

**CPC****COOPERATIVE PATENT CLASSIFICATION****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](#))

**B61L 1/00**

**Devices along the route controlled by interaction with the vehicle or vehicle train, {e.g. pedals}** (detonators [B61L 5/20](#); operation of points or signals by passage of the vehicle [B61L 11/00](#), [B61L 13/00](#); central traffic control systems controlled by train [B61L 27/04](#); operation of gates, or gates and signals, by approaching vehicle [B61L 29/18](#))

- B61L 1/02 . Electric devices associated with track {e.g. rail contacts}
- B61L 1/025 . . {actuated by variation of resistance or by piezo-electricity}
- B61L 1/04 . . mechanically actuated by a part of the vehicle
- B61L 1/045 . . . {actuated by fluid-pressure}
- B61L 1/06 . . actuated by deformation of rail; actuated by vibration in rail
- B61L 1/08 . . magnetically actuated; electrostatically actuated
- B61L 1/10 . . actuated by electromagnetic radiation; actuated by particle radiation
- B61L 1/12 . Electric devices associated with overhead trolley wires
- B61L 1/14 . Devices for indicating the passing of the end of the vehicle or vehicle train
- B61L 1/16 . Devices for counting axles; Devices for counting vehicles (counting moving objects in general [G06M](#))
- B61L 1/161 . . {characterised by the counting methods}
- B61L 1/162 . . {characterised by the error correction}
- B61L 1/163 . . {Detection devices}
- B61L 1/164 . . . {Mechanical}
- B61L 1/165 . . . {Electrical}
- B61L 1/166 . . . {Optical}
- B61L 1/167 . . {Circuit details}
- B61L 1/168 . . {Specific transmission details}
- B61L 1/169 . . {Diagnosis}
- B61L 1/18 . Railway track circuits (automatically-operated track circuits specially adapted for section blocking for controlling traffic [B61L 23/00](#); rail joints [E01B 11/00](#))
- B61L 1/181 . . {Details}
- B61L 1/182 . . . {Use of current of indifferent sort or a combination of different current types}
- B61L 1/183 . . . . {Use of means on the vehicle for improving short circuit e.g. in vehicles with rubber bandages}
- B61L 1/184 . . . . {Use of additional conductors for examining leakages between rails}
- B61L 1/185 . . . {Use of direct current}
- B61L 1/186 . . . {Use of rectified alternating current}

- B61L 1/187 . . . {Use of alternating current}
- B61L 1/188 . . . {Use of coded current}
- B61L 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 [G08B 21/00](#), [G08B 23/00](#); detectors for indicating the overheating of axle bearings [B61K 9/00](#))}
  
- B61L 3/00** **Devices along the route for controlling devices on the vehicle or vehicle train, e.g. to release brake, to operate a warning signal**
- B61L 3/002 . {Recorders on the vehicle}
- B61L 3/004 . {Memory means reproducing during the running of the vehicle or vehicle train, e.g. smart cards}
- B61L 3/006 . {On-board optimisation of vehicle or vehicle train operation (track-side optimisation of operation [B61L 27/0027](#))}
- B61L 3/008 . {On-board target speed calculation or supervision (track-side control of safe travel [B61L 27/0038](#); speed control circuitry [B60L 3/08](#); speed control of electric drives [B60L 15/20](#))}
- B61L 3/02 . at selected places along the route, e.g. intermittent control {simultaneous mechanical and electrical control}
- B61L 3/04 . . controlling mechanically {(arrangements of making elements acting directly on tread [B60T 1/04](#))}
- B61L 3/06 . . controlling by electromagnetic or particle radiation, e.g. by light beam (using radio waves [B61L 3/12](#))
- B61L 3/065 . . . {controlling optically}
- B61L 3/08 . . controlling electrically
- B61L 3/10 . . . using current passing between devices along the route and devices on the vehicle train
- B61L 3/103 . . . . {Details of current transmitting conductors or contact brushes}
- B61L 3/106 . . . . {with mechanically controlled electrical switch on the vehicle}
- B61L 3/12 . . . using magnetic or electrostatic induction; using radio waves
- B61L 3/121 . . . . {using magnetic induction}
- B61L 2003/122 . . . . . {German standard for inductive train protection, called "Induktive Zugsicherung"[INDUSI]}
- B61L 2003/123 . . . . . {French standard for inductive train protection, called "Contrôle de vitesse par balises" [KVB]}
- B61L 3/125 . . . . {using short-range radio transmission (long-range radio transmission [B61L 15/0027](#), [B61L 27/0005](#))}
- B61L 3/126 . . . . {Constructional details}
- B61L 3/127 . . . . {for remote control of locomotives (remote control of locomotives within a train consist [B61C 17/12](#))}
- B61L 3/128 . . . . {for control of tilting trains by external control devices, e.g. by Eurobalise (tilting details [B61F 5/22](#))}
- B61L 3/14 . . to cut-off the power supply to traction motors of electrically-propelled vehicles
- B61L 3/16 . Continuous control along the route
- B61L 3/18 . . using electric current passing between devices along the route and devices on the vehicle or vehicle train

