

Electric Shock Incident

Date / Time: 1 August 2024 - Thursday, 15:23
Location Between Barangaroo and Martin Place on the Up
Inter-Station: TS31 – Additional Emergency Exercise
Duration: 15:09 - 15:31



Summary of Incident

- Request was made from Fire Rescue New South Wales (FRNSW) to MTS Head of exercise MTS to close the doors on TS31 and deviate from the agreed emergency scenario to enable further tests of Emergency Door Release (EDR).
- FRNSW exercise participant was trying to gain access to train from the emergency walkway by activating several EDR's.
- 2 train doors were tried before moving to the 3rd, PEAs (Passenger Emergency Alarms) were also pressed from inside which caused multiple alarms to be activated on the Train Controller (TC's) HMI (Human Machine Interface) screen in the Operations Control Centre (OCC).
- Upon activation of 3rd EDR, OCC opens the doors at which point one of the FRNSW members sitting on the emergency walkway activating the EDR on the third car got "zapped" (his own words).
- MTS immediately called Ambulance NSW, SafeWork NSW were notified and area isolated. 37-year-old male treated. ECG completed with no issues. Released from St. Vincent's Hospital.
- Approx 15:31 Exercise was cancelled by FRNSW in terms of train related activities, but they proceeded to rescue the volunteers from the cross passage.
- MTS Asset Engineering Technician was dispatched to site to investigate.
- Voltages between train and walkway (touch potential) were measured (via multimeter device). Values up to ~120V were recorded – which is compliant with system design and EN50122 Standard.
- TS31 underwent full train maintenance exam with EDRs inspected – confirmed compliant with technical maintenance standards.
- Root cause - FRNSW exercise participant making contact between Rail connected Trainset and Earth Emergency Walkway (graphic on slide 8) – therefore being subjected to Rail-Earth Touch Potential and potentially causing the “zap” feeling.



Incident Timeline | Automatic Train System Logs

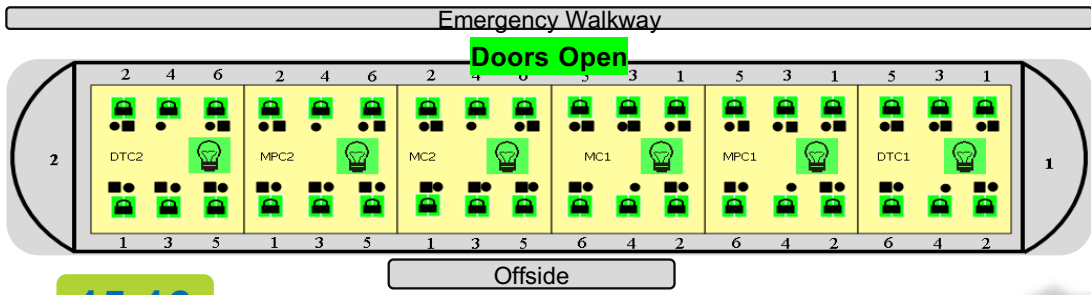
TS31 EDR ACTIVATIONS



Time	Event
15:10	All doors on emergency walkway side were remotely opened by OCC as part of the evacuation exercise scenario.
15:16	DTC1 Door 2 EDR (Emergency Door Release) was activated two (2) times by FRNSW from outside the train opposite side to the emergency walkway. Door authorisation was not provided by OCC as this was not part of the agreed scenario/exercise.
15:17	DTC1 Door 1 EDR (emergency walkway side) was activated by FRNSW while doors remained open.
15:19	All doors are automatically closed following 10-min system timeout, operating as per system design.
15:20	DTC1 Door 1 EDR (emergency walkway side) activated another seven (7) times by FRNSW and PEA (Passenger Emergency Alarm) activated onboard train by RFE (Rail Fire Engineering) at the same door.
15:21	OCC - TC (Train Controller) resets multiple PEA activations.
15:22	OCC - TC authorises doors for evacuation. (<i>system designed to release doors within 33 seconds</i>).
15:23	MPC1 Door 3 EDR on emergency walkway is activated again by FRNSW – “Zapp” sensation reported by FNRSW member
15:23	All doors are open via the OCC – TC remotely

