe
- B60T 15/58 . . . for supplying control impulses through a secondary air pipe
- B60T 15/60 . . . for releasing or applying brakes when vehicles of a vehicle train are uncoupled

B60T 17/00

Component parts, details, or accessories of power brake systems not covered by groups [B60T 8/00](#), [B60T 13/00](#) or [B60T 15/00](#), or presenting other characteristic features (air compressors per se [F04](#))

- B60T 17/002 . {Air treatment devices}
- B60T 17/004 . . {Draining and drying devices}
- B60T 17/006 . . {Anti-frost devices}
- B60T 17/008 . . {Silencer devices}
- B60T 17/02 . Arrangements of pumps or compressors, or control devices therefor
- B60T 17/04 . Arrangements of piping, valves in the piping, e.g. cut-off valves, couplings or air hoses (traction couplings involving joints for supply lines, electric circuits, or the like [B60D 1/62](#); couplings peculiar to railway vehicles for, or combined with, couplings or connectors for fluid conduits or electric cables [B61G 5/06](#); pipes, cut-off valves, couplings, air hoses per se [F16C](#), [F16K](#), [F16L](#))
- B60T 17/043 . . {Brake line couplings, air hoses and stopcocks}
- B60T 17/046 . . {Devices for pipe guiding and fixing}
- B60T 17/06 . Applications or arrangements of reservoirs
- B60T 17/08 . Brake cylinders other than ultimate actuators (with built-in wear-compensating mechanisms, ultimate actuators [F16D](#))
- B60T 17/081 . . {Single service brake actuators}
- B60T 17/083 . . {Combination of service brake actuators with spring loaded brake actuators}
- B60T 17/085 . . {Spring loaded brake actuators}
- B60T 17/086 . . . {Spring loaded brake actuators with emergency release device}
- B60T 17/088 . . {Mounting arrangements}
- B60T 17/10 . . Two or more cylinders acting on the same brake with means for rendering them effective selectively or successively, the number of effective cylinders being variable
- B60T 17/12 . . . according to vehicle weight
- B60T 17/14 . . . according to vehicle speed
- B60T 17/16 . . Locking of brake cylinders
- B60T 17/18 . Safety devices; Monitoring
- B60T 17/20 . . Safety devices operable by passengers other than the driver, {e.g. for railway vehicles}
- B60T 17/22 . . Devices for monitoring or checking brake systems; Signal devices
- B60T 17/221 . . . {Procedure or apparatus for checking or keeping in a correct functioning condition of brake systems (hydraulic pressure systems in general [F15B 19/00](#), [F15B 21/04](#); testing structures or apparatus [G01M](#))}

B60T 17/222	....	{by filling or bleeding of hydraulic systems}
B60T 17/223	.....	{Devices for pressurising brake systems acting on pedal}
B60T 17/225	...	{brake fluid level indicators (level indication in general G01F ; H01H)}
B60T 17/226	...	{using devices being responsive to the difference between the fluid pressions in conduits of multiple braking systems}
B60T 17/227	....	{With additional functions, e.g. by-pass}
B60T 17/228	...	{for railway vehicles}

B60T 2201/00 Particular use of vehicle brake systems; Special systems using also the brakes; Special software modules within the brake system controller

B60T 2201/02	.	Active or adaptive cruise control system; Distance control
B60T 2201/022	..	Collision avoidance systems
B60T 2201/024	..	Collision mitigation systems
B60T 2201/03	.	Brake assistants
B60T 2201/04	.	Hill descent control
B60T 2201/06	.	Hill holder; Start aid systems on inclined road
B60T 2201/08	.	Lane monitoring; Lane Keeping Systems
B60T 2201/081	..	using distance control
B60T 2201/082	..	using alarm actuation
B60T 2201/083	..	using active brake actuation
B60T 2201/084	..	using suspension control
B60T 2201/085	..	using several actuators; Coordination of the lane keeping system with other control systems
B60T 2201/086	..	using driver related features
B60T 2201/087	..	using active steering actuation
B60T 2201/088	..	using transmission control
B60T 2201/089	..	using optical detection
B60T 2201/09	.	Engine drag compensation
B60T 2201/10	.	Automatic or semi-automatic parking aid systems
B60T 2201/12	.	Pre-actuation of braking systems without significant braking effect; Optimizing brake performance by reduction of play between brake pads and brake disc
B60T 2201/122	..	Pre-actuation in case of ESP control
B60T 2201/124	..	Rain brake support [RBS]; Cleaning or drying brake discs, e.g. removing water or dirt
B60T 2201/14	.	Electronic locking-differential
B60T 2201/16	.	Curve braking control, e.g. turn control within ABS control algorithm
B60T 2210/00		Detection or estimation of road or environment conditions; Detection or estimation of road shapes
B60T 2210/10	.	Detection or estimation of road conditions
B60T 2210/12	..	Friction
B60T 2210/122	...	using fuzzy logic, neural computing