- B61L 3/185 . . . {using separate conductors}
- B61L 3/20 . . . employing different frequencies or coded pulse groups {e.g. using currents carried by traction current (operating and signalling systems using network power supply H02J 13/00)}
- B61L 3/22 . . . using magnetic or electrostatic induction; using electromagnetic radiation
- B61L 3/221 . . . {using track circuits}
- B61L 3/222 . . . {Arrangements on the track only}
- B61L 2003/223 . . . {French cab signaling system, called "Transmission Voie-Machine" [TVM]}
- B61L 3/225 . . . {using separate conductors along the route}
- B61L 2003/226 . . . {German inductive continuous train control, called 'Linienzugbeeinflussung' [LZB]}
- B61L 3/227 . . . {using electromagnetic radiation}
- B61L 2003/228 . . . {Constructional details}
- B61L 3/24 . . . employing different frequencies or coded pulse groups {e.g. in combination with track circuits}
- B61L 3/243 . . . {using alternating current}
- B61L 3/246 . . . {using coded current}
  
- B61L 5/00** **Local operating mechanisms for points or track-mounted scotch-blocks (track-mounted scotch-blocks per se B61K); Visible or audible signals; Local operating mechanisms for visible or audible signals (B61L 11/00 takes precedence)**
- B61L 5/02 . . . Mechanical devices for operating points or scotch-blocks {e.g. local manual control}
- B61L 5/023 . . . {using funicular driving means}
- B61L 5/026 . . . {fixing switch-rails to the driving means}
- B61L 5/04 . . . Fluid-pressure devices for operating points or scotch-blocks
- B61L 5/045 . . . {using electrically controlled fluid-pressure operated driving means}
- B61L 5/06 . . . Electric devices for operating points or scotch-blocks {e.g. using electromotive driving means}
- B61L 5/062 . . . {Wiring diagrams}
- B61L 5/065 . . . {Construction of driving mechanism}
- B61L 5/067 . . . {using electromagnetic driving means}
- B61L 5/08 . . . Underground actuating arrangements, e.g. for tramways
- B61L 5/10 . . . Locking mechanisms for points; Means for indicating the setting of points
- B61L 5/102 . . . {Controlling electrically}
- B61L 5/105 . . . {Controlling funicularly}
- B61L 5/107 . . . {electrical control of points position}
- B61L 5/12 . . . Visible signals {(signalling means on the vehicle B61L 15/00; signalling means for classification yards, or the like, with multiple indicating means B61L 17/023; signalling means for road crossings B61L 29/24; lighting in general F21; visible signalling arrangements in general G08B 5/00)}
- B61L 5/125 . . . {Fixed signals, beacons, or the like}
- B61L 5/14 . . . Form signals, e.g. semaphore arms {(illumination for points, form signals B61L 9/00)}

