Bibliography

[1] IEC 62305-2 Ed2:2010-12: Protection against lightning-Part 2: Risk management.

[2] Earthing & Surge Protetion for Telecom Installations, Indian Railways Institute of Signal Engineering and Telecommunications, 2009.

[3] All Relay Interloking, eylon Government Railway, 1962.

[4] "Trak circuit," Wikipedia, The free Enylopedia, June 2009. [Internett]. Available: https://en.wikipedia.org/wiki/Track_circuit. [Funnet 06 Deember 2017].

[5] M.Johnson, "How track circuits detect and protect trains", Greator Washington, 05 Marh 2010. [Internett]. Available: https://ggwash.org/view/4412/how-track-circuits-detect-and-protect-trains.

[6] H.Arai, Y.Ono, H.Fujita, "The Lightning Risk Evaluation for Railway Signalling Systems based on Observation of Lightning Overvoltages," in: Lightning Protection (ICLP), Austria, 2012.

[7] S.Yanagawa, K.Yamamoto, "An Example of Lightning-Protection Measures in Railway Signaling Systems," in: Lightning Protection (ICLP), China, 2014.

[8] P.Bojko, H.R.B.R.C.Roman, V. Kolar, "Measurement of current flowing through a rail with the use of Ohm's method; determination of the impedance of a rail", *IEEE Trans. on Industry Applications, Vol. 51, no.6,* 2015.

[9] I.Watanabel, S.Yokoyama, H. Arai, "Analytical study on lightning overvoltages of rail track and railway signalling equipment", in *30th International Conference on Lightning Protection - ICLP 2010*, Cagliari, Italy, 2010.

[10] Applications of PSCAD™ / EMTDC™, Manitoba HVDC Research Centre

[11] Y.Ono, H.Arai, H.Fujita, “Lightning Risk Analysis for Railway Signalling systems from observation of Lightning Overvoltages on Signalling Cables and Rails”, *Lightning Protection(ICLP)*, nr. Austria, 2012

[12] I. W. H. M. a. S. Y. Hideki Arai, “Analytical Study on Lightning Overevolatages of Rail Track and Railway and Railway Signalling Equipment”,in *30th International Conference on Lightning Protection - ICLP 2010*, Cagiliary, Italy, 2010.

[13] H.Arai, Y.Ono, H.Fujita, “Estimation of Lightning Overvoltages according to Lightning Conditions and Effect on Decreasing Lightning Hazards due to SPD for Railway Signalling Systems,” in: Lightning Protection (ICLP), China, 2014.

[14] H.Arai, et al. “Calculation Model to Evaluate Effects if Lightning Protection Measures on Railway Signalling Equipment,” International Symposium on Lightning Protection (XI SIPDA), Oct. 2011.

[15] K.Yamamoto, T.Ookawa, and S.Sumi, “Study of the Spread of Potential Rise Between Two Grounding Electrodes,” IEEE Trans. on Industry Applications, Vol. 51, no.6, Nov./Dec.2015.

[16] N.Theethayi, et al. “Experimental Investigation of Lightning Transients Entering a Swedish Railway Facility,” IEEE Trans. on Power Delivery , Vol.22, no 1, Jan.2007

[17] J.Vasata, R.Dolecek, “Electromagnetic Compatibility and Lightning Current Impats in the Railway Equipment Buildings,” 26th Conference Radio Elekronika in Slovac Republic, Apr.2016.

Appendix A

Table A: Probability of damage per piece of equipment from indirect lightning surges

Rail Length (m)	Lightning Over-voltage (kV)	Lightning Strike Condition I/r (kA/km)	Probability of Lightning Damage Occurance	Lightning Over-voltage (kV)	Lightning Strike Condition I/r (kA/km)	Probability of Lightning Damage Occurance	Lightning Over-voltage (kV)	Lightning Strike Condition I/r (kA/km)	Probability of Lightning Damage Occurance
	50kA			100kA			200kA		
36.625	1.56	150	1.41	3.11	0.00	0.00	6.22	0.00	0.00
73.25	1.50	150	1.41	3.03	0.00	0.00	5.80	0.00	0.00
109.875	1.04	100	3.10	2.07	0.00	0.00	4.15	0.00	0.00
146.5	0.96	99	3.16	1.73	180.00	0.99	4.00	0.00	0.00
183.125	0.52	30	29.79	1.03	100.00	3.11	2.08	0.00	0.00
219.75	0.45	28	33.76	0.98	99.00	3.16	1.68	170.00	1.11