ERL MAINTENANCE SUPPORT SDN BHD

Company Reg No. 199901023674 (498574-T)

E-MAS

Effective Railway Operations; Reliable System Maintenance

OPERATIONS DEPARTMENT

PROCEDURE FOR WORKS WITHIN STRUCTURAL & CLEARANCE GAUGE

Ref No : G00.OMO.M15631.NP.1001.E

Release

Released:	Hassan Assalamat	Chief Executive Officer	20.03.25	
Checked:	Sukhbir Singh	Safety & Security	20.03.25	
Checked:	Jayaraj	Maintenance	20.03.25	for
Checked:	Haryati Khalil	CEO Office	19.03.25	
Checked	Mohd Azim	CEO Office	13.03.25	
Checked	James Boudville	Operations	11.03.25	
Author:	Omar / Tajun Naim	Operations / SYS	10.Mar.25	
	Name	**Department**	**Date**	**Signature**

Amendments or additions to this procedure must be indicated with a vertical black line in the adjacent left margin.

Change Record and Configuration Control

Revision	Date	Modification	Name
E	20-Feb-25	3 years document revision. No significant changes on the procedure content. Changes on new CEO appointment.	Omar (OPS)
D	20-Dec-21	Revision of the entire document & changing on company registration number. This procedure supersedes the earlier version ref no ; G00.OMO.M15631.NP.1001.C	Omar (OPS)
C	25-Feb-19	Revision of the entire document including changes to reflect ISO9001:2015 and ISO14001:2015 new requirements. This procedure supersedes the earlier version ref no ; G00.OMO.M15631.NP.1001.B	Omar (OPS)
B	04-Mar-14	Revision of the entire document including exclusion of IWN work procedure. This procedure supersedes the earlier version ref no ; G00.OMO.M15631.NP.1001.A	Omar (OPS) / Tajun Naim (ELT)
A	02-Apr-12	Combination of Procedure for Work Within Structural & Clearance Gauge and Processing of Permit To Work. This procedure is treated as a new procedure and supersedes the earlier version ref no ; G00.OMO.M15631.NP.0001.B	Omar (OPS) / Tajun Naim (ELT)
B	21-Sept-05	Revision & summary of the entire document including changing of procedure's title, additional information and Operations Instruction (PICOP) */06.	Azrin (OPS) / Tajun Naim (TEL)
A	01-Feb-05	Handover/takeover of document/procedure from SAS to OPS. Revision of the entire document including additional information & changing of coding system.	Azrin/Suhaizee (OPS)

Planning Of Changes Reference For Revision: G00.OMO.M15631.NP.1001.E					
Issues To Consider	**Checked** ***(Please mark X)***				**Remarks**
1) Are there any negative impact?	YES		NO	X	
2) Will the integrity of QEMS be affected?	YES		NO	X	
3) Resources available?	YES	X	NO		Adequate
4) Allocation or relocation of responsibilities and authorities required?	YES		NO	X	

TABLE OF CONTENTS ..... **Page**

1 Purpose

This procedure is in accordance to Rulebook Section A (G00.OMZ.M10100.BT.0001.*),. The purpose of this procedure is to lay down the guidelines for implementation a PTW in order to: -

1. Protect and prevent the worksite from any incident or accident
2. Improve the planning and administration process
3. Minimize the impact to the train services

A PTW can be categorized as follows: -

1. Track Possession
2. Notice Call to OCC (NC)

2 Scope, Distribution & Access

This procedure is available to all Operations and Maintenance staff. Access to the document is given to all E-MAS Operations and Maintenance staff via Electronic Document Management System (EDMS). Employee without EDMS user access can retrieve this procedure via E-MAS Operations Department portal.

3 Definition / Abbreviation

CG	Clearance Gauge
CoCC	Chief of OCC
DTR	Department Training Representative
ERLSB	Express Rail Link Sdn Bhd. Company No: 199601003493 (375839 H)
EC	Engineering Controller
LC/DC	Line or Depot Controller
HoD	Head of Department
OCL	Overhead Contact Line
OCS	Operation Control Center Supervisor
OCC	Operation Control Center
PTW	Permit To Work
PICOP	Person In Charge Of Possession
PPE	Personal Protective Equipment
SG	Structural Gauge
SPYTL	Syarikat Pembenaan Yeoh Tiong Lay
OCL, OPS, TLE, RST, SIG, DWE, SAS	Refer to E-MAS Org chart (#44478) and its subset
TPR	Track Possession Request
TWP	Train Washing Plant
Look Out Man	Qualified personnel to monitor train movement and alert PICOP during implementation of PTW

An asterisk (*) used to refer to the latest version, applicable for all pages in this procedure

4 Personnel Working Under PTW

The respective HoD will decide their personnel to attend the PTW training to ensure that they will have competent personnel working under PTW.

4.1 Training & Test

OPS are responsible for the PTW Initial Training and Refresher Course arrangement. PTW theoretical training will be conducted by OPS and competent personnel from ELT (Senior Charge man) will carry out the practical training related to electricity safety, installation & removal of earthing devices and SAS for safety briefing.

All selected personnel must take the initial PTW training, which will cover both the theoretical and practical sessions. There will be half day theory session and half day practical session.

Upon completion of the training, then the candidates must sit for a theoretical test. The passing mark for the test is 70%, failing which; the candidates will have to re-sit for the test before they are certified as a PICOP.

4.2 Certification

The candidate who passed both sessions will get a certificate of competency signed by the HOD of OPS, SAS and the relevant trainers from OPS and SYS.

4.3 Refresher Course

The PICOP competency is valid for two (2) years only. OPS will update the training database after completion of each refresher course. Validity of the competency is to be monitored by the respective DTR and HOD. Thus, before expiry of the validity of the competency, the respective personnel will have to attend a refresher course.

5 Works within Structural gauge and Clearance gauge

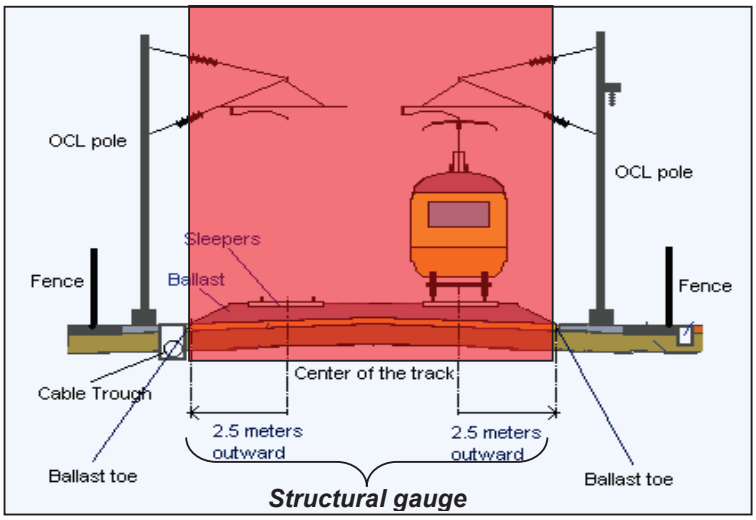
No person shall enter the SG/CG unless required by their duties and with an approved PTW. The approve PTW by OPS management is only treated as a reservation for scheduling of works, and it is not an approval to actually enter and work within SC and CG. PICOP must obtain permission from OCC to enter SG before implementing any PTW at site.

