

पश्चिम मध्य रेलवे
प्रमुख मुख्य संकेत एवं दूरसंचार इंजीनियर
का कार्यालय,
प्रथम तल, अनेक्सी बिल्डिंग-II,
जबलपुर-482001.



West Central Railway
Office of
Principal Chief Signal & Telecom Engineer,
1st Floor, Annexe Building-II,
Jabalpur-482001.

No. WCR/N-HQ/110/ Sig-Policy-corres./Sig-32

Dt. 06.04.2026

Sr.DSTE/Co./JBP, BPL & KOTA
Dy.CSTE/Proj./JBP & BPL
Dy.CSTE/C/JBP & BPL
Dy.CSTE/GSU-I & II/KOTA
Dy.CSTE/D&D-I & II/HQ

Sub- Policy regarding providing redundancy in BPAC, IB signaling and Automatic Signaling in Block sections and in station yard.

Ref- e-office file no.124454.

In connection with the above subject, Policy regarding redundancy in track circuits in station yard & Block sections are as follows:

General:

1. Inputs of both DCTC (DC Track Circuit) & AXT (Axle Counter track section) or AXTN (Axle Counter Main) & AXTS (Axle Counter Standby) shall be separately wired to EI, and manual or auto Reset commands shall be generated by EI in the form of separate outputs, which should reset the failed AXT. This is to monitor health of AXTs using generation of datalogger report of Reset commands. If the DAC (Digital Axle Counter) system has some facility to log various reset commands generated internally and can be accessed whenever required, then separate output is not required.
2. When both systems of a track section are healthy and maintenance is to be done on one system, TPR/VPD of the system to be maintained should forcibly be kept down by disconnecting links or by removing fuse. DAC shall have such facility of keeping down a particular VPD through links or through maintenance terminal. During maintenance of DCTC, TPR fuse from location box should be removed.
3. Detailed testing should be carried out in accordance with the clear instructions before and during commissioning of each installation. Specific and thorough testing (including negative testing) of the route release circuit shall be performed before commissioning, especially in the event of a failure of the track circuit or axle counter, or both simultaneously.
4. Wherever a back contact of the track section relay is required (block/route release circuit, etc.), the axle counters and track circuit back contacts shall be proven in series and there shall be no dilution to this requirement. Where dual detection is being provided in existing EIs without any change in logic, external relay may be wired using contacts of both Normal & Standby systems in parallel and the final relay should be wired in EIs as input.

5. Whenever either the track circuit or the axle counter of a track section is to be maintained/ repaired/rectified, the signalling staff shall intimate ASM through a memo duly mentioning that no train movement will be affected as another system will remain available, and after completion of works, maintainer should intimate back to the ASM about work completion.
6. Signalling staff shall seek failure memo & issue disconnection memo when both systems of a track section have failed. Reconnection should be given when any one of the two systems is rectified or if both systems get rectified simultaneously and are in healthy state. The divisional signal control should be advised only after ensuring synchronous working of both systems.

Dual detection using DAC for Block sections & yards:

1. Redundancy will be provided through dual axle counters in BPAC, IB Signalling, in yards (for dealing with rusty rails situation, longer loops, etc.) and Automatic Block Signalling sections preferably of different make or with hardware redundancy having separate power supplies, cables & cable routes, etc.
2. The detection points of both axle counters should be placed in such a way that they cover the same length for both detected track sections i.e. detection point of main and redundant axle counter shall be provided on different rails of the track. In case of crossover portions, the DPs shall be provided between Centre post of GJ and its welding in case of DCTC in parallel with DAC. Fixing of DPs and provision of Glued Joints should be done taking care of fouling protection as per IRSEM para 17.2.4(a).
3. Track clear status for the detected track section will be available when clear status is available for any axle counter on the relevant section. Final TPR of the track section will be picked up by using the pick-up contacts of both axle counters in parallel.
4. When any (Normal/Standby) of the axle counter of a track section has failed (VPR down) and the other axle counter of the same track section is healthy (VPR up), the clear axle counter will automatically give a resetting command, once only, to the failed axle counter duly observing the delay of 10-30seconds as per approved reset circuit.
5. If both axle counters on a track section in block section have failed, the station master can manually reset the axle counters using the cooperative feature. Manually reset to the axle counters shall be provided in yards, if both axle counters on a track section have failed, but without using the cooperative feature. The manual resetting command will be sent to both failed axle counters simultaneously.

