

# CPC COOPERATIVE PATENT CLASSIFICATION

## B PERFORMING OPERATIONS; TRANSPORTING

(NOTES omitted)

### TRANSPORTING

#### B61 RAILWAYS

(NOTE omitted)

#### B61L GUIDING RAILWAY TRAFFIC; ENSURING THE SAFETY OF RAILWAY TRAFFIC

(power supply lines for electrically-propelled vehicles [B60M](#); vehicle signalling in general [B60Q](#); brakes or auxiliary equipment [B61H](#), [B61K](#); point or crossing construction [E01B](#); insulated rail joints [E01B 11/54](#); optical devices in general [G02](#); controlling in general [G05](#); electric communication technique [H04](#))

#### WARNING

In this subclass non-limiting references (in the sense of paragraph 39 of the Guide to the IPC) may still be displayed in the scheme.

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|---|---|
| <p><b>1/00</b>    <b>Devices along the route controlled by interaction with the vehicle or vehicle train, {e.g. pedals}(detonators <a href="#">B61L 5/20</a>; operation of points or signals by passage of the vehicle <a href="#">B61L 11/00</a>, <a href="#">B61L 13/00</a>; central traffic control systems controlled by train <a href="#">B61L 27/04</a>; operation of gates, or gates and signals, by approaching vehicle <a href="#">B61L 29/18</a>)</b></p> | <p>1/182    . . . {Use of current of indifferent sort or a combination of different current types}</p>  |
| <p>1/02    . Electric devices associated with track {, e.g. rail contacts}</p>  | <p>1/183    . . . . {Use of means on the vehicle for improving short circuit, e.g. in vehicles with rubber bandages}</p>  |
| <p>1/025    . . {actuated by variation of resistance or by piezo-electricity}</p>   | <p>1/184    . . . . {Use of additional conductors for examining leakages between rails}</p>   |
| <p>1/04    . . mechanically actuated by a part of the vehicle</p>   | <p>1/185    . . . {Use of direct current}</p>   |
| <p>1/045    . . . {actuated by fluid-pressure}</p>  | <p>1/186    . . . {Use of rectified alternating current}</p>  |
| <p>1/06    . . actuated by deformation of rail; actuated by vibration in rail</p>   | <p>1/187    . . . {Use of alternating current}</p>  |
| <p>1/08    . . magnetically actuated; electrostatically actuated</p>  | <p>1/188    . . . {Use of coded current}</p>  |
| <p>1/10    . . actuated by electromagnetic radiation; actuated by particle radiation</p>  | <p>1/20    . Safety arrangements for preventing or indicating malfunction of the device, e.g. by leakage current, by lightning {(remote indicating means for abnormal operations conditions <a href="#">G08B 21/00</a>, <a href="#">G08B 23/00</a>; detectors for indicating the overheating of axle bearings <a href="#">B61K 9/00</a>)}</p> |
| <p>1/12    . Electric devices associated with overhead trolley wires</p>  | <p><b>3/00</b>    <b>Devices along the route for controlling devices on the vehicle or vehicle train, e.g. to release brake, to operate a warning signal</b></p>  |
| <p>1/14    . Devices for indicating the passing of the end of the vehicle or vehicle train</p>  | <p>3/002    . {Recorders on the vehicle}</p>  |
| <p>1/16    . Devices for counting axles; Devices for counting vehicles (counting moving objects in general <a href="#">G06M</a>)</p>  | <p>3/004    . {Memory means reproducing during the running of the vehicle or vehicle train, e.g. smart cards}</p>   |
| <p>1/161    . . {characterised by the counting methods}</p>   | <p>3/006    . {On-board optimisation of vehicle or vehicle train operation (track-side optimisation of operation <a href="#">B61L 27/16</a>)}</p>   |
| <p>1/162    . . {characterised by the error correction}</p>   | <p>3/008    . {On-board target speed calculation or supervision (track-side control of safe travel <a href="#">B61L 27/20</a>; speed control circuitry <a href="#">B60L 3/08</a>; speed control of electric drives <a href="#">B60L 15/20</a>)}</p>   |
| <p>1/163    . . {Detection devices}</p>   | <p>3/02    . at selected places along the route, e.g. intermittent control {simultaneous mechanical and electrical control}</p>   |
| <p>1/164    . . . {Mechanical}</p>  | <p>3/04    . . controlling mechanically {(arrangements of making elements acting directly on tread <a href="#">B60T 1/04</a>)}</p>  |
| <p>1/165    . . . {Electrical}</p>  | <p>3/06    . . controlling by electromagnetic or particle radiation, e.g. by light beam (using radio waves <a href="#">B61L 3/12</a>)</p>   |
| <p>1/166    . . . {Optical}</p>   |   |
| <p>1/167    . . {Circuit details}</p>   |   |
| <p>1/168    . . {Specific transmission details}</p>   |   |
| <p>1/169    . . {Diagnosis}</p>   |   |
| <p>1/18    . Railway track circuits (automatically-operated track circuits specially adapted for section blocking for controlling traffic <a href="#">B61L 23/00</a>; rail joints <a href="#">E01B 11/00</a>)</p>   |   |
| <p>1/181    . . {Details}</p>   |   |