B61L 5/16	. . . Local operating mechanisms for form signals
B61L 5/161	. . . . {using electromotive driving means}
B61L 5/162	. . . . . {Wiring diagrams}
B61L 5/163	. . . . . {Driving mechanisms}
B61L 5/165	. . . . {using electromagnetic driving means}
B61L 5/166	. . . . {using electrically controlled gravity operated driving means}
B61L 5/167	. . . . {using electrically controlled fluid-pressure operated driving means}
B61L 5/168	. . . . {using funicular driving means}
B61L 5/18	. . Light signals; Mechanisms associated therewith, e.g. blinders
B61L 5/1809	. . . {Daylight signals}
B61L 5/1818	. . . . {using mobile coloured screen}
B61L 5/1827	. . . . {using light sources of different colours and a common optical system}
B61L 5/1836	. . . . {using light sources of different colours and separate optical systems}
B61L 5/1845	. . . . {Optical systems, lenses}
B61L 5/1854	. . . . {Mounting and focussing of the light source in a lamp, fixing means (focussing of the light source in reflecting mirrors <a href="#">F21S 48/00</a> )}
B61L 5/1863	. . . . {Lamp mountings on a mast}
B61L 5/1872	. . . . {Mobile mounting arrangements on a mast; Arrangements for hoisting of the lamp along the mast}
B61L 5/1881	. . . . {Wiring diagrams for power supply, control or testing}
B61L 5/189	. . . {using flashing light sources (visible signalling in general using flashing light sources <a href="#">G08B 5/38</a> ; thermal switches operating intermittently <a href="#">H01H 61/06</a> , <a href="#">H01H 61/08</a> )}
B61L 5/20	. Audible signals, e.g. detonator {audible signalling}
B61L 5/203	. . {Detonators; Track mounting means; Composition of the detonative product}
B61L 5/206	. . {Signalling means for special purposes}
B61L 5/22	. . Devices for initiating the release of detonators in a certain position of a signal
B61L 5/24	. . Replacement of detonators
<b>B61L 7/00</b>	<b>Remote control of local operating means for points, signals, or trackmounted scotch-blocks (<a href="#">B61L 11/00</a> takes precedence; interlocking arrangements <a href="#">B61L 19/00</a>; transmission per se, see the relevant classes)</b>
B61L 7/02	. using mechanical transmission; e.g. wire, lever
B61L 7/021	. . {Driving wheels or supports for traction wires}
B61L 7/022	. . {Guiding means or supporting foundations in beton}
B61L 7/024	. . {Coupling for wires or traction bars}
B61L 7/025	. . {Bracing or compensating arrangements}
B61L 7/027	. . {Control levers}
B61L 7/028	. . {Indicating or fixing arrangements in the event of breaking or tension difference of transmission wires for points, signals or similar}
B61L 7/04	. using fluid-pressure transmitting
B61L 7/06	. using electrical transmission

B61L 7/061	. . {using electromotive driving means}
B61L 7/062	. . . {Wiring diagrams}
B61L 7/063	. . . {Construction of driving mechanism}
B61L 7/065	. . {using electromagnetic driving means}
B61L 7/066	. . {using electrically controlled fluid-pressure operated driving means}
B61L 7/067	. . {Supply for electric safety arrangements}
B61L 7/068	. . {Protection against eddy-currents, short-circuits, or the like, for electric safety arrangements}
B61L 7/08	. . Circuitry
B61L 7/081	. . . {Direct line wire control}
B61L 7/083	. . . {Common line wire control using currents of different amplitudes, polarities, frequencies, or the like}
B61L 7/085	. . . {Common line wire control using synchronous distributors}
B61L 7/086	. . . {Common line wire control using relay distributors}
B61L 7/088	. . . {Common line wire control using series of coded pulses}
B61L 7/10	. . . for light signals, e.g. for supervision, back-signalling
B61L 7/103	. . . . {Electric control of the setting of signals}
B61L 7/106	. . . . . {for form signals}
<b>B61L 9/00</b>	<b>Illumination specially adapted for points, form signals, or gates (lighting in general <a href="#">F21</a>)</b>
B61L 9/02	. non-electric
B61L 9/04	. electric
<b>B61L 11/00</b>	<b>Operation of points from the vehicle or by the passage of the vehicle</b>
B61L 11/02	. Using mechanical interaction between vehicle and track
B61L 11/04	. . Trailable point locks
B61L 11/06	. . with fluid-pressure transmission
B61L 11/08	. using electrical or magnetic interaction between vehicle and track
B61L 11/083	. . {Magnetic control}
B61L 2011/086	. . {German radio based operations, called "Funkfahrbetrieb" [ <a href="#">FFB</a> ]}
<b>B61L 13/00</b>	<b>Operation of signals from the vehicle or by the passage of the vehicle</b>
B61L 13/002	. {actuated by the passage of the vehicle}
B61L 13/005	. {optically actuated}
B61L 13/007	. {acoustically actuated}
B61L 13/02	. using mechanical interaction between vehicle and track {(pedals <a href="#">B61L 1/00</a> )}
B61L 13/04	. using electrical or magnetic interaction between vehicle and track {e.g. by conductor circuits using special means or special conductors}
B61L 13/042	. . {using isolated rail sections}
B61L 13/045	. . {using separated rail contacts, pedals or similar ( <a href="#">B61L 1/02</a> takes precedence)}
B61L 13/047	. . {controlling inductively or magnetically}