5.1 Safety Precaution on or Near the Track

1. Wear high visibility vest (Orange color)
2. Be continuously watchful for approaching vehicles/trains
3. Never sit, stand or walk on top of the rail
4. Never step or stand on the moveable part of turn out
5. Do not cross a track immediately after a vehicle passed. Wait until adjacent track can be observe in both direction
6. Do not touch or work on running rails during lightning and thunderstorm

5.2 Structural Gauge (SG) Parameter

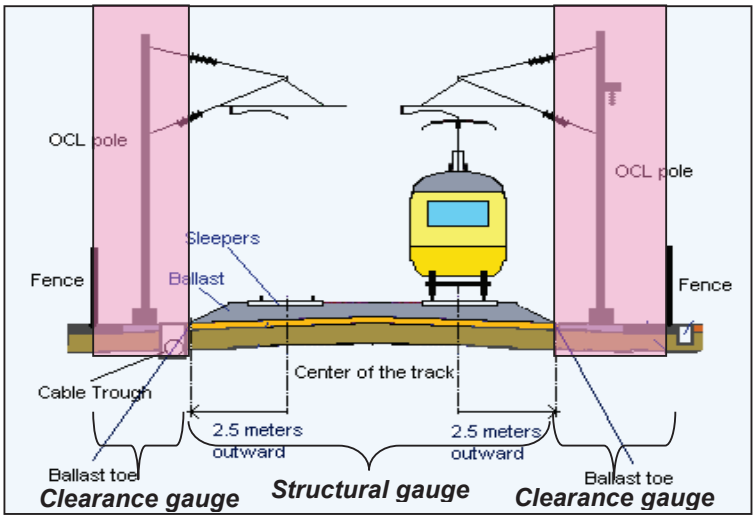
The SG describes the perimeter line for the passing of rail vehicles (2.5m from the center of track outward or approximately up to the ballast toe, which comprises the static car gauge, the dynamic deflection (or the kinematics envelope), the Construction and Maintenance tolerances and additional safety margins, which must be kept clear of personnel, tools and obstructions. (***SG shown as section highlighted in Red***)



As a general rule, the minimum distance to be kept clear from any persons, tools or materials is 2.5 metres from the centre line of the track outward which is applicable for single track and double tracks.

5.3 Clearance Gauge (CG) Parameter

The CG describes the area outside the SG up to the fence or any other limit to the railway corridor and platform area. (***CG shown as section highlighted in pink***)



6 Track Possession

The TPR can be defined as a closure of a portion of one or both tracks between stations or Depot or one or more turnouts.

A TPR is required for activities that are within the SG as indicated in diagram 1. (2.5m from the center of track up to the ballast toe).

During operational hours, only 2 TPR are allowed to be opened at any one time to limit the constrain on managing the train movement and communication with the trains and PICOP.

The following TPR are possible;

Planned; which is agreed in the TPR meeting and approved by the OPS Management
Unplanned; for immediate failure investigation and rectification, approved by the OCS under the direction of the OPS Management

TPR has to be applied for all works;

1. Within the SG (2.5m from the centre of the track outward)
2. Which requires the isolation of OCL power

DANGER
THERE IS NO SAFETY SPACE BETWEEN ANY 2 ADJACENT TRACKS

At converging lines the fouling point is marked according to the OPS Procedure for Communications & Signal Book. Staff must take care to ensure that there is sufficient clearance for their safety where lines converge.

6.1 Application for a TPR

A request for a Track Possession must be applied using the TPR form ***[Refer to Appendices 1]*** and submitted to the OCC no less than **48 hours** prior to commencement of work.

Third Parties must submit requests for a PTW to ERLSB for first layer approval. After it is accepted and approved, SAS HOD will then forward the request to OCC for PICOP arrangement and approval.

6.2 Processing of a TPR

A TPR meeting will be initiated by CoCC on weekly basis to discuss and arrange the best program for the following week and this is to ensure that the work does not conflict with other TPR.
The OCS shall ensure that the applicant completes all relevant details before providing a TPR number. The OCS then forwards the form to the CoCC for approval.

OCS to check;

1. PICOP validity
2. Any additional impact to operation i.e temporary speed restriction
3. Any conflict with other TPR
4. Any additional assistance require

6.3 Example of typical works under TPR

SYS (SIG)

• Point Machine Greasing
• ATP cable meggering

SPYTL

• Ballast unloading
• Tamping and track recording

SYS (OCL)

• Tensioning device inspection
• Earthing bar under road bridge inspection

INF

• Spot cooling at terminal KLS & KLIA
• Washing plant PM

OPS

• Turnout Training
• Practical training (e.g. coupling, evacuation)

7 Notice Call to OCC [NC]

NC is required for any activities authorized by an E-MAS HoDs & SPYTL within the CG [***refer Diagram 2***]. The OCS is required to create SAP notification with following info:-

1. Name of person in charge
2. Nature of work
3. Location
4. Open and closing time
5. Possible impact to the system if any

7.1 Exceptional

NC are exempted for all activities that have a mutual agreement with ERLSB and/or E-MAS (i.e. trackside security guard patrolling along the track) and stationed at the site for a long period.

7.2 Example of typical works under NC

SYS (SIG)

• ATP Voltage Measurement (indoor/outdoor)
• Signal Visual Inspection

SYS (OCL)

Schedule inspection	• Pole & wire
Unscheduled inspection	• Check on caused of power tripped

SPYTL

• Grass cutting
• Manual Drainage Cleaning

INF

• Lighting Inspection at KLS
• Lighting changing at KLS

OPS

• Installations of Speed Board Marker

SAS

• Replacement of damaged trespasser signage along the line
• Foot inspection

8 PICOP

8.1 General Definition of PICOP

A track possession requires a deployment of a **PICOP**.

PICOP is defined as "**a person who is in charge and have the exclusive right on a track possession area and will act as the group leader and have the sole responsibility for the safety of work at site and all arrangement with the OCC**". He takes over the responsibility of the OCC within the track possession area.

8.2 Responsibilities of PICOP for TPR

PICOP can be the work-group leader and/or supervisor and these have no effect to his responsibility as a PICOP. A PICOP shall only in charge one TPR at any one time.

The general responsibility of **PICOP** is:

1. Opening and taking over the TPR from OCC
2. Exclusive right within his possession area
3. Issued approval for any movement for entering, leaving or within the possessed area
4. Safety of work at site (track, equipments, workers etc)
5. To observe the turnout position is set correctly
6. Ensuring the clearance of the track, equipments, workers etc before closing and handing over TPR to OCC

REMINDER

IN THE EVENT WORK TO BE DONE FOR A LONG PERIOD, AND PICOP HAS FINISHED HIS SHIFT DUTY, THE PICOP SHALL BRIEF HIS RELIEF ON THE WORK STATUS AND NOTIFY OCC HIS RELIEF NAME THAT TOOK OVER HIS POSSESSION AREA

8.3 PICOP's Duties Before Opening of TPR

Before the PICOP start the work under TPR, PICOP must brief LC/DC on their working location and vehicle arrangement. For work that required OCL power isolation, the PICOP must brief the EC with regard to the section to be de-energized and fill up EC switching procedure form. The PICOP also must ensure his communication equipment is in good working condition by performing Radio check at their work area before start the work.

The PICOP ensures, that all workers are wearing the required PPE i.e; reflective safety vest and safety boots and gives a briefing to all workers involved containing of the following elements:

1. Safety briefing (safe precaution on or near the track)
2. Track and electrical safety aspects, depending on the nature of the work
3. Boundaries of the track possession
4. Physical boundary of work

5. Deployment of Look out man at least 3 pole from working area for work that implement in between of trains run

8.4 PICOP's Duties During Opening of TPR

The PICOP calls OCC for opening of the TPR at the exact location of track possession area, The PICOP shall inform OCC:

1. The TPR number,
2. Nature of work, location and time
3. Request for power OCL isolation if required
4. Obtain the approval to apply the EARTHING DEVICE from OCC
5. Confirmed present of voltage after any power isolation by using the Voltage tester
6. Inform OCC the exact location of the EARTHING DEVICE and Stop Board immediately after each earthing device and Stop Board installed
7. Request for additional assistance, if any [i.e.]
    - Speed restriction
    - To operate the Turn out to the other position if require
    - Request for Train driver to activate warning device or to switch high beam light approaching work area
    - Temporary removal of axle counters and etc

STOP board and earthing devices have to be placed within the possession area to protect the work site area. STOP board to be placed at approximately 50 meters (or 1 pole) away from the earthing device outward from the work area.

STOP board are required for any TPR that affecting vehicle movements on the track. All TPR working area shall be protected by a stop marker on each end of the specify work location.

REMINDER

IN THE EVENT OF ANY WORK THAT REQUIRES REMOVAL OF AXLE COUNTER, SIG PERSONAL SHALL ADVISE LC/DC THE IMPACT TO THE ADJACENT TRACK SECTION THAT MAY AFFECT THE TRAIN OPERATIONS. I.e. DUE TO SHARING AXLE COUNTERS

8.5 PICOP's Duties During Implementation of TPR

PICOP will continuously monitor the safety of work and his team activity. No trains, vehicle or personnel are allowed to access or leaving the possession area unless the PICOP has given them permission to do so.