3/065	. . . {controlling optically}	5/04	. Fluid-pressure devices for operating points or scotch-blocks
3/08	. . controlling electrically	5/045	. . {using electrically controlled fluid-pressure operated driving means}
3/10	. . . using current passing between devices along the route and devices on the vehicle train	5/06	. Electric devices for operating points or scotch-blocks {, e.g. using electromotive driving means}
3/103	. . . . {Details of current transmitting conductors or contact brushes}	5/062	. . {Wiring diagrams}
3/106	. . . . {with mechanically controlled electrical switch on the vehicle}	5/065	. . {Construction of driving mechanism}
3/12	. . . using magnetic or electrostatic induction; using radio waves	5/067	. . {using electromagnetic driving means}
3/121	. . . . {using magnetic induction}	5/08	. Underground actuating arrangements, e.g. for tramways
2003/122	. . . . . {German standard for inductive train protection, called "Induktive Zugsicherung"[INDUSI]}	5/10	. Locking mechanisms for points; Means for indicating the setting of points
2003/123	. . . . . {French standard for inductive train protection, called "Contrôle de vitesse par balises" [KVB]}	5/102	. . {Controlling electrically}
3/125	. . . . {using short-range radio transmission (long-range radio transmission <a href="#">B61L 15/0027</a> , <a href="#">B61L 27/70</a> )}	5/105	. . {Controlling funicularly}
3/126	. . . . {Constructional details}	5/107	. . {electrical control of points position}
3/127	. . . . {for remote control of locomotives (remote control of locomotives within a train consist <a href="#">B61C 17/12</a> )}	5/12	. Visible signals {( <a href="#">signalling means on the vehicle B61L 15/00</a> ; <a href="#">signalling means for classification yards, or the like, with multiple indicating means B61L 17/023</a> ; <a href="#">signalling means for road crossings B61L 29/24</a> ; <a href="#">lighting in general F21</a> ; <a href="#">visible signalling arrangements in general G08B 5/00</a> )}
3/128	. . . . {for control of tilting trains by external control devices, e.g. by Eurobalise ( <a href="#">tilting details B61F 5/22</a> )}	5/125	. . {Fixed signals, beacons, or the like}
3/14	. . to cut-off the power supply to traction motors of electrically-propelled vehicles	5/14	. . Form signals, e.g. semaphore arms {( <a href="#">illumination for points, form signals B61L 9/00</a> )}
3/16	. Continuous control along the route	5/16	. . . Local operating mechanisms for form signals
3/18	. . using electric current passing between devices along the route and devices on the vehicle or vehicle train	5/161	. . . . {using electromotive driving means}
3/185	. . . {using separate conductors}	5/162	. . . . . {Wiring diagrams}