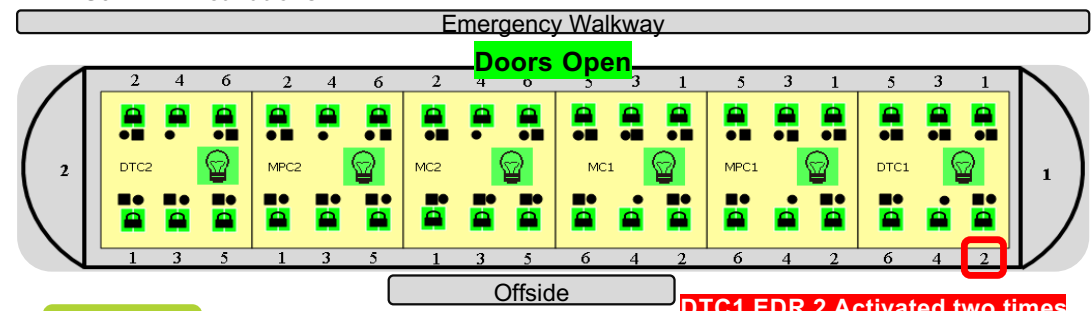
15:10

TS31 EDR Activations



15:16

TS31 EDR Activations

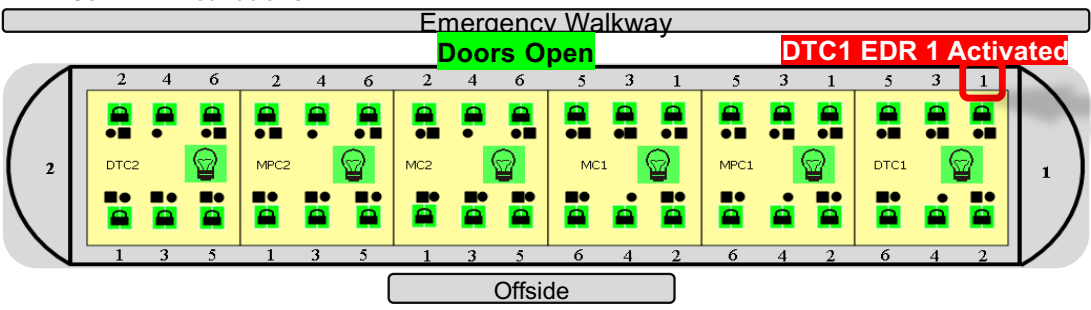


DTC1 EDR 2 Activated two times
Note 2 red lights in video



15:17

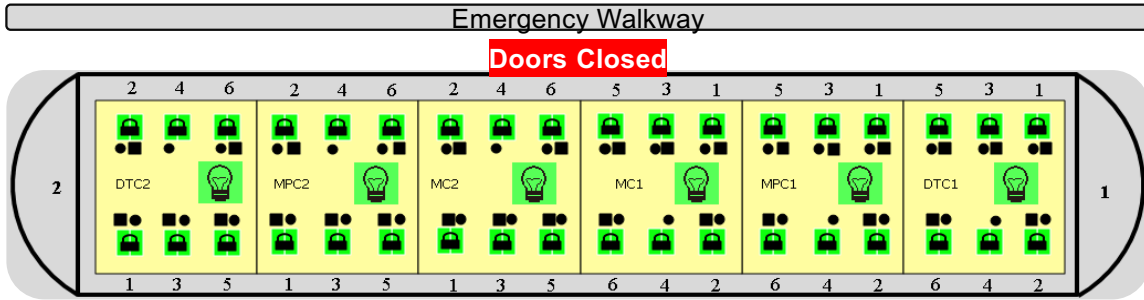
TS31 EDR Activations



DTC1 EDR 1 Activated

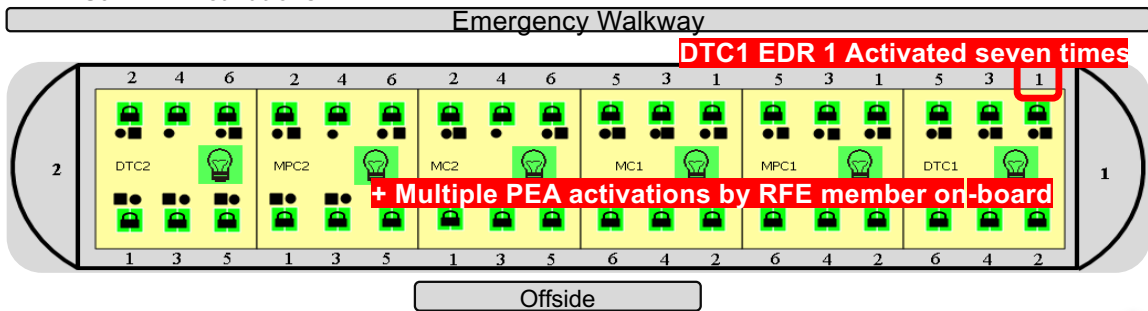
15:19

TS31 EDR Activations



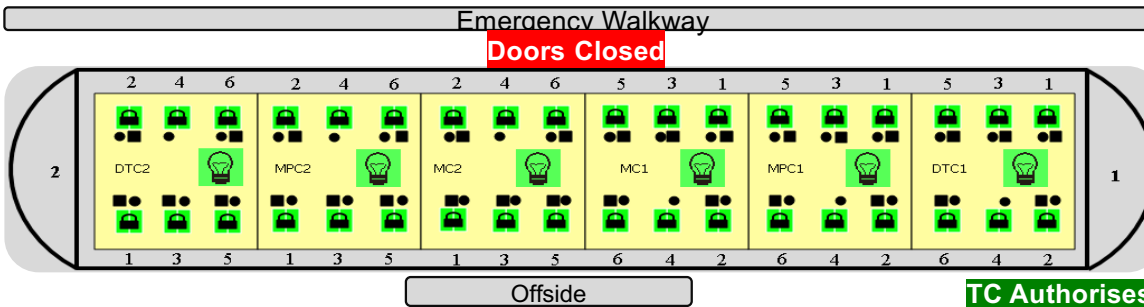
15:20

TS31 EDR Activations



15:22

TS31 EDR Activations



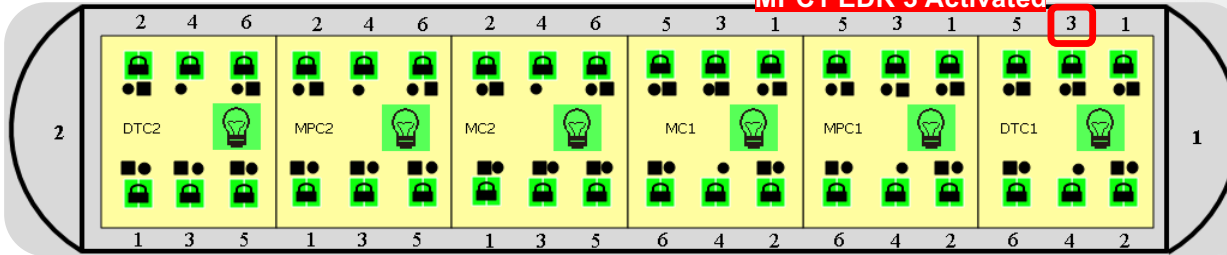
TC Authorises Doors Open

15:23

TS31 EDR Activations

Emergency Walkway