6. Auto-resetting can be provided through Supervisory track section to individual track section of a particular set of axle counter system as per design of OEM and approval of HQ drawing office.
7. Both auto and manual Resetting of all axle counters (including supervisory track section) used for these applications shall be of the preparatory reset type only.
8. The track indication on the Operating VDU/Panel/Display unit will display a clear status only when either both axle counters or any one axle counter of a particular track section is clear. The occupied indication for the track circuit will be displayed only when both axle counters are occupied.
9. However, separate indications can also be provided for all axle counter sections (including supervisory track sections) on the separate indication panel installed in ASM room/maintainers room/Relay room including clear, occupied, reset applied, reset accepted, etc. indications for easy identification of faulty system and for taking action for its restoration.
10. Resetting box for manual resetting of the failed axle counters will be kept in the ASM's office.

Dual detection in Station Yards using DCTC/DAC:

1. Redundancy in station yards shall be provided by axle counters in parallel with the DC track circuit ideally for entire yard. However, rusty rail portions shall be provided with dual MSDAC, preferably of different make or with hardware redundancy having separate power supplies, cables & cable routes, etc.
2. Axle counter detection points should be placed such that the axle counter covers the entire length of the DC track circuit to which it is providing redundancy, and has minimal overlap with other nearby track circuits/axle counters i.e. detection point of main and redundant axle counter, if any, shall be provided on different rails of the track with permissible staggering as per OEM. When DPs to be installed in track circuited areas, then the same should be installed between Centre post of a GJ and its welding. Fixing of DPs and provision of Glued Joints should be done taking care of fouling protection as per IRSEM para 17.2.4(a).
3. Track clear status for the relevant track section will be achieved when either the track circuit or the associated axle counter is in clear status (TPR/VPR up).
4. When the track circuit is showing clear status (TPR up) but the axle counter has failed (VPR down), the clear track circuit will automatically issue a reset command, only once, to the failed axle counter duly observing the delay of 10-30 seconds as per approved reset circuit.
5. When DCTC and AXT both failed, manual resetting may be provided in preparatory mode only. SWR to clearly mention that before issue of Authority to next train over such track section, concerned AXT resetting shall be done by on duty ASM after due verification of concerned failed track section.

6. The auto-reset box for the axle counters, if provided, shall be located in the relay rooms and manual reset box/VDU for resetting shall be provided in ASM's room.
7. For auto resetting, an approved type auto reset module developed by the axle counter manufacturer or RDSO approved vendor shall be used or otherwise railway approved circuit will be used as these will be included in the logic circuit of EI at the stations equipped with EI.

Based on the above policy, existing dual detection systems should be suitably modified whenever any interlocking modifications are being done. Since dual detection arrangement is new developments, this policy will require modifications whenever any new instructions are received or any operational/maintenance issue observed or otherwise also review should be done within a month of completing one year.

This is issued with the approval of PCSTE/WCR.

अभिषेक

(राव अभिषेक सिंह)

उप. मुख्य संकेत एवं दूरसंचार इंजीनियर/मु.

कृते प्र.मुख्य संकेत एवं दूरसंचार इंजीनियर

Copy to: -

CSE, CCE, CSTE/WKs, CSTE/P&D, CSTE/GSU/Kota, CSTE/Proj & CSTE/C for kind information please.



पश्चिम मध्य रेल
WEST CENTRAL RAILWAY

कार्यालय
प्रमुख मुख्य सि.एवं दूर.इंजीनियर
प्रथम तल, अनैक्स भवन - II
जबलपुर - 482001

No. WCR/N-HQ/110/Sig Policy/Sig-32/Pt-X

Date : 20/3/2026

SrDSTE/JBP, BPL & Kota

Sub : Earthing, bonding and other protective measures to minimize effects of lightning & thundering on S&T systems.

Ref : (1) RDSO letter No- RDSO-SIG0SPD(PROJ)/1/2020, Dt. 01/01/25.
(2) Railway Board letter No. 2020/Sig/31/Misc/24/Precautions(E-3319428), Dt. 21-3-25.