3/20	. . . employing different frequencies or coded pulse groups {, e.g. using currents carried by traction current ( <a href="#">operating and signalling systems using network power supply H02J 13/00</a> )}	5/163	. . . . . {Driving mechanisms}
3/22	. . using magnetic or electrostatic induction; using electromagnetic radiation	5/165	. . . . {using electromagnetic driving means}
3/221	. . . {using track circuits}	5/166	. . . . {using electrically controlled gravity operated driving means}
3/222	. . . . {Arrangements on the track only}	5/167	. . . . {using electrically controlled fluid-pressure operated driving means}
2003/223	. . . . {French cab signaling system, called "Transmission Voie-Machine" [TVM]}	5/168	. . . . {using funicular driving means}
3/225	. . . {using separate conductors along the route}	5/18	. . Light signals; Mechanisms associated therewith, e.g. blinders
2003/226	. . . . {German inductive continuous train control, called 'Linienzugbeeinflussung' [LZB]}	5/1809	. . . {Daylight signals}
3/227	. . . {using electromagnetic radiation}	5/1818	. . . . {using mobile coloured screen}
2003/228	. . . {Constructional details}	5/1827	. . . . {using light sources of different colours and a common optical system}
3/24	. . . employing different frequencies or coded pulse groups {, e.g. in combination with track circuits}	5/1836	. . . . {using light sources of different colours and separate optical systems}
3/243	. . . . {using alternating current}	5/1845	. . . . {Optical systems, lenses}
3/246	. . . . {using coded current}	5/1854	. . . . {Mounting and focussing of the light source in a lamp, fixing means}
<b>5/00</b>	<b>Local operating mechanisms for points or track-mounted scotch-blocks (<a href="#">track-mounted scotch-blocks per se B61K</a>); Visible or audible signals; Local operating mechanisms for visible or audible signals (<a href="#">B61L 11/00</a> takes precedence)</b>	5/1863	. . . . {Lamp mountings on a mast}
5/02	. Mechanical devices for operating points or scotch-blocks {, e.g. local manual control}	5/1872	. . . . {Mobile mountings arrangements on a mast; Arrangements for hoisting of the lamp along the mast}
5/023	. . {using funicular driving means}	5/1881	. . . . {Wiring diagrams for power supply, control or testing}
5/026	. . {fixing switch-rails to the driving means}	5/189	. . . {using flashing light sources ( <a href="#">visible signalling in general using flashing light sources G08B 5/38</a> ; <a href="#">thermal switches operating intermittently H01H 61/06</a> , <a href="#">H01H 61/08</a> )}
		5/20	. Audible signals, e.g. detonator {audible signalling}
		5/203	. . {Detonators; Track mounting means; Composition of the detonative product}
		5/206	. . {Signalling means for special purposes}
		5/22	. . Devices for initiating the release of detonators in a certain position of a signal
		5/24	. . Replacement of detonators