MPC1 EDR 3 Activated

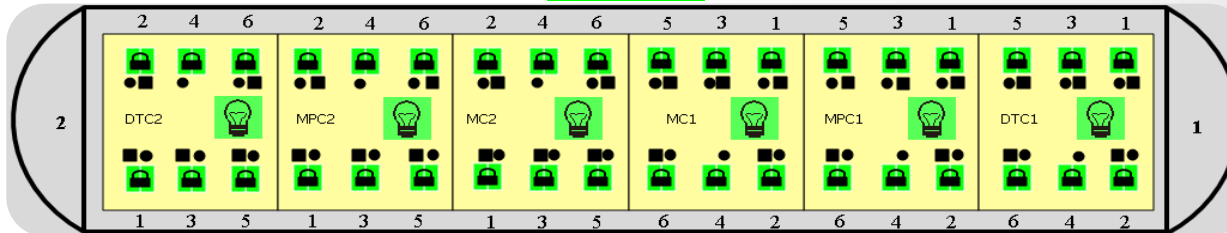


15:23

TS31 EDR Activations

Emergency Walkway

Doors Open

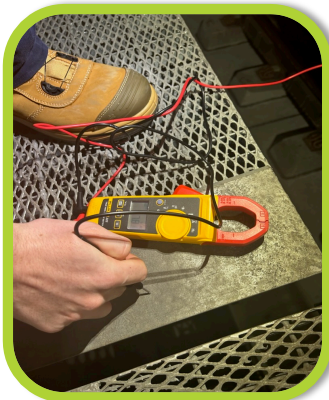


MTS Response



IMMEDIATE ACTIONS

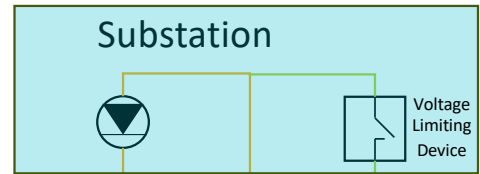
- Ambulance NSW called, SafeWork NSW notified, immediately isolated the area. Confirmed no loss time injury (LTI) for FRNSW, ECG undertaken with no identified issues (no admission to hospital) and released from St Vincent's Hospital.
- MTS Asset Engineering Technician was dispatched to site to investigate. Voltages were measured between the emergency walkway