<b>B61L 15/00</b>	<b>Indicators provided on the vehicle or vehicle train for signalling purposes; {On-board control or communication systems}</b>
B61L 15/0009	. {wiring diagrams for start- or stop-signals on vehicles having one or more carriages and having electrical communication lines between the carriages}
B61L 15/0018	. {Communication with or on the vehicle or vehicle train (line transmission systems <a href="#">H04B 3/00</a> )}
B61L 15/0027	. . {Radio-based, e.g. using GSM-R}
B61L 15/0036	. . {Conductor-based, e.g. using CAN-Bus, train-line or optical fibres}
B61L 15/0045	. {Destination indicators, identification panels or distinguishing signs on the vehicles (displaying in general <a href="#">G09F</a> )}
B61L 15/0054	. {Train integrity supervision, e.g. end-of-train [EOT] devices}
B61L 15/0063	. {Multiple on-board control systems, e.g. "2 out of 3"-systems (trackside multiple control systems <a href="#">B61L 27/0061</a> )}
B61L 15/0072	. {On-board train data handling (trackside train data handling <a href="#">B61L 27/0077</a> )}
B61L 15/0081	. {On-board diagnosis or maintenance (trackside diagnosis or maintenance <a href="#">B61L 27/0083</a> )}
B61L 15/009	. {On-board display devices}
B61L 15/02	. Head or tail indicators, e.g. light
<b>B61L 17/00</b>	<b>Switching systems for classification yards (rail brakes <a href="#">B61K</a>)</b>
B61L 17/02	. Details, e.g. indicating degree of track filling
B61L 17/023	. . {Signalling; Signals with multiple indicating means}
B61L 17/026	. . {Brake devices}
<b>B61L 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>
B61L 19/02	. Interlocking devices having mechanical or fluid-pressure operation
B61L 19/023	. . {purely mechanical (control levers <a href="#">B61L 7/027</a> )}
B61L 19/026	. . {using fluid-pressure operated points or signals}
B61L 19/04	. . Detail- e.g. hand lever, back-signalling device
B61L 19/06	. Interlocking devices having electrical operation
B61L 2019/065	. . {with electronic means}
B61L 19/08	. . Special arrangements for power supply for interlocking devices
B61L 19/10	. . with mechanical locks
B61L 19/12	. . . Details
B61L 19/14	. . with electrical locks
B61L 19/16	. . . Details
<b>B61L 21/00</b>	<b>Station blocking between signal boxes in one yard (interlocking between points and signals by means of a single interlocking device <a href="#">B61L 19/00</a>)</b>
B61L 21/02	. Mechanical locking and release of the route; Repeat locks; Coupling of semaphores

- B61L 21/04 . Electrical locking and release of the route; Electrical repeat locks [{\(central interlocking B61L 19/00\)}](#)
- B61L 21/06 . Vehicle-on-line indication; Monitoring locking and release of the route
- B61L 21/065 . . [{for signals, including signals actuated by the vehicle}](#)
- B61L 21/08 . Order transmission and reception arrangements for giving or withholding permission
- B61L 21/10 . Arrangements for trains which are closely following one another [\(automatic central traffic control systems B61L 27/04\)](#)
  
- B61L 23/00 Control, warning, or like safety means along the route or between vehicles or vehicle trains**
- B61L 23/002 . [{Control or safety means for heart-points and crossings of aerial railways, funicular rack-railway \(points or safety systems for model railways A63H; points, crossings or hearts for aerial railway, funicular rack railway E01B 25/12\)}](#)
- B61L 23/005 . . [{Automatic control or safety means for points for operator-less railway, e.g. transportation systems}](#)
- B61L 23/007 . [{Safety arrangements on railway crossings}](#)
- B61L 23/02 . for indicating along the route the failure of brakes
- B61L 23/04 . for monitoring the mechanical state of the route
- B61L 23/041 . . [{Obstacle detection}](#)
- B61L 23/042 . . [{Track changes detection}](#)
- B61L 23/044 . . . [{Broken rails}](#)
- B61L 23/045 . . . [{Rail wear}](#)
- B61L 23/047 . . . [{Track or rail movements}](#)
- B61L 23/048 . . . [{Road bed changes, e.g. road bed erosion}](#)
- B61L 23/06 . for warning men working on the route
- B61L 23/08 . for controlling traffic in one direction only [\(station blocking between signal boxes in one yard B61L 21/00\)](#)
- B61L 23/10 . . manually operated [{e.g. block arrangements}](#)
- B61L 23/12 . . partly operated by train
- B61L 23/14 . . automatically operated
- B61L 23/16 . . . Track circuits specially adapted for section blocking
- B61L 23/161 . . . . [{using current of indifferent sorte or a combination of different current types}](#)
- B61L 23/163 . . . . [{using direct current}](#)
- B61L 23/165 . . . . [{using rectified alternating current}](#)
- B61L 23/166 . . . . [{using alternating current}](#)
- B61L 23/168 . . . . [{using coded current}](#)
- B61L 23/18 . . . specially adapted for changing lengths of track sections in dependence upon speed and traffic density
- B61L 23/20 . . . with transmission of instructions to stations along the route
- B61L 23/22 . for controlling traffic in two directions over the same pair of rails [\(station blocking between signal boxes in one yard B61L 21/00\)](#)
- B61L 23/24 . . using token systems, e.g. train staffs, tablets
- B61L 23/26 . . with means for actuating signals from the vehicle or by passage of the vehicle