<b>7/00</b>	<b>Remote control of local operating means for points, signals, or trackmounted scotch-blocks</b> ( <a href="#">B61L 11/00</a> takes precedence; interlocking arrangements <a href="#">B61L 19/00</a> ; transmission per se, see the relevant classes)	13/02	• using mechanical interaction between vehicle and track {( <a href="#">pedals B61L 1/00</a> )}
7/02	• using mechanical transmission; e.g. wire, lever	13/04	• using electrical or magnetic interaction between vehicle and track {, e.g. by conductor circuits using special means or special conductors}
7/021	• . {Driving wheels or supports for traction wires}	13/042	• . {using isolated rail sections}
7/022	• . {Guiding means or supporting foundations in beton}	13/045	• . {using separated rail contacts, pedals or similar ( <a href="#">B61L 1/02</a> takes precedence)}
7/024	• . {Coupling for wires or traction bars}	13/047	• . {controlling inductively or magnetically}
7/025	• . {Bracing or compensating arrangements}	<b>15/00</b>	<b>Indicators provided on the vehicle or vehicle train for signalling purposes {; On-board control or communication systems}</b>
7/027	• . {Control levers}	15/0009	• {wiring diagrams for start- or stop-signals on vehicles having one or more carriages and having electrical communication lines between the carriages}
7/028	• . {Indicating or fixing arrangements in the event of breaking or tension difference of transmission wires for points, signals or similar}	15/0018	• {Communication with or on the vehicle or vehicle train ( <a href="#">line transmission systems H04B 3/00</a> )}
7/04	• using fluid-pressure transmission	15/0027	• . {Radio-based, e.g. using GSM-R}
7/06	• using electrical transmission	15/0036	• . {Conductor-based, e.g. using CAN-Bus, train-line or optical fibres}
7/061	• . {using electromotive driving means}	15/0045	• {Destination indicators, identification panels or distinguishing signs on the vehicles ( <a href="#">displaying in general G09F</a> )}
7/062	• . . {Wiring diagrams}	15/0054	• {Train integrity supervision, e.g. end-of-train [EOT] devices}
7/063	• . . {Construction of driving mechanism}	15/0063	• {Multiple on-board control systems, e.g. "2 out of 3"-systems ( <a href="#">trackside multiple control systems B61L 27/30</a> )}
7/065	• . {using electromagnetic driving means}	15/0072	• {On-board train data handling ( <a href="#">trackside train data handling B61L 27/40</a> )}
7/066	• . {using electrically controlled fluid-pressure operated driving means}	15/0081	• {On-board diagnosis or maintenance ( <a href="#">trackside diagnosis or maintenance B61L 27/50</a> )}
7/067	• . {Supply for electric safety arrangements}	15/009	• {On-board display devices}
7/068	• . {Protection against eddy-currents, short-circuits, or the like, for electric safety arrangements}	15/02	• Head or tail indicators, e.g. light
7/08	• . Circuitry	<b>17/00</b>	<b>Switching systems for classification yards (rail brakes <a href="#">B61K</a>)</b>
7/081	• . . {Direct line wire control}	17/02	• Details, e.g. indicating degree of track filling
7/083	• . . {Common line wire control using currents of different amplitudes, polarities, frequencies, or the like}	17/023	• . {Signalling; Signals with multiple indicating means}
7/085	• . . {Common line wire control using synchronous distributors}	17/026	• . {Brake devices}
7/086	• . . {Common line wire control using relay distributors}	<b>19/00</b>	<b>Arrangements for interlocking between points and signals by means of a single interlocking device {, e.g. central control (remote control <a href="#">B61L 7/00</a>; station block arrangements <a href="#">B61L 21/00</a>)}</b>
7/088	• . . {Common line wire control using series of coded pulses}	19/02	• Interlocking devices having mechanical or fluid-pressure operation
7/10	• . . for light signals, e.g. for supervision, back-signalling	19/023	• . {purely mechanical ( <a href="#">control levers B61L 7/027</a> )}
7/103	• . . . {Electric control of the setting of signals}	19/026	• . {using fluid-pressure operated points or signals}
7/106	• . . . {for form signals}	19/04	• . Detail- e.g. hand lever, back-signalling device
<b>9/00</b>	<b>Illumination specially adapted for points, form signals, or gates (<a href="#">lighting in general F21</a>)</b>	19/06	• Interlocking devices having electrical operation
9/02	• non-electric	2019/065	• . {with electronic means}
9/04	• electric	19/08	• . Special arrangements for power supply for interlocking devices
<b>11/00</b>	<b>Operation of points from the vehicle or by the passage of the vehicle</b>	19/10	• . with mechanical locks
11/02	• using mechanical interaction between vehicle and track	19/12	• . . Details
11/04	• . Trailable point locks	19/14	• . with electrical locks
11/06	• . with fluid-pressure transmission	19/16	• . . Details
11/08	• using electrical or magnetic interaction between vehicle and track	<b>21/00</b>	<b>Station blocking between signal boxes in one yard (<a href="#">interlocking between points and signals by means of a single interlocking device B61L 19/00</a>)</b>
11/083	• . {Magnetic control}		
2011/086	• . {German radio based operations, called "Funkfahrbetrieb" [FFB]}		
<b>13/00</b>	<b>Operation of signals from the vehicle or by the passage of the vehicle</b>		
13/002	• {actuated by the passage of the vehicle}		
13/005	• {optically actuated}		
13/007	• {acoustically actuated}		

