

B60 VEHICLES IN GENERAL

B60T VEHICLE BRAKE CONTROL SYSTEMS OR PARTS THEREOF; BRAKE CONTROL SYSTEMS OR PARTS THEREOF, IN GENERAL (electrodynamic brake systems for vehicles, in general B60L; conjoint control of vehicle sub-units of different type or different function, road vehicle drive control systems for purposes other than the control of a particular sub-unit B60W; 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** [1,8]

In this subclass, the following expression is used with the meaning indicated:

- “brake control systems” includes brake control systems for vehicles or of general applicability.

IMMOBILISATION

Portable devices 3/00

BRAKING

Kind of braking and corresponding arrangements 1/00

Vehicle modifications for cooling brakes 5/00

Kinds of brake control

initiating means; varying braking force or its distribution according to road or load conditions 7/00; 8/00

continuous braking 10/00

transmission of control between initiating means and brakes 11/00, 13/00

Parts or accessories for fluid-pressure brake control:

valve structure, disposition, and operation 15/00

other parts or accessories 17/00

1/00 Arrangements of braking elements, i.e. of those parts where braking effect occurs

1/02 . acting by retarding wheels

1/04 . . acting directly on tread

1/06 . . acting otherwise than on tread, e.g. employing rim, drum, disc, or transmission

1/08 . . using fluid or powdered medium

1/087 . . . in hydrodynamic, i.e. non-positive displacement, retarders [3]

1/093 . . . in hydrostatic, i.e. positive displacement, retarders [3]

1/10 . . by utilising wheel movement for accumulating energy, e.g. driving air compressors (using propulsion unit as braking means, *see* the relevant class)

1/12 . acting otherwise than by retarding wheels, e.g. jet-action

1/14 . . directly on road (portable devices, e.g. chocks, B60T 3/00)

1/16 . . by increasing air resistance, e.g. flaps

3/00 Portable devices for preventing unwanted movement of vehicles, e.g. chocks**5/00 Vehicle modifications to facilitate cooling of brakes**

7/12 . for automatic initiation; for initiation not subject to will of driver or passenger

7/14 . . operated upon collapse of driver (dead-man's devices for electrically-propelled vehicles B60L 3/02)

7/16 . . operated by remote control, i.e. initiating means not mounted on vehicle

7/18 . . . operated by wayside apparatus

7/20 . . specially adapted for trailers, e.g. in case of uncoupling of trailer (inertia-actuated overrun brakes B60T 13/08)

7/22 . . initiated by contact of vehicle, e.g. bumper, with an external object, e.g. another vehicle [4]

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)

8/17 . Using electrical or electronic regulation means to control braking [8]

When classifying in group B60T 8/17, classification is also made in appropriate places in groups B60T 8/18, B60T 8/24, B60T 8/26 or B60T 8/32 if other aspects than electronic control are of interest. [8]

Brake control systems or parts thereof**7/00 Brake-action initiating means**

7/02 . for personal initiation

7/04 . . foot-actuated

7/06 . . . Disposition of pedal

7/08 . . hand-actuated

7/10 . . . Disposition of hand control

8/171 . . Detecting parameters used in the regulation; Measuring values used in the regulation [8]

8/172 . . Determining control parameters used in the regulation, e.g. by calculations involving measured or detected parameters [8]

