Title (en)

Automatic train protection and stop system

Title (de)

Automatischer Zugschutz und Anhaltsystem

Title (fr)

Protection de train automatique et système d'arrêt

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Application

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Priority

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Abstract (en)

Automatic train protection and stop system (ATPSS) comprises a satellite positioning signal receiver (SPSR) with a satellite positioning antenna (SPA) or the means for connecting the system to external source of the train positioning, preferably an external SPSR (ESPSR). It also contains an operator vigilance check module (OVCM), a central processing unit (CPU), and at least one, preferably exchangeable, reference checkpoint memory module (RCMM) to store coordinates of the reference checkpoints, and additionally at least one, preferably exchangeable, route map memory module (RMMM) to store a map containing at least one route, preferably all routes on which the train can move, optionally with coordinates of the reference checkpoints. The OVCM comprises a deadman's handle (DMH) or it is connected to external DMH. Alternatively the OVCM comprises a train emergency stop unit (TESU), which controls an electro-mechanical air valve (EAV), preferably through a relay (R), to activate the train brakes in emergency. Besides, the OVCM contains a light signalling device (L), an acoustic signalling device (A) and manual or foot-operated switch (S) of both L and A devices, preferably containing a push-button and a sub-system switching-off both L and A signalling means. The ATPSS contains a velocity meter (V) and/or a recorder (P) of events, in particular the control events and the events of activation of emergency stopping braking, and/or it contains a tachograph (T) to record distance from certain reference point and velocity of the train and events. A train speed sensor (TSS) and/or a train distance sensor (TDS) are connected to the CPU, while the sensors TSS and TDS are preferably the sensors of the train wheels revolution and/or the Doppler sensors. In a method of automatic train protection and stop current coordinates (x s ,y s) of the train are compared in the CPU with the reference checkpoints coordinates (x c ,y c) taken out of the RCMM and at the moment of coincidence of current coordinates (x s ,y s) of the train with any reference checkpoint coordinates (x c ,y c) the CPU activates the OVCM, whereas current coordinates (x s ,y s) of the train are derived from the signal of satellite positioning received by the SPSR equiped with the SPA, or they are taken from external source of the train positioning, preferably the ESPSR, by wire or wireless means, preferably realised in digital techology. Advantageously the values of current coordinates (x s ,y s) of the train and the reference checkpoint coordinates (x c ,y c) are compared with allowance to specified tolerances (#x s , #y s). After activation of the OVCM the CPU switches-on the L device, and after first preset time interval #t 1 , the CPU switches-on the A device, and the CPU waits for pressing the switch (S) by the operator no longer than second preset time interval #t 2 , beginning from the moment of switching-on the L device, and in case the operator does not press the switch (S) during the time interval #t 2 the CPU initiates the train emergency stopping braking, preferably by switching-on the EAV activating the train brakes. In case of fadeout of the satellite positioning signal, current coordinates (x s ,y s) of the train are derived with use of the TSS and TDS. The recorder (P) or the tachograph (T) registers current coordinates (x s ,y s) of the train derived from the satellite positioning signal and/or with use of the TSS and/or TDS, and the recorder (P) or tachograph (T) registers spatio-temporal coordinates (x e ,y e ,t e) of events, in particular the control events, the events of activation of emergency stopping braking, the events of change of the source of the train positioning. In case of change of the train route the CPU registers the event of change of route and determines current changed route of the train and compares it to the route taken out of the RMMM, and determines current new reference checkpoints with use of coordinates taken out of the RMMM, and preferably registers this changed route together with new reference checkpoints in the recorder (P) or the tachograph (T).

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Citation (applicant)

- GB 804672 A 19581119 - WESTINGHOUSE BRAKE & SIGNAL, et al
- GB 1021835 A 19660309 - OERLIKON MASCHF
- GB 1324956 A 19730725 - RHEINSTAHL AG
- GB 1244601 A 19710902 - DAVIES & METCALF LTD
- WO 2005002944 A1 20050113 - SHALOM ENGINEERING CO LTD [KR], et al
- JP H07227009 A 19950822 - HITACHI LTD
- JP 2006131219 A 20060525 - HOKKAIDO RYOKAKU TETSUDO KK, et al
- JP 2007135292 A 20070531 - NATIONAL TRAFFIC SAFETY & ENVIRONMENT LABORATORY
- JP 2007135291 A 20070531 - NATIONAL TRAFFIC SAFETY & ENVIRONMENT LABORATORY
- WO 2005048000 A2 20050526 - LOCKHEED CORP [US], et al
- WO 02059635 A2 20020801 - LOCKHEED CORP [US], et al
- CA 2273400 A1 19991209 - WESTINGHOUSE AIR BRAKE CO [US]
- US 5129605 A 19920714 - BURNS ROGER D [US], et al

Citation (search report)

- [XY] WO 03081514 A1 20031002 - NAHLA IBRAHIM [AU]
- [Y] US 6347265 B1 20020212 - BIDAUD ANDRE C [CA]
- [A] US 2006041341 A1 20060223 - KANE MARK E [US], et al
- [A] DE 10042574 A1 20020228 - SIEMENS AG [DE]

Cited by

US11352036B2; CN108238068A; CN112550360A; CN102745206A; CN113442970A; CN110008022A; CN110362066A; CN113928374A; CN109389678A; CN104602983A; CN103345147A; EP3751315A1; AT511269A1; AT511269B1; KR101065342B1; CN112131764A; US9327743B2; US11414112B2; US9387867B2; US10077060B2; WO2020249874A1; WO2014011887A1; WO2014035268A3; US10088847B2; US9428203B2

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