21/02	• Mechanical locking and release of the route; Repeat locks; Coupling of semaphores	23/34	• Control, warnings or like safety means indicating the distance between vehicles or vehicle trains by the transmission of signals therebetween
21/04	• Electrical locking and release of the route; Electrical repeat locks <a href="#">{(central interlocking B61L 19/00)}</a>	<b>25/00</b>	<b>Recording or indicating positions or identities of vehicles or vehicle trains or setting of track apparatus</b>
21/06	• Vehicle-on-line indication; Monitoring locking and release of the route	25/02	• Indicating or recording positions or identities of vehicles or vehicle trains
21/065	• . {for signals, including signals actuated by the vehicle}	25/021	• . {Measuring and recording of train speed}
21/08	• Order transmission and reception arrangements for giving or withholding permission	25/023	• . {Determination of driving direction of vehicle or vehicle train}
21/10	• Arrangements for trains which are closely following one another <a href="#">(automatic central traffic control systems B61L 27/04)</a>	25/025	• . {Absolute localisation, e.g. providing geodetic coordinates}
<b>23/00</b>	<b>Control, warning, or like safety means along the route or between vehicles or vehicle trains</b>	25/026	• . {Relative localisation, e.g. using odometer}
23/002	• {Control or safety means for heart-points and crossings of aerial railways, funicular rack-railway <a href="#">(points or safety systems for model railways A63H; points, crossings or hearts for aerial railway, funicular rack railway E01B 25/12)</a> }	25/028	• . {Determination of vehicle position and orientation within a train consist, e.g. serialisation}
23/005	• . {Automatic control or safety means for points for operator-less railway, e.g. transportation systems}	25/04	• . Indicating or recording train identities
23/007	• {Safety arrangements on railway crossings}	25/041	• . . {using reflecting tags}
23/02	• for indicating along the route the failure of brakes	25/043	• . . {using inductive tags}
23/04	• for monitoring the mechanical state of the route	25/045	• . . {using reradiating tags}
23/041	• . {Obstacle detection}	25/046	• . . {using magnetic tags}
23/042	• . {Track changes detection}	25/048	• . . {using programmable tags}
23/044	• . . {Broken rails}	25/06	• Indicating or recording the setting of track apparatus, e.g. of points, of signals
23/045	• . . {Rail wear}	25/065	• . {for signalling systems on the vehicle using current conduction}
23/047	• . . {Track or rail movements}	25/08	• . Diagrammatic displays
23/048	• . . {Road bed changes, e.g. road bed erosion}	<b>27/00</b>	<b>Central railway traffic control systems; Trackside control; Communication systems specially adapted therefor</b>
23/06	• for warning men working on the route	27/02	• Manual systems
23/08	• for controlling traffic in one direction only <a href="#">(station blocking between signal boxes in one yard B61L 21/00)</a>	27/04	• Automatic systems, e.g. controlled by train; Change-over to manual control
23/10	• . manually operated {, e.g. block arrangements}	27/10	• Operations, e.g. scheduling or time tables
23/12	• . partly operated by train	27/12	• . Preparing schedules
23/14	• . automatically operated	27/14	• . Following schedules
23/16	• . . Track circuits specially adapted for section blocking	27/16	• . Trackside optimisation of vehicle or vehicle train operation
23/161	• . . . {using current of indifferent sorte or a combination of different current types}	27/18	• . Crew rosters; Itineraries
23/163	• . . . {using direct current}	27/20	• Trackside control of safe travel of vehicle or vehicle train, e.g. braking curve calculation
23/165	• . . . {using rectified alternating current}	2027/202	• . {using European Train Control System [ETCS]}
23/166	• . . . {using alternating current}	2027/204	• . {using Communication-based Train Control [CBTC]}
23/168	• . . . {using coded current}	27/30	• Trackside multiple control systems, e.g. switch-over between different systems
23/18	• . . specially adapted for changing lengths of track sections in dependence upon speed and traffic density	27/33	• . Backup systems, e.g. switching when failures occur
23/20	• . . with transmission of instructions to stations along the route	27/37	• . Migration, e.g. parallel installations running simultaneously
23/22	• for controlling traffic in two directions over the same pair of rails <a href="#">(station blocking between signal boxes in one yard B61L 21/00)</a>	27/40	• Handling position reports or trackside vehicle data
23/24	• . using token systems, e.g. train staffs, tablets	27/50	• Trackside diagnosis or maintenance, e.g. software upgrades
23/26	• . with means for actuating signals from the vehicle or by passage of the vehicle	27/53	• . for trackside elements or systems, e.g. trackside supervision of trackside control system conditions
23/28	• . using non-automatic blocking from a place along the route	27/57	• . for vehicles or vehicle trains, e.g. trackside supervision of train conditions
23/30	• . using automatic section blocking	27/60	• Testing or simulation
23/32	• . . with provision for the blocking or passing sidings	27/70	• Details of trackside communication
		<b>29/00</b>	<b>Safety means for rail/road crossing traffic</b>