B60T

- 8/173 . . . Eliminating or reducing the effect of unwanted signals, e.g. due to vibrations or electrical noise [8]
 - 8/174 . . . characterised by using special control logic, e.g. fuzzy logic [8]
 - 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) [8]
 - 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) [8]
 - 8/176 . . . Brake regulation specially adapted to prevent excessive wheel slip during vehicle deceleration, e.g. ABS (B60T 8/1755 takes precedence) [8]
 - 8/1761 . . . responsive to wheel or brake dynamics, e.g. wheel slip, wheel acceleration or rate of change of brake fluid pressure [8]
 - 8/1763 . . . responsive to the coefficient of friction between the wheels and the ground surface (B60T 8/1764 takes precedence) [8]
 - 8/1764 . . . Regulation during travel on surface with different coefficients of friction, e.g. between left and right sides, mu-split [8]
 - 8/1766 . . . Proportioning of brake forces according to vehicle axle loads, e.g. front to rear of vehicle [8]
 - 8/1769 . . . specially adapted for vehicles having more than one driven axle, e.g. four-wheel drive vehicles [8]
 - 8/18 . . responsive to vehicle weight or load, e.g. load distribution (B60T 8/30 takes precedence; responsive to weight and speed condition B60T 8/58) [4]
 - 8/20 . . with stepwise control action
 - 8/22 . . with continuous control action
 - 8/24 . . responsive to vehicle inclination or change of direction, e.g. negotiating bends
 - 8/26 . . characterised by producing differential braking between front and rear wheels
 - 8/28 . . responsive to deceleration [4]
 - 8/30 . . responsive to load [4]
 - 8/32 . . responsive to a speed condition, e.g. acceleration or deceleration (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) [4]
 - 8/34 . . having a fluid pressure regulator responsive to a speed condition [4]
 - 8/36 . . . including a pilot valve responding to an electromagnetic force [4]
 - 8/38 . . . including valve means of the relay or driver controlled type [4]
 - 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 [4]
 - 8/42 . . . having expanding chambers for controlling pressure [4]
 - 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 [4]
 - 8/46 . . . the pressure being reduced by exhausting fluid [4]
 - 8/48 . . . connecting the brake actuator to an alternative or additional source of fluid pressure [4]
 - 8/50 . . . having means for controlling the rate at which pressure is reapplied to the brake [4]
 - 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 [4]
 - 8/54 . . by mechanical means [4]
 - 8/56 . . having means for changing the coefficient of friction [4]
 - 8/58 . . responsive to speed and another condition or to plural speed conditions [4]
- In this group, a single condition which is itself responsive to, or representative of, another single condition is not regarded as plural conditions. [4]
- 8/60 . . . using electrical circuitry for controlling the braking action, the circuitry deriving a control function relating to the dynamic of the braked vehicle or wheel [4]
 - 8/62 . . . wherein the individual vehicle wheels are provided (i) with self-contained braking systems operating the individual wheels in accordance with its dynamic state or (ii) with a central processing unit which receives input from individual wheels or wheel groups and produces a plurality of control signals for separately operating individual wheels or groups of wheels [4]
 - 8/64 . . . wherein the controlled braking action is characterised by the manner in which the braking fluid pressure is reduced or reapplied [4]
 - 8/66 . . . wherein the braking action is responsive to the difference between a computed or other theoretical vehicle speed and an actual speed of a wheel thereof [4]
 - 8/68 . . . wherein the braking action is controlled by a difference between the rate of change of vehicle velocity and the rate of change of wheel velocity [4]
 - 8/70 . . . sensing both acceleration and deceleration of either the vehicle or the wheel [4]
 - 8/72 . . responsive to a difference between a speed condition, e.g. deceleration, and a fixed reference (B60T 8/66 takes precedence) [4]
 - 8/74 . . . sensing a rate of change of velocity [4]
 - 8/76 . . . two or more sensing means from different wheels indicative of the same type of speed condition [4]
 - 8/78 . . . using electrical circuitry for controlling the braking action, the circuitry deriving a control function relating to the dynamics of the braked vehicle or wheel [4]
 - 8/80 . . . Means sensing a rate of change of velocity [4]