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The letter Dt.02/4/2025 issues on the subject is being re-issued with minor modifications.

In order to prevent damages to S&T equipment & failures on account of transients generated due to lightning, thundering and other industrial events, the following actions may be taken on urgent basis :

- A. Go through RDSO letter No- RDSO-SIG0SPD(PROJ)/1/2020, Dt. 01/01/25, and ensure :
 - 1) equipotential earthing & bonding of S&T installations as per RDSO directives vide STS/E/TAN/3006, Ver-3.1, Dt.25-6-25.
 - 2) firm connections in earthing circuits.
 - 3) Firm connectivity of earth with resistance less than 1 ohm at class B & C SPDs provided in IPS room, class C/D SPDs provided in EI room on 110V DC supply and any other SPD requiring earth connection.
- B. Ensure compliance of "Summar & Monsoon precautions for Signalling systems" circulated by Railway Board vide letter No. 2020/Sig/31/Misc/24/Precautions(E-3319428), Dt. 20-3-26.
- C. Segregation of DIRTY & CLEAN wiring : Cables through which transient current passes are DIRTY cables because the electromagnetic flux produced due to flow of such transient current will induce voltages in other adjacent cables and cause damage to the equipment connected through those adjacent cables. The SPDs, provided in IPS room & other SPDs requiring earth connection, divert any high voltage transient generated due to lightning in the incoming supply cable to earth. As a result, very high impulsive current flows through the incoming supply cables and earth connection from SPDs to the earth pits. Hence these cables carrying high impulsive currents are DIRTY cables and all other cables connected with sensitive electronic equipment **should not have proximity & parallelism with such DIRTY cables**. Thus the 230V AC supply cable from CLS Panel to SPD box in IPS room and the Earth cable(s) from SPD to earth pits via MEEB are also DIRTY cable(s). In case of EI installations, the 110V DC supply cable from IPS to EI SPD in EI room and the earth connection cable from EI room SPD to earth pits through MEEB are also DIRTY cables. Another very DIRTY cable is the down-conductor cable from Class-A SPD to earth pit(s), which will generate very high magnitude of emf which will certainly affect EI sub-systems like input/output cards, VDU, etc. as on the roof the cable from class-A LPD might be running parallel to and with vertical proximity also to various wiring troughs in relay room. Hence now onwards at all installations, following practice to be adopted with immediate effect :

- 1) The 230V AC supply cable from CLS Panel upto the SPD box in IPS room must be laid through GI pipe to get the shielding effect in the event of high transient current flowing through the cable conductors.
- 2) Earth wire connection from the earth pit(s) to MEEB in IPS room should be brought in GI pipes from a distance of 4-5m away from building walls upto MEEB to get shielding effect.
- 3) The down-conductor of Class-A LPD must be laid using suitable GI pipe with suitable bend/elbow again to get benefit of shielding effect.

In case of existing installations where neither GI pipe is provided nor could be retrofitted, good quality Copper tape of reputed make or Nickel-Copper Faraday cloth with shielding effect of more than 70dB may be wrapped for suitable portion of the DIRTY cables and CLEAN cables in the proximity with earth connection made at one end of each.

Copper tape or Nickel-Copper Faraday cloth with shielding effect of more than 70dB may be wrapped around other cables connecting sensitive electronic equipment related to EI, ASM VDU, Telecom circuits, etc. with earth connection at one end to get shielding effects & protections from transients at installations in heavy lightning prone areas. Where segregation of DIRTY & CLEAN wiring is requiring disproportionately high efforts, Copper tape or Nickel-Copper Faraday cloth with shielding effect of more than 70dB may be wrapped around the dirty & clean cables in segregated grouping & earthing.