and train. Values of up to ~120V recorded (via multimeter device), which are compliant with EN50122 standard and system design levels.
- TS31 EDR's were inspected at the Maintenance Depot - all reported fully functional (operating as per design) and compliant with TMP (Technical Maintenance Plan).
- Incident Cause Analysis Method (ICAM) investigation initiated by MTS Safety Team.



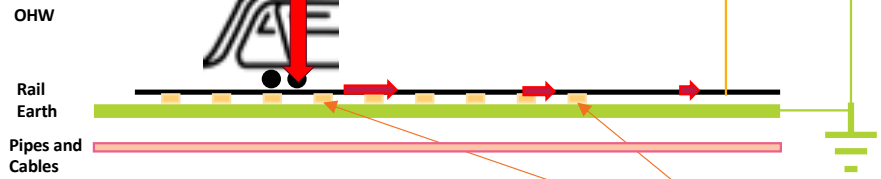
Network System Design



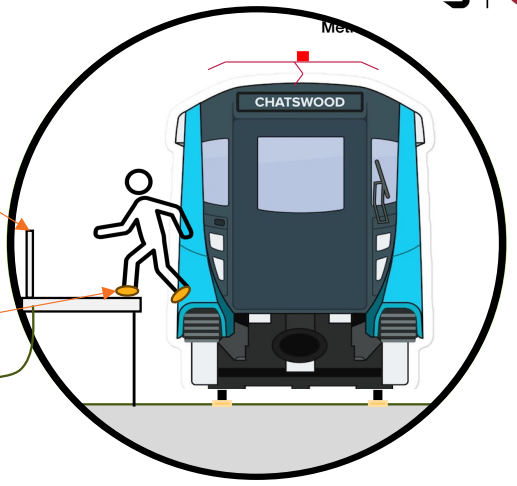
Substation VLDs manage rail-to-earth voltage, keeping it below the Transport Standards threshold