1. PICOP is responsible in giving approval for any movement for entering, leaving or within the possessed area
2. PICOP has to ensure that any approval for any movement of trains or vehicle within or passed their working area will not endanger staff working within his possession area.

WARNING

OCC MUST OBTAINED AN APPROVAL FROM THE PICOP BEFORE ALLOWING OTHER VEHICLES OR TRAINS ENTERING OR PASSED THE POSESSED AREA

8.6 PICOP's Duties Before Closing of TPR

TPR must be closed at the exact location of the track possession area/work. Before the PICOP close the TPR he must ensure that: -

1. All personnel in the TPR area have left the working area
2. All personnel and equipment (i.e Earthing devices, Stop Board, work materials) are clear from the work area
3. The OCL is safe to be re-energize and track is safe for train operations

REMINDER

IF THE TRACK VEHICLE NEED TO BE STABLE AT STATION OR KLS REVERSING TRACK, THE BRAKE SHOES AND STOP BOARD MUST BE INSTALLED TO SECURE AND PROTECT THE VEHICLE FROM ACCIDENTLY MOVE OR HIT BY THE OTHER VEHICLE OR TRAIN

9 Radio Communications Principle

9.1 Radio Communications

Hand portable Radio shall be use as a main mode of communication during implementation of TPR. Usage of mobile phone is only allowed as a back up in the event of TPR to be implementing in the area where Radio signal is interrupted or in the Radio blind spot area. All communications to/from OCC must be communicated via facilities, which are connected to the voice recorder.

9.2 Radio Check

Prior to commencing duty, PICOP issued with hand portable radio must conduct a radio check for its functionality i.e. hand portable in good working condition.
The PICOP to check:

1. Battery strength
2. Signal coverage
3. Aerial
4. Set the correct group channel

9.3 Radio Test (Test call)

A radio test (test call) has to be conducted:

1. After radio check
2. Before opening a PTW and pushing or pulling of trains
3. After changing to a new location of work

9.4 Principles for Radio Communication

The radio communication has to be started with information of:

1. Identification (name/call sign)
2. Location
3. Purpose
4. Additional info, which related to operational and safety decision (i.e. coupling of vehicle, equipment used, etc)

9.5 Radio Communication to/ from OCC

Operations and Maintenance staffs are not allowed to execute any instruction:

1. Which is not properly understood and confirmed by the OCC
2. Which is obviously affecting safety and may lead to an accident
3. Which is given by unauthorized persons

9.6 Approval to Proceed

A verbal “Approval to Proceed” is an authorization to move that only be given when communication by signals is not possible.

Details about signals can be obtained from Operations Procedure for Communication and Signal Book, **ref no G00.OMO.M15114.NA.1002**.*

REMINDER

BEAR IN MIND THAT INSTRUCTION GIVEN BY THE OCC DOES NOT IN ANY WAY RELIEVE ANY STAFF FROM THEIR RESPONSIBILITY IN OBSERVING ALL NECESSARY SAFETY PROCEDURES, RULES AND REGULATIONS.

9.7 Sample of Communications during TPR work

9.7.1 Opening of TPR

PICOP : Control, this is PICOP XX. Over.

Control : PICOP XX. Go ahead

PICOP : PICOP XX would like to open TPR XXX for XXX work at XXX. Over

Control : PICOP XX, TPR XXX for XXX work at station XXX open at time xxxx hrs. Over

PICOP : Control, this is PICOP XX repeat TPR XXX for XXX work at station XXX open at time xxxx hrs. Over

Control : That is affirmative, Out!

9.7.2 Closing of TPR

PICOP : Control, this is PICOP XX. Over

Control : PICOP XX. Go ahead

PICOP : PICOP XX would like to close TPR XXXX work at XXX. Over

Control : PICOP XX, confirmed that all personnel and equipment are cleared from your working area? Over

PICOP : That is affirmative. All personnel and equipment are cleared from working area, over.

Control : PICOP XX, TPR XXXX closed at time xxxx hrs,

PICOP : PICOP XX repeat. TPR XXX closed at xxxx hrs

9.7.3 Opening of TPR with OCL Power Isolation

PICOP : Control, this is PICOP XXX. Over

Control : PICOP XXX. Go ahead

PICOP : PICOP XXX would like to open TPR XXXX for XXXX work at km xx until xx on track 2/3. Request OCL to be de-energized from {section} to {section} on track x. Over

Control : PICOP XXX, TPR XXXX for XXXX work at km xx until xx on track x. Request OCL to be de-energized from {section} to {section} on track 2/3. Is that confirmed? Over

PICOP : That is affirmative.

Control : Stand by for OCL power to be de-energized

PICOP : Control, PICOP XXX stand by for power to be de-energized

Control : PICOP XXX, this is control, OCL power from {section} to {section} on track 2/3 is de-energized, TPR XXXX for XXXX work at km xx until xx on track 2/3 open at time xxxx hrs Please inform OCC the location of the earthing devices applied. Over

PICOP : Control, Roger OCL power from {section} to {section} on track 2/3 is now de-energized, TPR XXXX opened at time xxxx hrs. Confirmed control it's safe to apply the earthing device, Over

Control : Affirmative

PICOP : Control, this is PICOP XXX, earthing device applied at OCL pole no XXXX and stop board at pole no XXXX on track 2/3. Over

Control : PICOP XXX, Control acknowledge earthing device applied at OCL pole no XXXX and stop board at pole no XXXX on track 2/3. Out!

9.7.4 Closing of TPR with OCL Power Isolation

PICOP : Control, this is PICOP XXX, over

Control : PICOP XXX. Go ahead

PICOP : PICOP XXX would like to close TPR XXXX, all personnel and equipment are cleared from the working area and both earthing devices and stop board at poles no XXXX and XXXX were removed. Over.

Control : PICOP XXX, this is Control. Confirmed all personnel and equipment are cleared from the track area and both earthing devices and stop board were removed and confirm that OCL power can be re-energize. Over

PICOP : That is affirmative.

Control : PICOP XXX, TPR XXXX closed at time xxxx hrs,

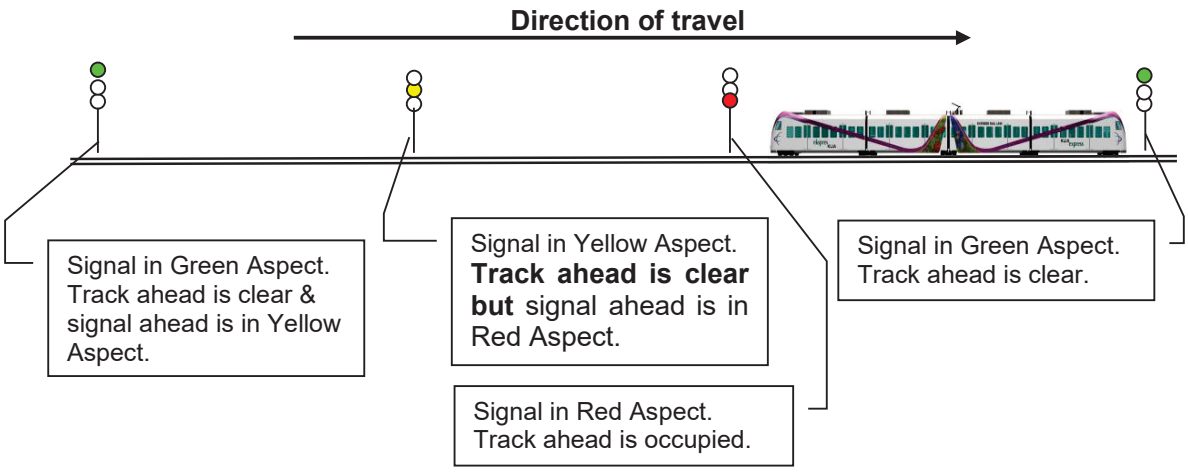
PICOP : Control, PICOP XXX repeat TPR XXXX closed at time xxxx hrs,

10 Signaling Principle

Movements on track are to be made in accordance with signaling principle. Train and track vehicle driver must ensure that they are fully familiar and must obey all signals applicable to their movement.

All fixed signals are equipped with identification markers, which must be quoted to OCC when required.