- D. When lightning strike takes place, it creates magnetic field which can induce transients in nearby indoor, outdoor and even underground cables carrying various circuits. In the proximity of lightning strike the magnitude of transients will be much higher but even if lightning strike takes place at about 1.5Km away, it generates transients of considerable large magnitude in the cables which affects electronic equipment connected through such cables. Even cloud to cloud lightning also creates transients of considerably large magnitude in open as well as underground cables which affects electronic equipment connected through such cables. In order to prevent equipment failures on account of transients/surges generated due to thundering/lightnings/other industrial events, earthing and bonding alone is not going to give complete protection and we need to provide individual circuit-wise protections by providing protective devices at both ends of such cables connecting sensitive electronic equipment which need protection from transients. These components to be provided directly across the cables terminated on the equipment. If it is not possible to provide these components directly at the cable termination terminals of the equipment at both ends then provide them on any cable terminations nearest to the equipment to be protected on both ends of the cable. This will clamp the magnitude of such transient voltages to such a low level which our sensitive electronic equipment may withstand. In order to avoid damages & failures of S&T equipment from the effects of transients generated due to lightning, thundering & other industrial events, following protective devices may be provided at both ends of cable connecting sensitive electronic equipment depending upon voltages the cables connected with such equipment carry :

- 1) MOV, 20mm dia, for 11V AC/14V DC supply with maximum clamping voltage of 36V at 20A and peak single pulse(8/20us) rating of 2KA of reputed make : Across TB/TN & RB/RN of track circuits in feed end & relay end TLJBs, VHF supply on both end of the cable, etc. Any other equipment requiring protection against transients with working voltages upto 11V AC/14V DC.
- 2) MOV, 20mm dia, for 25V AC/31V DC supply with maximum clamping voltage of 77V at 20A and peak single pulse(8/20us) rating of 2KA of reputed make : Across TPR/NKR/RKR/NWKR/RWKR/Slots outgoing supply cable side in location boxes & at highly lightning prone stations on incoming supply in relay room at cable side terminations,

- various DAC supplies/VPR/Reset ports, 24V DC supply terminals of EI VDU inverter, VDU PC, etc. Across 24V(Ext) cable incoming & outgoing side on cable terminations in each location boxes and two in parallel across cable side in IPS power distribution board. Any other equipment requiring protection against transients with working voltages more than 11V AC/14V DC upto 25V AC/31V DC. If busbar voltages are high at extended yards, MOV, 20mm dia, 30V AC/38V DC, with maximum clamping voltage of 93V may be used.
- 3) MOV, 20mm dia, for 40V AC/56V DC supply with maximum clamping voltage of 135V at 20A and peak single pulse(8/20us) rating of 2KA of reputed make : Across outputs terminals of 48V DC OFC charger and at the power supply terminals of equipment(STM, PD MUX, Exchanges, etc.), DAC Reset circuits on both ends of equipment terminals, Mapple equipment supply terminals and at source in IPS room. Any other equipment requiring protection against transients with working voltages more than 25V AC/31V DC upto 40V AC/56V DC supply.
 - 4) MOV, 20mm dia, for 50V AC/65V DC supply with maximum clamping voltage of 135V at 100A and peak single pulse(8/20us) rating of 6.5KA of reputed make : Across TPR/NKR/RKR/NWKR/RWKR/Slots outgoing supply cable side in location boxes & at highly lightning prone stations incoming supply in relay room at cable side terminations, Mapple equipment supply terminals and at source in IPS room. Across 60V(Ext) cable incoming & outgoing side on cable terminations in each location boxes and two in parallel across cable side in IPS power distribution board. CEL DAC supplies, PDCU(input & output), corresponding Mushroom box terminals, TX outputs of CEL DAC, etc. Any other equipment requiring protection against transients with working voltages more than 40V AC/56V DC upto 50V AC/65V DC supply.
 - 5) MOV, 20mm dia, for 95V AC/125V DC supply with maximum clamping voltage of 250V at 100A and peak single pulse(8/20us) rating of 6.5KA of reputed make : Two in parallel across EI 110V DC supply terminals in relay room & originating supply terminals in IPS room power distribution boards. 110V DC input terminals of DC-DC converter sets, IPS inverters, EI VDU inverters, DAC supplies, PDCU(input & output), corresponding Mushroom box terminals, TX outputs of Eldyne & GGT DAC, etc. Any other equipment requiring protection against transients with working voltages more than 50V AC/65V DC & upto 95V AC/125V DC supply.
 - 6) MOV, 20mm dia, for 250/275/300V AC supply with maximum clamping voltage of 650/710/775V at 100A and peak single pulse(8/20us) rating of 8KA of reputed make : . Across 230V AC supply terminals of OFC charger, each SMR, 12V charger of VHF set, etc. taking into account prevailing maximum voltages at the installation. Across any other equipment/circuit working on 220/250/275V AC supply. If AT supply voltages are higher than 275V AC which is the highest permissible as per IPS specifications, then the prevailing voltage may be brought down below 275V AC with the help of Electrical department.
 - 7) MOV, 10mm dia, for 25V AC/31V DC supply with maximum clamping voltage of 77V at 5A and peak single pulse(8/20us) rating of 0.5KA of reputed make : Across input/output terminals of UFSBI & NV MUX in Auto Huts and at other places where UFSBI/any MUX are wired with relays directly on relay racks with cable length >3m from such electronic equipment, across EI input/output terminations nearest to EI of Hitachi & Medha, etc.
 - 8) TVS Diode, 1500W peak pulse capability at 10/1000 micro-second, Bi-directional, reverse standoff voltage = 8.55V, maximum clamping voltage = 14.5V at 104.8A, maximum reverse leakage current of 10 micro-Amp at 8.55V of reputed make : Across Data Communication ports of UFSBI, MSDAC(non-superimposed), HASSDAC, SSDAC, data port of ACE/PDCU data terminals of equipment at originating & terminating side of cable. Across TX/RX of E1 terminals of equipment wherever cable connecting the equipment length is more than 1m. Across RX input terminals of DAC(if functional earth is there then