B61L 23/28	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>using non-automatic blocking from a place along the route</li> </ul> </li> </ul>
B61L 23/30	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>using automatic section blocking</li> </ul> </li> </ul>
B61L 23/32	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>with provision for the blocking or passing sidings</li> </ul> </li> </ul> </li> </ul>
B61L 23/34	<ul style="list-style-type: none"> <li>Control, warnings or like safety means indicating the distance between vehicles or vehicle trains by the transmission of signals therebetween</li> </ul>
<b>B61L 25/00</b>	<b>Recording or indicating positions or identities of vehicles or vehicle trains or setting of track apparatus</b>
B61L 25/02	<ul style="list-style-type: none"> <li>Indicating or recording positions or identities of vehicles or vehicle trains</li> </ul>
B61L 25/021	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{Measuring and recording of train speed}</li> </ul> </li> </ul>
B61L 25/023	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{Determination of driving direction of vehicle or vehicle train}</li> </ul> </li> </ul>
B61L 25/025	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{Absolute localisation, e.g. providing geodetic coordinates}</li> </ul> </li> </ul>
B61L 25/026	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{Relative localisation, e.g. using odometer}</li> </ul> </li> </ul>
B61L 25/028	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{Determination of vehicle position and orientation within a train consist, e.g. serialisation}</li> </ul> </li> </ul>
B61L 25/04	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Indicating or recording train identities</li> </ul> </li> </ul>
B61L 25/041	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{using reflecting tags}</li> </ul> </li> </ul> </li> </ul>
B61L 25/043	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{using inductive tags}</li> </ul> </li> </ul> </li> </ul>
B61L 25/045	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{using reradiating tags}</li> </ul> </li> </ul> </li> </ul>
B61L 25/046	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{using magnetic tags}</li> </ul> </li> </ul> </li> </ul>
B61L 25/048	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{using programmable tags}</li> </ul> </li> </ul> </li> </ul>
B61L 25/06	<ul style="list-style-type: none"> <li>Indicating or recording the setting of track apparatus, e.g. of points, of signals</li> </ul>
B61L 25/065	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{for signalling systems on the vehicle using current conduction}</li> </ul> </li> </ul>
B61L 25/08	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>Diagrammatic displays</li> </ul> </li> </ul>
<b>B61L 27/00</b>	<b>Central traffic control systems; {Track-side control or specific communication systems}</b>
B61L 27/0005	<ul style="list-style-type: none"> <li>{Details of track-side communication}</li> </ul>
B61L 27/0011	<ul style="list-style-type: none"> <li>{Regulation, e.g. scheduling, time tables}</li> </ul>
B61L 27/0016	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{Preparing schedules}</li> </ul> </li> </ul>
B61L 27/0022	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{Following schedules}</li> </ul> </li> </ul>
B61L 27/0027	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{Track-side optimisation of vehicle or vehicle train operation (on-board optimisation <a href="#">B61L 3/006</a>)}</li> </ul> </li> </ul>
B61L 27/0033	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{Crew rosters and itineraries}</li> </ul> </li> </ul>
B61L 27/0038	<ul style="list-style-type: none"> <li>{Track-side control of safe travel of vehicle or vehicle train, e.g. braking curve calculation (on-board target speed calculation and supervision <a href="#">B61L 3/008</a>)}</li> </ul>
B61L 2027/0044	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{using European Train Control System [ETCS]}</li> </ul> </li> </ul>
B61L 2027/005	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{using Communication-based Train Control [CBTC]}</li> </ul> </li> </ul>
B61L 27/0055	<ul style="list-style-type: none"> <li>{Testing or simulation}</li> </ul>
B61L 27/0061	<ul style="list-style-type: none"> <li>{Track-side multiple control systems, e.g. switch-over between different systems, "2 out of 3"-systems (on-board multiple control systems <a href="#">B61L 15/0063</a>)}</li> </ul>
B61L 27/0066	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{Backup systems, e.g. switching when failures occur}</li> </ul> </li> </ul>
B61L 27/0072	<ul style="list-style-type: none"> <li> <ul style="list-style-type: none"> <li>{Migration, e.g. parallel installations running simultaneously}</li> </ul> </li> </ul>