10.1 Basic Signal Function [based on track occupancy]



10.2 Category & Type of Signals

The ERL-CRS Signaling system has Signals and Markers/Signboards as follows:

1. Types of Signal
   - Main Signals
   - Subsidiary Signals
   - Hand Signals

2. Type of Markers/Signboards
   - Permanent
   - Temporary

Signal direction number for down track (direction from KLS to KLIA T2 on track 3) is indicated with alphabet T for ‘TURUN’ while for up track (direction from KLIA T2 to KLS on track 2) is indicated with alphabet N for ‘NAIK’.

10.3 Main Signal

Main Signals are normally placed at the left-hand side of the track at the OCL poles or on their own pole. For the bi-directional (reverse direction) the Main Signal is placed at the right-hand side of the track. The distance between the signals varies between 950 m to 1850 m.

Main Signal is a multi colored light signal and used to indicate the occupancy status of the track ahead. Indications are as follows:

1. **GREEN Aspect: PROCEED**
   - Track ahead is cleared and movement is allowed
   - Allows the maximum speed according to the line speed, except if there are other speed restrictions or instructions
2. **YELLOW Aspect: CAUTION**
   - Reduce speed and expect a stop aspect at next signal
   - Reduce speed for diverging of track
3. **RED Aspect: STOP**
   - Track ahead is occupied and no movement into the section is allowed
   - Stop for all trains, maintenance vehicles and locomotive
   - Stop approximate 10 meters in front of Red Aspect signal

10.4 Subsidiary Signal

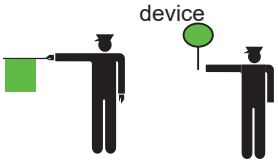
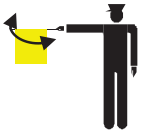
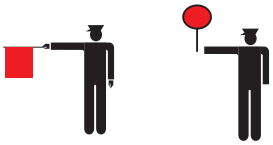
Subsidiary signals are signals that are attached to support the functionality of the main signals for bi-directional movement and depot movement.

Sample of subsidiary signals; -

1. Distant signal
2. Shunting signal
3. Call On signal
4. Route Indicator

10.5 Hand Signal

The hand signals are shown as follows:

Meaning	Hand Signal	Night Hand	Flag (Day)
Proceed! Resume Authorised Speed!	One arm out-stretched parallel to ground 	One arm out-stretched with **Green** signal lamp 	One arm out-stretched with **Green** signal flag/rounded device 
Slow down. Caution. Prepare to stop	One arm out-stretched and waving down/up from side 	One arm out-stretched and waving down/up from side with **Yellow** signal lamp 	One arm out-stretched and waving down/up from side with **Yellow** signal flag 
Stop! Come to a full stop before the signal	Arms out-stretched with upright forearms 	One arm outstretched with **Red** signal lamp 	One arm outstretched with **Red** signal flag/rounded device 

10.6 Marker / Signboards

10.6.1 STOP Board

The STOP board is double sided reflective signboard and it displays STOP with white alphabet on a red background. During nighttime the STOP board must be equipped with a hazard light.

The STOP board shall be placed in a safety distance of approximately 50m away from the earthing device or a track section to be protected.

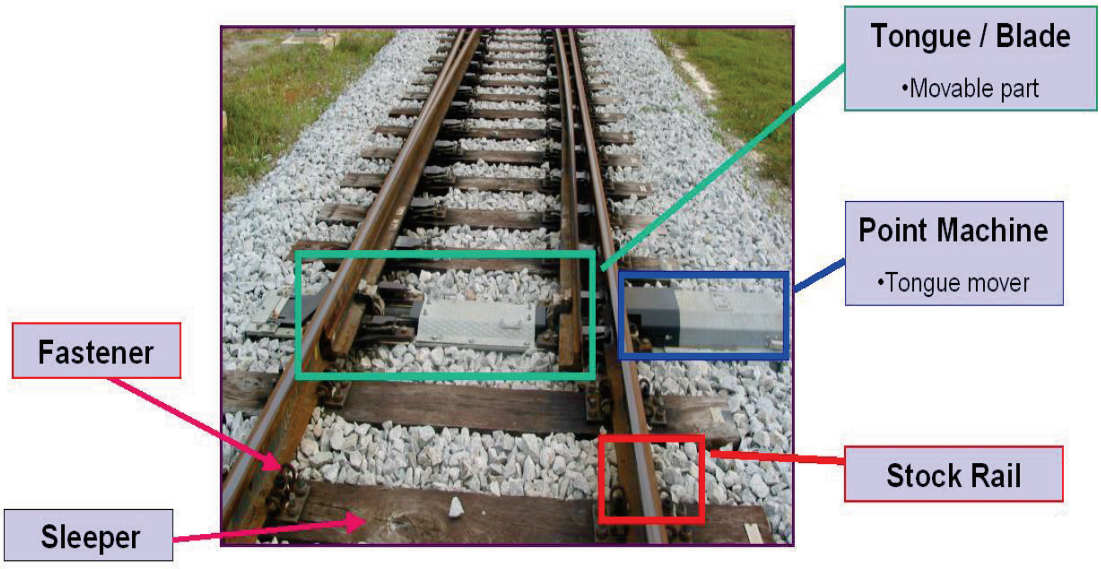
Details about Signals can be obtained from Operations Procedure for Communication and Signal Book, ref no G00.OMO.M15114.NA.1002.*

11 Turnout

Turnout is a combination of rails, rail tongues, motor/s and locking detector/s. The function is to allow movement of train from one track to the other track.

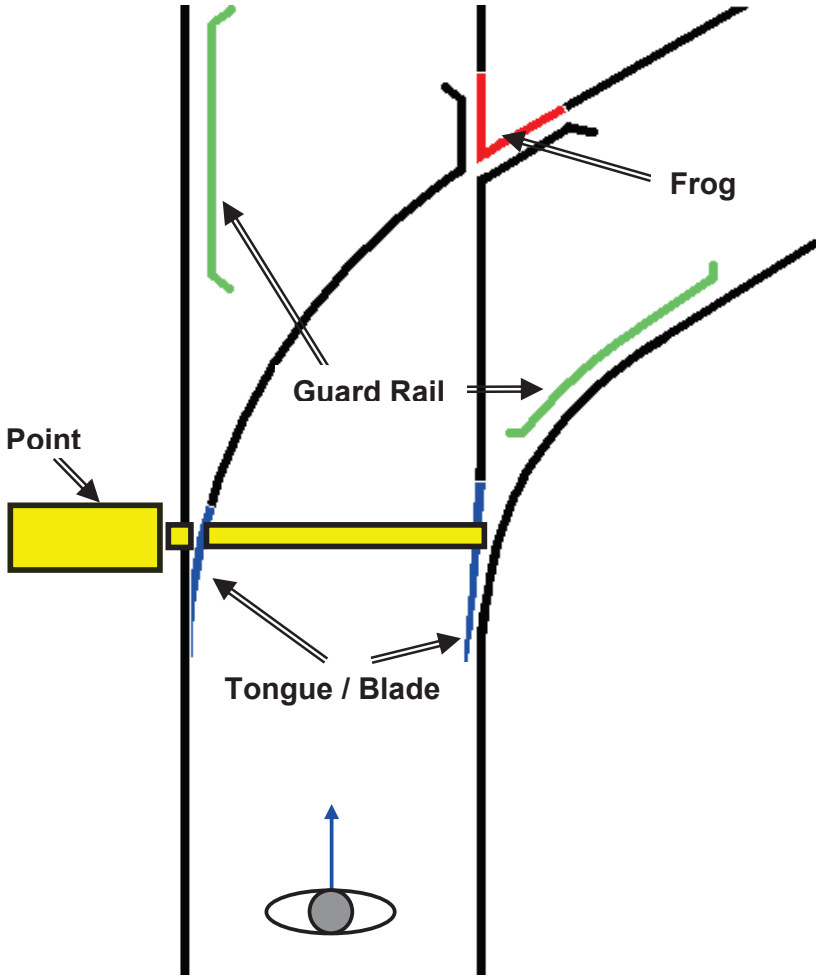
It is essential for a PICOP to identify the turnout position in his/her working area PICOP is to provide accurate information pertaining to the turnout position in case of loss of detection, manual operating of turnout, greasing and etc.