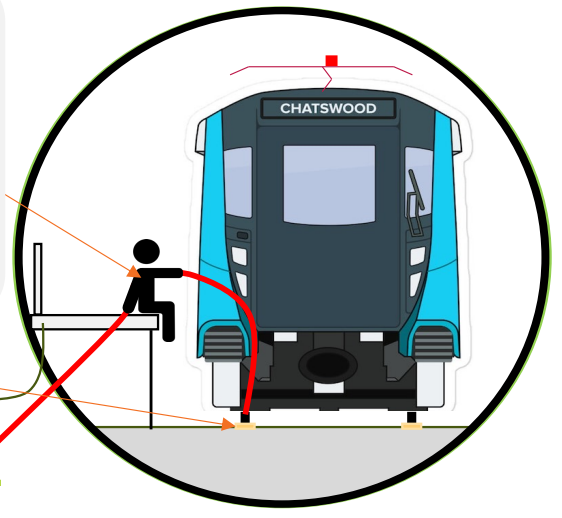
The return current path for the train is via the running rails.
As distance from the substation increases, resistance in the rail causes higher rail-to-earth voltage.



During an Evacuation passengers are directed to hold the handrail away from the train, moving them away from the touch potential points on the train.
Shoes provide enough Insulation to prevent a Rail-Earth Shock.



The Rail-Earth touch potential had been realised with positioning of FRNSW member, hence experiencing the zap feeling - difficult to quantify exact voltage although measured within design and EN standards.



Because the rail network uses continuously welded rail, rail voltage will be present throughout the corridor, regardless of whether the overhead wire (OHW) is isolated. This features in all GOA4 1500v DC Design.

Rail is insulated from Earth
This prevents Traction Return Current flowing through assets parallel to our tracks preventing Electrolysis.

EN50122 standard permits rail voltage of up to 150 volts for up to 300 Sec (5mins) and up to 120 volts for less than 300 Secs (5mins). The MTS network is always compliant with this and is controlled via a Voltage Limiting Device located in each substation which trips instantaneously when rail volts exceed 150 volts.

Key Actions

MTS

MTS to continue with additional demonstrations (not part of Trial Running or Emergency Exercises) to further enhance FRNSW Network and Systems familiarisation

OCC task analysis in degraded mode to be undertaken with specific focus on multiple event/alarms

Additional emergency exercise protocols to be followed as per agreed scenarios

MTS to provide FRNSW with briefing on incident report findings

MTS confirmed current PPE/Standard requirements are adequate to mitigate against rail-earth touch potential





Appendix:

EDR Activation / Response Process
Asset Engineering Report
Alstom Job Card



EDR Activation/Response Process

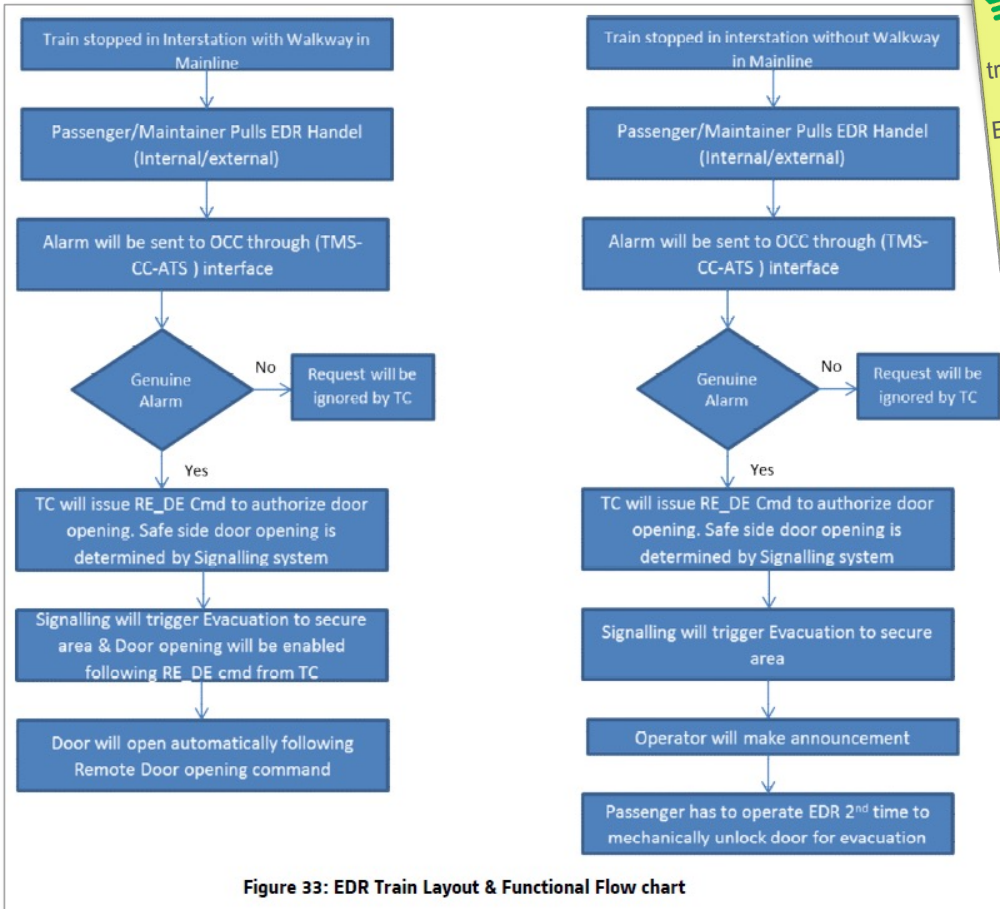
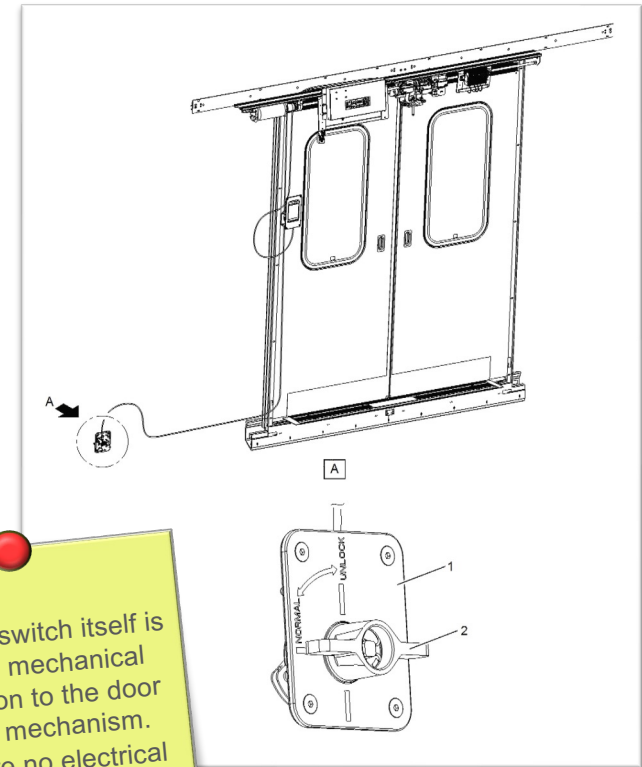


Figure 33: EDR Train Layout & Functional Flow chart

When an EDR is activated, and the trainset is localised and communicative, EDR activation requires TC authorisation to enable door open.



The EDR switch itself is purely a mechanical connection to the door release mechanism. There are no electrical components attached to the switch itself.



MTS | 
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Thank you