RX1 – E – RX2 & RX1 – RX2(Δ protection). Any other equipment requiring protection against transients with working voltages less than 5.5V AC/8.5V DC and cable length is more than 1m.

- 9) MOV, 20mm dia, for 130V AC/170V DC supply with maximum clamping voltage of 340V at 100A and peak single pulse(8/20us) rating of 8KA of reputed make : Across 110V AC(Ext) cable terminations(incoming & outgoing) in each location boxes and cable side in IPS power distribution board, both ends of cable supplying 110V AC to maintenance VDU of EI and at old installation on operator's VDU, across LED lamps in signal units(if existing one goes defective or quality doubtful), etc. Across any other equipment/circuit working on upto 130V AC/170V DC supply.

At lightning prone installations, this MOVs to be provided across outgoing RG, HG, HHG & DG on cable side terminations in relay room except Junction route indicator circuit(UG) and at other than lightning prone stations, this MOV to be provided across OFF aspects(not ON aspects) of reception signals and across other than GREEN aspects of departure signals(certainly NO on UG circuit) to prevent fuse blowing in lamp circuit & ECR going defective during lightnings with the condition that :

- after every major lightening event around any installation where the MOVs are provided in signal lamp circuits at relay room end, the MOVs at relay room end should be inspected & to be replaced on observing any deformity in shape, bulging, swelling, cracking, heating, burn marks, etc.
- June to September or till extended monsoon, every month current through MOVs in signal lamp circuits to be measured and if found to be equal to or more than 250 microamp, such MOV to be replaced. Other than monsoon period, current through MOV in circuit to be measured quarterly(for Jun ending quarter-in May) and MOV replaced if current found to be equal to or more than 250 microamp.
- MOVs in signal lamp circuit at CTR to be replaced every year or whenever any deformity in shape, bulging, swelling, cracking, heating or burn marks observed.
- Any incidence of signal blank and ECR pick up situation may be investigated in detail and intimated immediately. Summary of such incidences with detailed remarks may be sent every year by the end of monsoon season i.e. Oct-end.

MOVs' coating shall be flame-retardant, compliant to UL 94 V-0. MOVs & TVS diodes to be provided with **firm connection at both the legs(there should not be any loose connection)** and in such a manner to facilitate visual inspections of both sides which will have to be done quarterly for all other circuits (except signal lamp circuits at relay room end for which it is to be done as directed above) to check about any deformity in shape, bulging, swelling, cracking, heating, burn marks, etc. on observation of which the MOVs/TVS diodes shall be replaced. Other than signal lamp circuit MOVs should also be replaced when leakage current at rated voltage exceeds 500 microamp. In any case MOVs to be replaced after every 5 years.

All AC ratings mentioned above are for RMS voltages.

EKNATH MOHKER
Digitally signed by
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Date: 2026.03.27
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} For information & necessary actions for installations to be commissioned now onwards.