GENERAL TERMS FOR TURNOUT



11.1 Reading The Turnout Position (Facing)

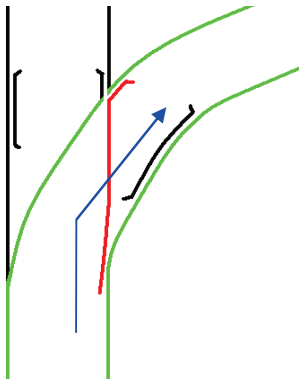
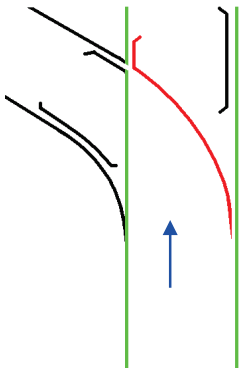
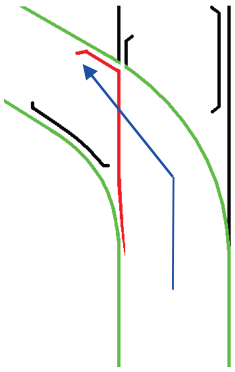
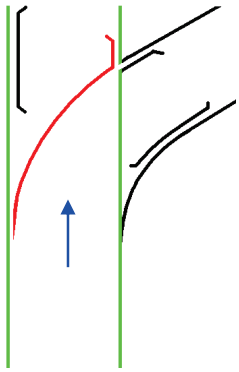
Turnout directions must be read from Facing position only



You Are Facing The Turnout

11.2 Reading The Turnout Position (Facing)

Right Position **Left Position**

			
1. **Right** position**.** Right blade open, left blade close.	2. **Right** position. Right blade open, left blade close.	1. **Left** position. Left blade open, right blade close.	2. **Left** position. Left blade open, right blade close.

12 Working with or near to OCL

12.1 Introduction

Electrical equipment and its connections have to be treated as energized until confirmed has been switched off and connected to earth. This also applies to fallen or broken Overhead Line Equipment or any parts connected with it. It must not be approached or touched unless the Five Electrical Safety Rules has been applied.

NOTE

THE FIVE ELECTRICAL SAFETY RULES SHALL BE APPLIED BEFORE ANY WORK WHICH REQUIERD DIRECT CONTACT OR NEAR TO OCL IMPLEMENTED

12.2 Five Electrical Safety Rules

1. It has to be ensured that the section concerned and all attached equipment is switched off
2. The section concerned has to be secured against unintended and automatic restoration of power
3. The section concerned has to be checked to be certain that the power is switched off.
4. The section concerned has to be connected to earth. Only an overhead line section between two earthing devices is electrically safe
5. Adjacent parts and equipment, which are still energized, must be covered against touch voltage if required

NOTE

4 (FOUR) EARTHING DEVICES TO BE INSTALLED FOR MAINTENANCE OF OCL SWITCHES (**2 EARTHING DEVICES ON EACH SIDE**)

WARNING!

IN CASE OF VOLTAGE TESTER IS DAMAGE (MALFUNCTION) , EARTHING DEVICE SHALL NOT TO BE USED TO TEST THE PRESENT OF THE OCL VOLTAGE

USING OF EARTHING DEVICE TO TEST THE PRESENT OF OCL VOLTAGE MAY LEAD TO AN INJURIES / DEATH

12.3 De-energize of power supply

If the TPR requires the OCL to be de-energized, the PICOP has the following responsibilities:

1. Submit the EC switching procedure form to OCC (EC), detailing on
2. Request for switching off the required section according to the TPR with the relevant Controller
3. Receive confirmation from OCC that the section required has been de-energized
4. Use the voltage tester to confirm that the required OCL section has been de-energized
5. Installed the earthing devices and stop boards after confirmed the section has been de-energized

12.4 Discharging of power supply [Earthed]

Discharging of power supply can only be done by installing the earthing device after de-energizing of power supply is confirmed by OCC and tested with voltage tester.

Details of installation of earthing device can be obtained from Annex 4: Technical Information of Earthing Device and also from a Video clip - "PICOP[1]".

12.5 Re-energizing of traction power supply [Restoration]

Traction Power can only be restored after the PICOP has confirmed that the work has been completed, earthing devices and attached equipments have been removed from OCL and running rail and safe to re-energized OCL power.

12.6 Power supply for track 9 and 10 [workshop]

Any movement or activities at track 9 and 10, [workshop] in depot is under supervision of RST. Manual de-energizing and re-energizing of power supply will be done by RST personnel. PIC for these activities must be selected among the RST personnel.

12.7 De-energizing of track 9 and 10 [workshop]

For power supply de-energizing for track 9 and 10, the RST personnel has to ;

1. Ensure that trains at both track 9 and 10 are shutdown and the pantographs are lowered
2. Request to EC to switch OFF -OCL switch 326
3. Get confirmation that the OCL switch 326 is switched OFF

When it is confirmed by EC that the OCL 326 is OFF,

1. unlock the padlock from the overhead platform gate
2. Turn the manual OCL switch to "OFF' position
3. Secured the manual OCL switch with the padlock
4. Check the voltage by using a voltage tester and apply earthing devices at designated location on both entrances if the OCL is confirmed de-energized

12.8 Re-energizing of track 9 and 10 [workshop]

For power supply re-energizing for track 9 and 10, **the PICOP has to ;**

1. Ensure all persons and equipments are clear from the required closed section
2. Ensure earthing devices has been removed from both ends
3. Removes padlock from manual OCL switch
4. Switch ON the manual OCL switch
5. Overhead platform gate is locked with the padlock
6. Advises EC that the power can be re-energized
7. Update EC which track is still de-energized, if any

12.9 De-energizing of track 4 [Track Washing Plant (TWP)] for maintenance

De-energizing power supply for track 4, **the PICOP has to ;**

1. Ensure that no train is being routed into TWP
2. Contact OCC to open TPR and request to de-energize the OCL for track 4 Depot (TWP)
3. Get confirmation that the TWP section is switched off
4. Test and confirmed the OCL voltage by using a voltage tester
5. Get approval from OCC to apply earthing devices at the designated places on both enterances
6. Inform OCC the exact location of the EARTHING DEVICE immediately after each earthing device installed

13 Appendices

Appendices 1: TPR Form (Sample)

Ref No: G00.OMO.M39910.DQ.1001.D (#100347)

ERL Maintenance Support Sdn Bhd

Co. Reg. No. 199901023674 (498574-T)

Operations Department TRACK POSSESSION REQUEST	TPR:

A.	Application (To be filled by the Applicant)				Docs # 100347
Applicant Name		ID No:		Dept:	
		From		To	
Effective from	Date		Date		
	Time		Time		
Description of Works:					

1.	Location of Worksite									
Please tick √										
1.1	Track	1		2		3		4		DEPOT
1.2	From Signal			to						
1.3	From Km			to						

2	De-energising of OCL Section					
2.1	Power De-energised? Please tick √	YES		NO		

3	Protection of Worksite

4	Speed restriction on the adjacent track if require					
No	Location	Speed limit	From	Ending	Distance	Additional warning/assistance require if applicable
1						
2						

5	Person in Charge (PICOP) *Please use BLOCK letter*			
	* Department/ Contractor	Name	ID Number	Contact
	* Con's Person in Charge			
	PICOP 1			
	PICOP 2			
	PICOP 3			
	PICOP 4			
	PICOP 5			
	PICOP 6			