- B61L 27/0077 . {Track-side train data handling, e.g. vehicle or vehicle train data, position reports (on-board train data handling [B61L 15/0072](#))}
- B61L 27/0083 . {Track-side diagnosis or maintenance, e.g. software upgrades (on-board diagnosis or maintenance [B61L 15/0081](#))}
- B61L 27/0088 . . {for track-side elements or systems, e.g. trackside supervision of trackside control system conditions}
- B61L 27/0094 . . {for vehicles or vehicle trains, e.g. trackside supervision of train conditions}
- B61L 27/02 . Manual systems
- B61L 27/04 . Automatic systems, e.g. controlled by train; Change-over to manual control

**B61L 29/00****Safety means for rail/road crossing traffic**

- B61L 29/02 . Guards or obstacles for preventing access to the route (cattle guards connected to the permanent way [E01B 17/00](#))
- B61L 29/023 . . {Special gates}
- B61L 29/026 . . . {Preventing access by means of obstacles raising across the route}
- B61L 29/04 . Gates for level crossings
- B61L 29/06 . . yielding to vehicles in one direction but operated in a different direction
- B61L 29/08 . Operation of gates; Combined operation of gates and signals
- B61L 29/10 . . Means for securing gates in their desired position
- B61L 29/12 . . Manual operation
- B61L 29/14 . . . mechanically
- B61L 29/16 . . . electrically
- B61L 29/18 . . Operation by approaching rail vehicle or rail vehicle train
- B61L 29/20 . . . mechanically
- B61L 29/22 . . . electrically
- B61L 29/222 . . . . {using conductor circuits with separate contacts or conductors}
- B61L 29/224 . . . . . {using rail contacts}
- B61L 29/226 . . . . {using track-circuits, closed or short-circuited by train or using isolated rail-sections}
- B61L 29/228 . . . . {using optical means}
- B61L 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
- B61L 29/243 . . {Transmission mechanism or acoustical signals for gates}
- B61L 29/246 . . {Signals or brake- or lighting devices mounted on the road vehicle and controlled from the vehicle train}
- B61L 29/26 . . mechanically operated
- B61L 29/28 . . electrically operated
- B61L 29/282 . . . {magnetic or inductive control by the vehicle}
- B61L 29/284 . . . {using rail-contacts, rail microphones, or the like, controlled by the vehicle}
- B61L 29/286 . . . {using conductor circuits controlled by the vehicle}
- B61L 29/288 . . . {Wiring diagram of the signal control circuits}
- B61L 29/30 . . . Supervision, e.g. monitoring arrangements

B61L 29/32	<ul style="list-style-type: none"><li>. . . Timing, e.g. advance warning of approaching train</li></ul>
B61L 99/00	<b>Subject matter not provided for in other groups of this subclass</b>
B61L 2201/00	<b>Control methods</b>
B61L 2201/02	<ul style="list-style-type: none"><li>. Fuzzy control</li></ul>
B61L 2205/00	<b>Communication or navigation systems for railway traffic</b>
B61L 2205/02	<ul style="list-style-type: none"><li>. Global system for mobile communication - railways (GSM-R)</li></ul>
B61L 2205/04	<ul style="list-style-type: none"><li>. Satellite based navigation systems, e.g. GPS</li></ul>
B61L 2207/00	<b>Features of light signals</b>
B61L 2207/02	<ul style="list-style-type: none"><li>. using light-emitting diodes (LEDs)</li></ul>
B61L 2210/00	<b>Vehicle systems</b>
B61L 2210/02	<ul style="list-style-type: none"><li>. Single autonomous vehicles</li></ul>
B61L 2210/04	<ul style="list-style-type: none"><li>. Magnetic elevation vehicles (maglev)</li></ul>