B60T 2210/124	...	Roads with different friction levels
B60T 2210/13	..	Aquaplaning, hydroplaning
B60T 2210/14	..	Rough roads, bad roads, gravel roads
B60T 2210/16	..	Off-road driving conditions
B60T 2210/20	.	Road shapes
B60T 2210/22	..	Banked curves
B60T 2210/24	..	Curve radius
B60T 2210/30	.	Environment conditions or position therewithin
B60T 2210/32	..	Vehicle surroundings
B60T 2210/34	..	Blind spots
B60T 2210/36	..	Global Positioning System [GPS]
B60T 2220/00	Monitoring, detecting driver behaviour; Signalling thereof; Counteracting thereof	
B60T 2220/02	.	Driver type; Driving style; Driver adaptive features
B60T 2220/03	.	Driver counter-steering; Avoidance of conflicts with ESP control
B60T 2220/04	.	Pedal travel sensor, stroke sensor; Sensing brake request
B60T 2220/06	.	Adjustment of accelerator pedal reaction forces
B60T 2230/00	Monitoring, detecting special vehicle behaviour; Counteracting thereof	
B60T 2230/02	.	Side slip angle, attitude angle, floating angle, drift angle
B60T 2230/03	.	Overturn, rollover
B60T 2230/04	.	Jerk, soft-stop; Anti-jerk, reduction of pitch or nose-dive when braking
B60T 2230/06	.	Tractor-trailer swaying
B60T 2230/08	.	Driving in reverse
B60T 2240/00	Monitoring, detecting wheel/tire behaviour; counteracting thereof	
B60T 2240/02	.	Longitudinal grip (detection of road friction B60T 2210/10)
B60T 2240/03	.	Tire sensors
B60T 2240/04	.	Tire deformation
B60T 2240/06	.	Wheel load; Wheel lift
B60T 2240/07	.	Tire tolerance compensation
B60T 2240/08	.	Spare wheel detection; Adjusting brake control in case of spare wheel use
B60T 2250/00	Monitoring, detecting, estimating vehicle conditions	
B60T 2250/02	.	Vehicle mass
B60T 2250/03	.	Vehicle yaw rate
B60T 2250/04	.	Vehicle reference speed; Vehicle body speed
B60T 2250/042	..	Reference speed calculation in ASR or under wheel spinning condition
B60T 2250/06	.	Sensor zero-point adjustment; Offset compensation
B60T 2250/062	..	loosing zero-point calibration of yaw rate sensors when travelling on banked roads or in case of temperature variations

B60T 2260/00**Interaction of vehicle brake system with other systems**

B60T 2260/02

. Active Steering, Steer-by-Wire

B60T 2260/022

.. Rear-wheel steering; Four-wheel steering

B60T 2260/024

.. Yawing moment compensation during mu-split braking

B60T 2260/04

. Automatic transmission

B60T 2260/06

. Active Suspension System

B60T 2260/08

. Coordination of integrated systems

B60T 2260/09

. Complex systems; Conjoint control of two or more vehicle active control systems

B60T 2270/00**Further aspects of brake control systems not otherwise provided for**

B60T 2270/10

. ABS control systems

B60T 2270/12

.. for all-wheel drive vehicles

B60T 2270/14

.. hydraulic model

B60T 2270/20

. ASR control systems

B60T 2270/202

.. for all-wheel drive vehicles

B60T 2270/203

.. hydraulic system components

B60T 2270/204

.. hydraulic model

B60T 2270/206

.. Monitoring, e.g. parameter monitoring, plausibility check

B60T 2270/208

.. adapted to friction condition

B60T 2270/211

.. Setting or adjusting start-control threshold

B60T 2270/213

.. Driving off under Mu-split conditions

B60T 2270/30

. ESP control system

B60T 2270/302

.. for all-wheel drive vehicles

B60T 2270/303

.. Stability control with active acceleration

B60T 2270/304

.. during driver brake actuation

B60T 2270/306

.. hydraulic system components

B60T 2270/308

.. hydraulic model

B60T 2270/311

.. Predefined control maps, lookup tables

B60T 2270/313

.. with less than three sensors (yaw rate, steering angle, lateral acceleration)

B60T 2270/40

. Failsafe aspects of brake control systems

B60T 2270/402

.. Back-up

B60T 2270/403

.. Brake circuit failure

B60T 2270/404

.. Brake-by-wire or X-by-wire failsafe

B60T 2270/406

.. Test-mode; Self-diagnosis

B60T 2270/408

.. Hierarchical failure detection

B60T 2270/411

.. Offset failure

B60T 2270/413

.. Plausibility monitoring, cross check, redundancy

B60T 2270/414

.. Power supply failure

B60T 2270/415

.. Short-circuit, open circuit failure

B60T 2270/416

.. Wheel speed sensor failure

B60T 2270/60	. Regenerative braking
B60T 2270/602	. . ABS features related thereto
B60T 2270/603	. . ASR features related thereto
B60T 2270/604	. . Merging friction therewith; Adjusting their repartition
B60T 2270/606	. . Axle differential or center differential features related thereto
B60T 2270/608	. . Electronic brake distribution (EBV/EBD) features related thereto
B60T 2270/611	. . Engine braking features related thereto
B60T 2270/613	. . ESP features related thereto
B60T 2270/82	. Brake-by-Wire, EHB
B60T 2270/83	. Control features of electronic wedge brake [EWB]
B60T 2270/84	. Driver circuits for actuating motor, valve and the like
B60T 2270/86	. Optimizing braking by using ESP vehicle or tire model
B60T 2270/88	. Pressure measurement in brake systems
B60T 2270/89	. Criteria for brake release