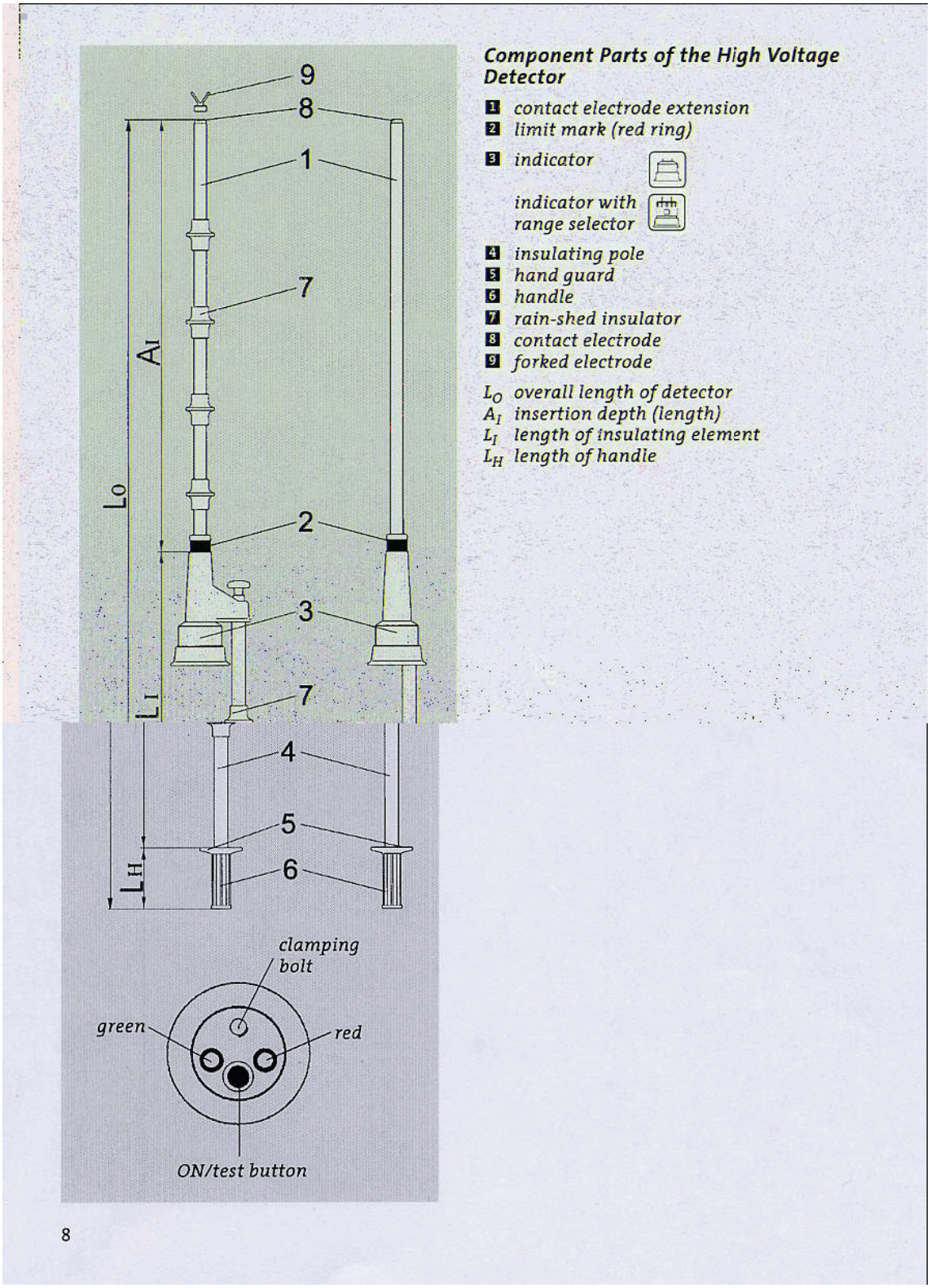
Prepared by : OZI Ref No; G00.OMO.M39910.DQ.1001.D

ERL Maintenance Support Sdn. Bhd., Kompleks Rel Udara, Bandar Baru Salak Tinggi, 43900 Sepang, Selangor Darul Ehsan

Appendices 2: References Document

Document	Doc. No.
Abbreviations	G00.OMO.M11150.CZ.0001.*
Glossary	G00.OMO.M11150.CZ.0002.*
Rulebook	G00.OMZ.M10100.BT.0001.*
Safety Procedure	G00.OMZ.M11451.NP.0006*
OPS Procedure for Communications & Signal Book	G00.OMO.M15114.NA.1002.*
Video clip PICOP: Installation of earthing device	*G00.OMO.M15631.SH.0001.**

Appendices 3: Operating Instruction of Voltage Tester



Component Parts of the High Voltage Detector

1. *contact electrode extension*
2. *limit mark (red ring)*
3. *indicator*
   indicator with range selector
4. *insulating pole*
5. *hand guard*
6. *handle*
7. *rain-shed insulator*
8. *contact electrode*
9. *forked electrode*

L_O *overall length of detector*
A_I *insertion depth (length)*
L_I *length of insulating element*
L_H *length of handle*

8

1. General Instructions

Voltage detectors serve for the safety of the users. It is therefore absolutely necessary to observe the following instructions for use and maintenance.
The voltage detectors comply with DIN IEC 61243-1 (DIN VDE 0682, Part 411).

1.1 The voltage detector must only be used for the nominal voltage and nominal frequency indicated on the casing and with the approved insulating poles as well as the contact electrode extension in accordance with category S (voltage detectors with contact electrode extension).

1.2 Voltage detectors are to be used only by skilled or instructed persons as defined by DIN VDE 0105, Part 100. They are to be used only to determine whether the system or installation has been deenergized.

1.3 During operation, voltage detectors must only be held by the handle which is separated from the insulating element by the hand guard. It is not allowed to hold the detector beyond this hand guard.

1.4 Voltage detectors must be kept dry and clean and their performance should be checked 2 to 3 times a year by placing it in metallic contact with live parts of the installation.

1.5 Before use, the user must check the voltage detector with regard to any obvious damages. Defective voltage detectors must not be used. Voltage detectors must be transported carefully.

1.6 Voltage detectors of the type "Not to be used where precipitation occurs" must not be used in fog either.

Voltage detectors of the type "Can be used during precipitation" must not be used uninterruptedly during precipitation for more than one minute.

1.7 Before use, the indicator must be screwed into the contact electrode extension and the insulating pole must be attached either to the indicator or contact electrode extension (depending on the design). Make sure the components are tightly fitted.

2. Operational Performance Check

2.1 Single-Range Voltage Detectors (II E, III):
Activate the detector by pressing the red ON/test button and maintain pressure. Observe that green signal is lit momentarily, followed by changeover to red signal lit or blinking. Maintain pressure of the test button for about 3 seconds (performance check of detector and control of batteries).

If pressure of the test button is released too early, the detector will switch off automatically.

Release the test button and observe that signals revert to green lit only. The detector is ready for use.

2.2 Voltage Detectors with Range Selector (II USE):
For safety reasons, voltage detectors with range selector can only be switched on in the lowest selectable range of rated voltages. Pull the range selector back axially in the direction of the handle and turn it to the right until the lowest rated voltage or lowest range of rated voltages appears in the range window. After starting the detector as described under 2.1, select the rated voltage or range of rated voltages in accordance with the operating voltage of the installation to be tested.

2.3 After 1 to 2 minutes, the detector switches off automatically unless the contact electrode is in touch with operating voltage. In this event the automatic switch-off operation is ineffective.

Important: One of the visual signals (red or green) should always be lit when a voltage detector is ready for use.

9

3. Testing a System or Installation for Operating Voltage

3.1 After having checked the performance of the voltage detector, place the contact electrode in metallic contact with the conductors of the system or installation under test. Observe signals: If green signal changes to red (lit or blinking) – conductor live. If green signal stays on – remove the detector from the conductor under test and repeat the performance check mentioned under 2.1 above.

3.2 The detector is guaranteed to give a clear indication "operating voltage present" (red signal lit) when the actual voltage applied to the contact electrode is 40% or more (to ground) of the rated voltage of the detector. Too intensive an interference voltage may affect the indication. In this connection, the influence of interference voltages in accordance with the standard must be taken into consideration.

3.3 The voltage detector must be handled in such a way that the operator always maintains the necessary clearance from all installation parts which might be live.
This clearance is guaranteed by the length of the insulating element of the detector which is the section between the hand guard and the limit mark (red ring).
The voltage detector must be handled in such a way that both signals are visible. This is ensured by holding the voltage detector in such a manner that the visual axis and the insulating pole are nearly parallel.

3.4 When testing parts of the installation which are arranged one behind the other and which are or may be live, the voltage detector must not be inserted beyond the limit mark (red ring).

3.5 The voltage detector can be used in most factory-assembled switchgear. The user must obtain information from the switchgear manufacturer whether and where the voltage detector may be used.

4. Faults

If the voltage detector cannot be activated as described under 2.1 above, exchange the batteries (see 8).

If the detector cannot be activated after renewal of the batteries either, return it to the manufacturer. The same applies to mechanical damages to the insulation.

5. Maintenance of the Indicator

For Pfisterer voltage detectors lithium batteries to IEC LR6 are specified. Since these batteries are leakproof, there is no need, under normal conditions, to replace them before the next in-service test.