- 8/82 two or more sensing means from different wheels indicative of the same type of speed condition [4]
- 8/84 wherein two wheels or wheel groups are controlled in dependence on the behaviour of a reference wheel or wheel group, with means for changing the reference wheel, e.g. "select high, select low" operation [4]
- 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 [4]
- 8/88 . . with failure responsive means, i.e. means for detecting and indicating faulty operation of the speed responsive control means [4]
- 8/90 . . . using a simulated speed signal to test speed responsive control means [4]
- 8/92 . . . automatically taking corrective action [4]
- 8/94 on a fluid pressure regulator [4]
- 8/96 on speed responsive control means [4]
- 10/00 Control or regulation for continuous braking making use of fluid or powdered medium, e.g. for use when descending a long slope [4]**
- 10/02 . with hydrodynamic brake [4]
- 10/04 . with hydrostatic brake [4]
- 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) [5]**
- 11/04 . transmitting mechanically [5]
- 11/06 . . Equalising arrangements [5]
- 11/08 . . providing variable leverage [5]
- 11/10 . transmitting by fluid means, e.g. hydraulic [5]
- 11/12 . . the transmitted force being varied therein (B60T 11/16 B60T 11/28 take precedence) [5]
- 11/14 . . the transmitted force being substantially unchanged [5]
- 11/16 . . Master control, e.g. master cylinders (master cylinders associated with vacuum boosters B60T 13/565) [5]
- 11/18 . . . Connection thereof to initiating means [5]
- 11/20 . . . Tandem, side-by-side, or other multiple master-cylinder units [5]
- 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) [5]
- 11/22 . . . characterised by being integral with reservoir [5]
- 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 [5]
- 11/228 . . . Pressure-maintaining arrangements, e.g. for replenishing the master cylinder chamber with fluid from a reservoir (B60T 11/232 takes precedence) [5]
- 11/232 . . . Recuperation valves [5]
- 11/236 . . . Piston sealing arrangements [5]
- 11/24 . . Single initiating means operating on more than one circuit, e.g. dual circuits (multiple master-cylinder units B60T 11/20) [5]
- 11/26 . . Reservoirs (integral with master controls B60T 11/22) [5]
- 11/28 . . Valves specially adapted therefor (recuperation valves B60T 11/232) [5]
- 11/30 . . . Bleed valves for hydraulic brake systems [5]
- 11/32 . . . Automatic cut-off valves for defective pipes [5]
- 11/34 . . . Pressure-reducing or limiting valves [5]
- 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)**
- 13/02 . with mechanical assistance or drive
- 13/04 . . by spring or weight (fluid-released B60T 13/10)
- 13/06 . . by inertia, e.g. flywheel
- 13/08 . . . Overrun brakes (automatic brake-action initiating means specially adapted for trailers B60T 7/20)
- 13/10 . with fluid assistance, drive, or release
- 13/12 . . the fluid being liquid
- 13/122 . . . Systems using both master cylinder and distributor valve; Structural associations of master cylinder with distributor valve [6]
- 13/125 . . . Systems using brake pressure distributor valve without master cylinder [6]
- 13/128 . . . Systems using booster hydraulically combined with master cylinder [6]
- 13/13 with additional direct hydraulic output from booster to brake circuit [6]
- 13/132 . . . Systems using booster having mechanical output, e.g. to master cylinder [6]
- 13/135 . . . Boosters characterised by control valve in booster piston [6]
- 13/138 . . . Pressure supply arrangements [6]
- 13/14 using accumulators or reservoirs [6]
- 13/16 using pumps directly, i.e. without interposition of accumulators or reservoirs [6]
- 13/18 with control of pump output delivery [6]
- 13/20 with control of pump driving means [6]
- 13/22 . . . Brakes applied by springs or weights and released hydraulically
- 13/24 . . the fluid being gaseous
- 13/26 . . . Compressed-air systems
- 13/36 direct, i.e. brakes applied directly by compressed air
- 13/38 Brakes applied by springs or weights and released by compressed air
- 13/40 indirect, i.e. compressed-air booster units
- 13/44 with two-chamber booster units
- 13/45 with multiple booster units, e.g. tandem booster units [5]
- 13/46 . . . Vacuum systems
- 13/48 direct, i.e. brakes applied directly by vacuum
- 13/50 Brakes applied by springs or weights and released by vacuum
- 13/52 indirect, i.e. vacuum booster units
- 13/56 with two-chamber booster units

