SECTION B — PERFORMING OPERATIONS; TRANSPORTING

B60 VEHICLES IN GENERAL

B60T VEHICLE BRAKE CONTROL SYSTEMS OR PARTS THEREOF; BRAKE CONTROL SYSTEMS OR PARTS THEREOF, IN GENERAL (control of electrodynamic brake systems B60L 7/00; conjoint control of brakes and other drive units of vehicles B60W); ARRANGEMENT OF BRAKING ELEMENTS ON VEHICLES IN GENERAL; PORTABLE DEVICES FOR PREVENTING UNWANTED MOVEMENT OF VEHICLES; VEHICLE MODIFICATIONS TO FACILITATE COOLING OF BRAKES [1, 2006.01]

Note(s)

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.

Subclass index

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

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
7/12 • for automatic initiation; for initiation not subject to will of driver or passenger
7/14 • • operated upon collapse of driver
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 **[2006.01]**

Note(s) [2006.01]

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.

8/171 • • Detecting parameters used in the regulation; Measuring values used in the regulation **[2006.01]**

8/172 • • Determining control parameters used in the regulation, e.g. by calculations involving measured or detected parameters **[2006.01]**

8/173 • • Eliminating or reducing the effect of unwanted signals, e.g. due to vibrations or electrical noise **[2006.01]**

8/174 • • characterised by using special control logic, e.g. fuzzy logic **[2006.01]**

8/175 • • Brake regulation specially adapted to prevent excessive wheel spin during vehicle acceleration, e.g. for traction control **[2006.01]**

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) **[2006.01]**

8/176 • • Brake regulation specially adapted to prevent excessive wheel slip during vehicle deceleration, e.g. ABS (B60T 8/1755 takes precedence) **[2006.01]**

8/1761 • • • responsive to wheel or brake dynamics, e.g. wheel slip, wheel acceleration or rate of change of brake fluid pressure **[2006.01]**

8/1763 • • • responsive to the coefficient of friction between the wheels and the ground surface (B60T 8/1764 takes precedence) **[2006.01]**

8/1764 • • • Regulation during travel on surface with different coefficients of friction, e.g. between left and right sides, mu-split **[2006.01]**

8/1766 • • • Proportioning of brake forces according to vehicle axle loads, e.g. front to rear of vehicle **[2006.01]**

8/1769 • • • specially adapted for vehicles having more than one driven axle, e.g. four-wheel drive vehicles **[2006.01]**

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) **[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]**

Note(s)

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

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 [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 **[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 **[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
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
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) **[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
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 [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 **[4]**
17/06 • Applications or arrangements of reservoirs
17/08 • Brake cylinders other than ultimate actuators
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