6. Maintenance of Insulating Poles and Contact Electrode Extension

For safety reasons the approved insulating poles required for the insulating property of the voltage detector must be maintained exceptionally well. The surfaces, in particular, must be protected from damage and pollution.

7. In-Service Test

In Germany, the voltage detector must be subjected to an in-service test at least every 6 years (see VBG4).

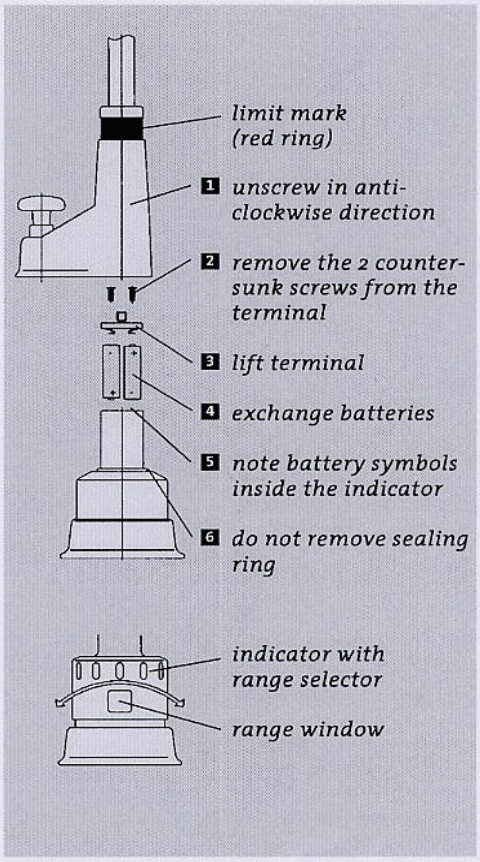
It is recommended to have the in-service test done by the manufacturer.

8. Exchange of Batteries

For the exchange of batteries, proceed according to the illustration on the left **1** – **6**.

Important:
The sealing ring **6** *serves as insulation against high voltage and as sealing against moisture.*
The perfect condition is imperative for maintaining the high level of safety of the voltage detector.
Reassemble in reverse order. Test the device as described under 2.1 above.

Any tampering with the electronic unit or any changes on the voltage detector affect its functional efficiency and are therefore prohibited.



9. Spare Parts and Accessories

No.	Article
2 021 012 327	Countersunk screw M 4 x 12
610 022 022	Contact spring
6 021 970 454	Sealing ring
4 619 435 004	Battery
364 746 002	Sonic (audible indication)

11

Appendices 4: Technical Information of Earthing Device

SIEMENS

Earthing Device

Technical Information **Version 1.01**

Work on sections of overhead lines, which are constantly alive, cannot commence until it has been confirmed that the overhead system has been isolated, power disconnected and that it is safe to connect temporary grounds. This work must always be carried out according to the rules and regulations laid down by the authority.

The earthing device, therefore, represents an essential part of equipment for safe working on the overhead system.

To guarantee long-term functioning, it is important to check it's condition at regular intervals, especially the insulation.

Earthing device, telescopic type		
max. length	[m]	5
flexible earthing cable	[mm²]	50
length of flexible earthing cable	[m]	8.5
head for earthing rod		
earthing magnet or earthing clamp		

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A temporary ground should be connected in the following manner:

1. After the operator has been notified that the overhead contact system has been isolated the operator must verify that the OCL is de-energized by using a live line tester. The live line tester should first be verified on a known live circuit prior to use on the isolated OCL.

2. Next secure the "rail clamp" to the rail at the required ground location for exposed rail or the grounding magnet for embedded rail.

3. To ensure that the OCL has in fact been isolated, the ground stick should be flicked against a live metal fitting (never contact auxiliary feeder or catenary wire). Check the isolation first.

4. When the OCL is isolated, the operator can fasten the connection clamp to the auxiliary feeder. If no auxiliary feeder is available the contact wire may be used. In removing a ground, the connection to the OCS must be removed first; the rail clamp can then be disconnected.

5. Earth at both sides of working area.

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earthing device_ti_101_76.p65
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Bahnerdungsvorrichtungen dienen der Sicherheit der Benutzer.
Die Beachtung dieser Gebrauchsanleitung ist unbedingt erforderlich.

Earthing and short-circuiting devices serve for the safety of the users.
It is therefore absolutely necessary to observe the following instructions.

1. Allgemeine Hinweise

1.1. Die Bestimmungen DIN VDE 0105 Teil 1, DIN VDE 0105 Teil 3 sind zu beachten, besonders im Hinblick auf die Orte, an denen geerdet und kurzgeschlossen werden muß.

1.2. Das Erden und Kurzschließen soll nur von Fachkräften oder unterwiesenen Personen im Sinne von DIN VDE 0105 Teil 1 bzw. DIN VDE 0105 Teil 3 durchgeführt werden.

1.3. Dem Erden und Kurzschließen des freigeschalteten Anlagenteils hat an der Anschließ-Stelle eine Prüfung auf Spannungsfreiheit vorauszugehen.

1.4. Bahnerdungsvorrichtungen sind sorgfältig zu behandeln und vor Gebrauch auf einwandfreien Zustand, insbesondere der Erdungs-und Kurzschließ-Seile, sowie auf festen Sitz der Schraubverbindungen zu kontrollieren.

1.5. Erdungs- und Kurzschließvorrichtungen dürfen nur in Anlagen benutzt werden, deren Kurzschlußströme sie laut Angabe zugeordnet sind. Die Strombelastbarkeit der Erdungs- und Kurzschließvorrichtung richtet sich nach dem Querschnitt, der auf der PVC-Hülle des Seiles angegeben ist und der darauf bezogenen zulässigen Strombelastbarkeit.

1.6. Strombelastbarkeit von Kurzschließseilen aus Kupfer zum Einsatz an Fahrleitungsanlagen elektrischer Bahnen:

1. General Instructions

1.1. The regulations of DIN VDE 0105, Part 1 DIN VDE 0105 part 3 must be observed, particularly with regard to the places where earthing and short-circuiting is to be done.

1.2. Earthing and short-circuiting work must be carried out by electrically skilled or instructed persons only, as defined by DIN VDE 0105 Part 1. resp. DIN VDE 0105 part 3.

1.3. Before earthing and short-circuiting of e de-energized system component, the absence of voltage must be tested, preferably on the connection point.

1.4. Earthing and short-circuiting devices must be handled carefully. Before use, earthing and short-circuiting devices, in particular the short-circuiting cab'es, must be examined with regard to their perfect condition and the tight fit of the bolted connections must be checked.

1.5. Earthing and short-circuiting devices must only be used in installations with short-circuit currents assigned to and indicated on the devices. The current-carrying capacity of an earthing and short-circuiting device is determined by the cross section indicated on the short-circuiting cable and by the permissible current-carrying capacity referred to that cross section.

1.6. Examples for the use of earthing and short-circuiting devices with reference to the cross section of the short-circuiting cables are given in the table below.

Querschnitt des Kupferseils / Cross section of copper cable mm²	Maximaler Kurzschlußstrom in kA während der Dauer von / Max. current in kA during a period of 0,5 s	1 s	3 s
16	11	5,8	4,0
25	18	8,8	6,0
35	25	11,5	8,5
50	35	17,0	12,0
70	48	25,0	18,0
95	68	33,0	25,0

(Diese Werte wurden nach EN 61230 ermittelt).

(Values according to EN 61230).

1.7. Zum Kurzschließen sind Erdungsstangen zu verwenden, wobei der schwarze Ring den nötigen Schutzabstand zu den unter Umständen Restspannung führenden Anlagenteilen begrenzt.

1.8. Erdungsstangen sind mit dem Herstelljahr sowie dem zulässigen Gewicht der Erdungs- und Kurzschließvorrichtung gekennzeichnet, ebenso mit Handhabungshinweisen.

1.9. Die Anschließteile, Kurzschließseile und Verbindungsstücke sind so konzipiert, daß in der Regel immer metallisch blanke Kontaktstellen erzeugt werden. Erdungs- und Kurzschließvorrichtungen sind nur für einmalige Belastung mit dem höchstzulässigen Kurzschlußstrom vorgesehen.

1.7. For earthing and short-circuiting work earthing poles must be used. The black ring on the earthing pole indicates to the user the necessary clearance from the system components which may still be carrying residual voltage.