- 13/563 with multiple booster units, e.g. tandem booster units [5]
- 13/565 characterised by being associated with master cylinders, e.g. integrally formed [5]
- 13/567 characterised by constructional features of the casing or by its strengthening or mounting arrangements [5]
- 13/569 characterised by piston details, e.g. construction, mounting of diaphragm [5]
- 13/57 characterised by constructional features of control valves [5]
- 13/573 characterised by reaction devices [5]
- 13/575 using resilient discs or pads [5]
- 13/577 using levers [5]
- 13/58 . . . Combined or convertible systems
- 13/60 . . . both fluid pressure and vacuum
- 13/62 . . . both straight and automatic
- 13/64 . . . both single and multiple, e.g. single and tandem
- 13/66 . . . Electrical control in fluid-pressure brake systems
- 13/68 . . . by electrically-controlled valves
- 13/70 . . . by fluid-controlled switches
- 13/72 . . . in vacuum systems
- 13/74 . . with electrical assistance or drive
- 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; connection of valves to inflatable elastic bodies B60C 29/00) [4]**
- 15/02 . . Application and release valves
- 15/04 . . Driver's valves
- 15/06 . . . Single driver's valves for pressure brakes without automatic control
- 15/08 . . . Driver's valves for pressure brakes having automatic control (automatic initiation of braking in general B60T 7/12)
- 15/10 . . . for vacuum brakes
- 15/12 . . . combined with relay valves or the like
- 15/14 . . . influencing electric control means
- 15/16 . . . Arrangements enabling systems to be controlled from two or more positions
- 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
- 15/20 . . . controlled by two fluid pressures
- 15/22 with one or more auxiliary valves, for braking, releasing, filling reservoirs
- 15/24 . . . controlled by three fluid pressures
- 15/26 without a quick braking action
- 15/28 and having auxiliary valves
- 15/30 with a quick braking action
- 15/32 and having auxiliary valves
- 15/34 . . . controlled alternatively by two or three fluid pressures
- 15/36 . . Other control devices or valves characterised by definite functions
- 15/38 . . . for quick take-up and heavy braking, e.g. with auxiliary reservoir for taking-up slack
- 15/40 with separate take-up and applying cylinders
- 15/42 . . . with a quick braking action, i.e. with accelerating valves actuated by brake-pipe pressure variation
- 15/44 and operating independently of the main control device
- 15/46 . . . for retarding braking action to prevent rear vehicles of a vehicle train from overtaking the forward ones
- 15/48 . . . for filling reservoirs
- 15/50 with means for limiting or relieving pressure in reservoirs
- 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
- 15/54 . . . for controlling exhaust from triple valve or from brake cylinder
- 15/56 . . . for filling reservoirs by means of a secondary supply pipe
- 15/58 . . . for supplying control impulses through a secondary air pipe
- 15/60 . . . for releasing or applying brakes when vehicles of a vehicle train are uncoupled
- 17/00 Component parts, details, or accessories of brake systems not covered by groups B60T 8/00, B60T 13/00 or B60T 15/00, or presenting other characteristic features (air compressors F04) [4]**
- 17/02 . . Arrangements of pumps or compressors, or control devices therefor
- 17/04 . . Arrangement 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) [4]
- 17/06 . . Applications or arrangements of reservoirs
- 17/08 . . Brake cylinders other than ultimate actuators (with built-in wear-compensating mechanisms, ultimate actuators F16D)
- 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
- 17/12 . . . according to vehicle weight
- 17/14 . . . according to vehicle speed
- 17/16 . . Locking of brake cylinders
- 17/18 . . Safety devices; Monitoring
- 17/20 . . Safety devices operable by passengers other than the driver
- 17/22 . . Devices for monitoring or checking brake systems; Signal devices