- 29/02 . Guards or obstacles for preventing access to the route ([cattle guards connected to the permanent way E01B 17/00](#))
- 29/023 . . {[Special gates](#)}
- 29/026 . . . {[Preventing access by means of obstacles raising across the route](#)}
- 29/04 . Gates for level crossings
- 29/06 . . yielding to vehicles in one direction but operated in a different direction
- 29/08 . Operation of gates; Combined operation of gates and signals
- 29/10 . . Means for securing gates in their desired position
- 29/12 . . Manual operation
- 29/14 . . . mechanically
- 29/16 . . . electrically
- 29/18 . . Operation by approaching rail vehicle or rail vehicle train
- 29/20 . . . mechanically
- 29/22 . . . electrically
- 29/222 . . . . {[using conductor circuits with separate contacts or conductors](#)}
- 29/224 . . . . . {[using rail contacts](#)}
- 29/226 . . . . {[using track-circuits, closed or short-circuited by train or using isolated rail-sections](#)}
- 29/228 . . . . {[using optical means](#)}
- 29/24 . Means for warning road traffic that a gate is closed or closing, or that rail traffic is approaching, e.g. for visible or audible warning
- 29/243 . . {[Transmission mechanism or acoustical signals for gates](#)}
- 29/246 . . {[Signals or brake- or lighting devices mounted on the road vehicle and controlled from the vehicle train](#)}
- 29/26 . . mechanically operated
- 29/28 . . electrically operated
- 29/282 . . . {[magnetic or inductive control by the vehicle](#)}
- 29/284 . . . {[using rail-contacts, rail microphones, or the like, controlled by the vehicle](#)}
- 29/286 . . . {[using conductor circuits controlled by the vehicle](#)}
- 29/288 . . . {[Wiring diagram of the signal control circuits](#)}
- 29/30 . . . Supervision, e.g. monitoring arrangements
- 29/32 . . . Timing, e.g. advance warning of approaching train

**99/00 Subject matter not provided for in other groups of this subclass**

#### **2201/00 Control methods**

- 2201/02 . Fuzzy control

#### **2205/00 Communication or navigation systems for railway traffic**

- 2205/02 . Global system for mobile communication - railways (GSM-R)
- 2205/04 . Satellite based navigation systems, e.g. GPS

#### **2207/00 Features of light signals**

- 2207/02 . using light-emitting diodes (LEDs)

#### **2210/00 Vehicle systems**

- 2210/02 . Single autonomous vehicles
- 2210/04 . Magnetic elevation vehicles (maglev)