1.8. Earthing and short-circuiting devices are marked with the year of manufacturing and with the total weight and also with instructions for use.

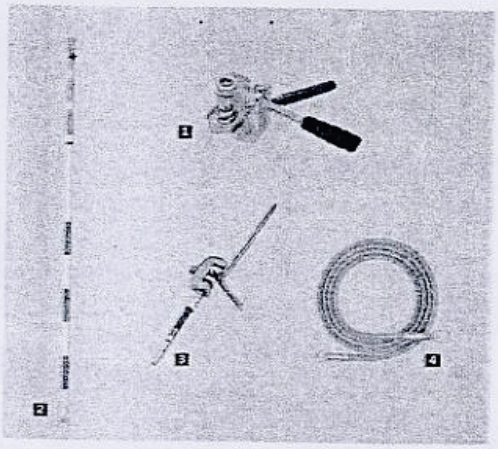
1.9. Connecting parts, grounding and short-circuiting wires are designed in a way that generally metallic contact points are being created. Earthing and short-circuiting devices are designed for only one exposure to the maximum permissible short-circuit current.

2. Gebrauch der Bahnerdungsvorrichtung

2.1. Allgemeine Hinweise:
Eine Bahnerdungsvorrichtung besteht aus:
1 Schienenfuß-Erdungsklemme
2 Erdungsstange 2teilig teleskopierbar
3 Fahrdraht-Erdungsklemme
4 Kurzschließseil

2. Operation of the Railway Earthing and Short-Circuiting Devices

2.1. General Instructions:
A railway earthing device consists of
1 *rail grounding clamp*
2 *grounding pole 2pieces telesk.*
3 *contact wire grounding clamp*
4 *ground wire*



2.2. Bahnerdungsvorrichtungen sind grundsätzlich zuerst mit der Erdungsanlage (Fahrschiene) zu verbinden. Da an freigeschalteten Anlagenteilen noch erhebliche Restspannungen anstehen können, sind Anschließteile (Fahrdrahterdungsklemme) mit der Erdungsstange an die Außenleiter heranzuführen und zu befestigen. Hierbei darf über den schwarzen Ring nicht hinausgegriffen werden.

2.2. In principle, earthing and short-circuiting devices must first of all be connected to the rail earthing system. Since the de-energized system components may still be carrying considerable residual voltages, the connecting parts must be brought and connected to the conductors to be short-circuited with the help of an earthing pole. It is not allowed to hold the earthing pole beyond the black ring.

1 Schienenfuß-Erdungsklemme

Bestell-Nr. 363 322-005 / DB-Stoff-Nr. 071.50.82/001 575 00

- Klemme so weit öffnen, daß Sie am Schienenfuß angesetzt werden kann.
- Mittels Ratsche wird die Gewindespindel so weit angezogen, bis das Tellerfedernpaket auf Block ist.
- Zum Lösen wird die Ratsche um 180 Grad gedreht und die Spindel geöffnet.
- Zur Sicherung der Arbeitsstelle kann die Ratsche nach Öffnen des Federsplint ganz abgezogen werden (DIN VDE 0105 Teil 3 / Abs. 5.3.2.3).

1 *Rail Grounding Clamp*

Order-No. 363 322-005 / DB-No. 071.50.82/001 575 00

- *Clamp has to be opened as wide to be fixed on the rail base.*
- *Threaded spindle has to be screwed with ratchet until the cup spring package is completely closed.*
- *For detaching the ratchet has to be rotated for 180 degrees to open the spindle.*
- *For safety on the working place the ratchet can be pulled off completely (DIN VDE 0105 part 3 / No. 5.3.2.3) after opening of safety split pin.*

2 Erdungsstangen

Teleskop-Erdungsstange Bestell-Nr. 362 744-744 / DB-Stoff-Nr. 071.50.79/001 574 97

5-teilige Erdungsstange Bestell-Nr. 364 784-001 / DB-Stoff-Nr. 071.50.72/001 574 90

2 *Grounding Pole*

Telescopic grounding pole Order No. 362 744-744 / DB-No.071.50.79/001 574 97

5-piece grounding pole Order No. 364 784-001 DB / DB-No. 071.50.72/001 574 90

Beim Zusammenbau der Erdungsstange ist darauf zu achten, daß die vorgegebene Reihenfolge gemäß Nummerierung der Einzelstangen eingehalten wird.

Die Erdungsstangen können am Betätigungskopf wahlweise verriegelbar oder abziehbar von der Fahrdraht-Erdungsklemme eingestellt werden.

When mounting the grounding pole it has to be taken care that the order is is kept according to the numbering of the single poles.

On the operation head of the grounding poles the rail grounding clamp can be adjusted optionally in a fixed or detachable way.

3 Fahrdraht-Erdungsklemme

Bestell-Nr. 361 499-001 / DB-Stoff-Nr. 071.50.33/001 574 71

- Spindel der Klemme in Betätigungskopf der Erdungsstange einschieben und einrasten.
- Klemme bis zum Anschlag öffnen und leicht anziehen, um ein Verdrehen der Klemme beim Hochheben zu verhindern, Erdungsstange hochnehmen und Fahrdrahtklemme auf Fahrdraht aufsetzen und durch Rechtsdrehend der Spindel fest anziehen.
- Bei profilfreier Erdung wird die Erdungsstange abgezogen und das Kurzschließ-Seil mittels Aufhängehaken (Bestell-Nr. 360 453-453 / DB-Stoff-Nr. 071.50.39/001 574 75) profilfrei an einem Mast verlegt.

3 *Contact wire grounding clamp*

Order-No. 361 499-001 / DB-No. 071.50.33/001 574 71

- *Spindle of the clamp has to be put into operating head of the earthing pole until it is engaged.*
- *Clamp has to be opened until stop and to be tightened smoothly to prevent from a torsion of the clamp when lifting it up. Then contact wire clamp has to be put onto the contact wire and can be fixed tight through clockwise rotation.*
- *When profile-free earthing the earthing pole has to be removed from the pole. The short-circuiting-cable can be attached profile free on the tower with hook. (Order-No. 360 453-453 / DB-No. 071.50.39/001 574 75)*

4 Kurzschließseile

Länge 8.5m, Bestell-Nr. 362 138-138 / DB-Stoff-Nr. 071.50.37/001 574 73

Länge 12m, Bestell-Nr. 362 138-529 / DB-Stoff-Nr. 071.50.38/001 574 74

Werkstoff: Cu 50mm² / PVC umhüllt.

Kurzschließ-Seile sind regelmäßig auf sichtbare Beschädigungen zu überprüfen und gegebenfalls auszusondern.

4 *Short circuiting cable*

Length 8.5m, Order-No. 362 138-138 / DB-No. 071.50.37/001 574 73

Length 12m, Order-No. 362 138-529 / DB-No. 071.50.38/001 574 74

Material: Cu 50mm² / PVC sheated

Short circuiting cables has to be checked for visible damages continuously and shall be changed in case of damages.

3. Wartung

3.1. Die Schienenfuß-Erdungsklemme ist von Zeit zu Zeit darauf zu überprüfen, ob der Frästeller abgenutzt ist. Desweiteren ist es empfehlenswert, das Spindelgewinde mit säurefreiem Fett zu fetten (z.B. Vaseline).

3.2. Die Fahrdraht-Erdungsklemme ist weitgehend wartungsarm. Es ist jedoch ratsam das Spindelgewinde mit säurefreiem Fett zu fetten.

3.3. Die Erdungsstange ist wartungsarm. Es sollte jedoch darauf geachtet werden, daß der Verriegelungshebel am Betätigungskopf nicht deformiert ist.

3.4. Sollten Ersatzteile benötigt werden, sind diese aus den DB-Zeichnungen zu entnehmen.

3. Inspection

3.1. The rail grounding clamp has to be checked regularly concerning the perforation of the thrust block. Furthermore it is recomended to cover the screw thread of the spindle with noncorrosive grease (f.e. Vaseline).

3.2. In general the contact wire grounding clamp is free of maintenance, but it is advisable to cover the screw thread of the spindle with noncorrosive grease.

3.3. The grounding pole is free of maintenance. Please make sure, that the operating head of the interlocking device is not deformed.

3.4. For any demand of spare parts, please take your information out of the DB-drawings.