



USER REQUIREMENT SPECIFICATION

FOR

ELECTRONIC AUTHORISATION REGISTER



FOR USE IN THE

PASSENGER RAIL AGENCY OF SOUTH AFRICA

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| EAS URS | | | | Doc No. & Version |
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Document acceptance

The following parties acknowledge that they have read this document, including all schedules and diagrams that may be attached. It is also agreed by all parties that any decisions affecting this document will only be valid if minuted and agreed upon by all parties involved and/or by those parties authorised to approve changes.

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1 INTRODUCTION

1.1 PURPOSE OF THE DOCUMENT

- 1.1.1 This document is the user requirement specification for Electronic Authorisation System (EAS) for use within the Passenger Rail Agency of South Africa (PRASA).

1.2 OVERVIEW

- 1.2.1 PRASA's primary method of train control is colour light signalling.
- 1.2.2 The signalling system might become unavailable due to equipment failure, theft, and vandalism.
- 1.2.3 In the event that the signalling system is not available, the fall-back system comprises of manual verbal train movement authorisations, issued by the train control officer (TCO) to the train driver.
- 1.2.4 This method of working consists of the TCO issuing the driver with an authority to occupy a certain section of the track.
- 1.2.5 Currently, the TCO must manually determine whether the route over which he is going to issue the authority is clear, manually write out the lengthy authority according to the format as stipulated in the train working rules and verbally issue the authority to the train driver over the radio or any approved method of communication. When the train has cleared the track, the train driver must verbally confirm to the TCO that his train is clear and complete, with the TCO having to manually write down the information. The TCO must keep track of all the movements and ensure that no conflicting authorities are issued.
- 1.2.6 This process is time consuming, places a lot of stress on the TCO and is prone to human error.

2 SYSTEM REQUIREMENT

2.1 GENERAL

- 2.1.1 The EAS shall be a VDU based computer application with graphical display that will aid the TCO with the planning and managing of authorities during fall back.
- 2.1.2 The EAS shall protect against the issuing of conflicting authorities, enforce the operating rules and provide the TCO with a graphical display of the network status to do better planning.
- 2.1.3 The EAS territory consists of single or multiple lines with crossing places where trains can cross or pass each other, or inter-sidings and junctions where trains cannot cross or pass each other.
- 2.1.4 The electrically operated points at crossing places, inter-sidings and junctions will be clamped and will have to be cranked according to the train movement requirements.
- 2.1.5 The system provides for absolute working only in the case of single lines. Two trains may not be allowed to be in the same single line authority section simultaneously, except as provided for in the operating rules.
- 2.1.6 In the case of multiple lines, the system provides for uni-directional working only.

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- 2.1.7 In the case of trains running in the same direction, an EA token must not be issued to the driver of a following train before advice is received that the preceding train is complete and has cleared the authority section and that the EA token of that train has been partially cleared or cancelled.
- 2.1.8 The authority for the driver to enter an authority section between the start of the authorisation and the authorisation destination is an EA token exchanged between the driver and the train-control officer. A driver must not enter an authority section unless he/she is in possession of an EA token which is completed, repeated in full to the train-control officer and confirmed as correct.

2.2 APPLICABLE DOCUMENTS

- 2.2.1 All applicable legislation and regulations
- 2.2.2 SANS 3000-1: General
- 2.2.3 Metrorail General Operating Instructions
- 2.2.4 Trains Working Rules of PRASA
- 2.2.5 PRASA EAS Operating Instruction
- 2.2.6 SATCOS indication catalogue

2.3 GLOSSARY OF TERMS

| TERM | DESCRIPTION |
|---|---|
| Authority destination | Signal, specific kilometre point, stop signal or stop board as depicted on the EA token as the limit of the authority |
| Authority section | The line between the start of the authority and the authority destination |
| Crossing place | A place, equipped with two or more running lines and points, where trains can cross or pass each other as arranged by the train-control officer and which is connected at each end to another crossing place by means of a running line(s). |
| EAS | Electronic Authorisation System |
| Electronic Authorisation System | A VDU based computer application with graphical displays used to authorise a train movement in a fall back / emergency state. |
| Electronic Authorisation System territory | The territory in which the running of trains is authorised by the train-control officer by means of the EAS |
| Electronic Authorisation Token | An authority completed by the driver with the relevant instructions received from the train-control officer and confirmed as correct by the train-control officer |
| Inter-siding | Any siding, where trains cannot cross, connected to a running line in an authority section |
| Junction | A place where one or more running lines leave or join a running line and where trains cannot cross or pass each other |
| Licensed employee | An employee who has been trained, certified as competent and authorised to perform the relevant duties independently |
| PRASA | Passenger Rail Agency of South Africa |
| SANS | South African National Standards |
| TCO | Train Control Officer |
| Train control office | The office from where train movements are controlled by the train-control officer |

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| Train-control officer | The licensed employee on duty in the train control office, to control trains in a designated territory |
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3 OBJECTIVE

3.1.1 The objective of the EAS is to:

- Improve the overall safety of train operations during fall back.
- Assist the TCO with planning and managing of authorities.
- Protect against conflicting movements.
- Enforce the operating rules.
- Provide the TCO with a train position and indication on the VDU based computer application with graphical display of the network.

4 REQUIREMENTS

4.1 GENERAL

- 4.1.1 The EAS consists of computer-based VDU(s) with a graphical layout of the EAS territory on which the train-control officer generates the authority for train movements.
- 4.1.2 The graphical layout includes train numbers, train movement reporting, automatic authority number generation, conflicting authority protection, occupation and work team warnings, indication of default setting of points, clamping of points and temporary speed restrictions.
- 4.1.3 Train position and indication on the VDU based computer application with graphical display of the network.

4.2 The train-control officer uses a keyboard and mouse to operate the system GRAPHICAL DISPLAY

- 4.2.1 The EAS provides a graphical display of the actual rail layout (track and points) and trackside equipment (signals, boards, etc).
- 4.2.2 The EAS graphically displays the position of all traffic and other activities on the network.
- 4.2.3 The EAS graphical display is aligned with the standards in the SATCOS indications catalogue.

4.3 USER ACCESS CONTROL

- 4.3.1 The EAS provides the facility to control the user access levels depending of the type of user and application access level depending on the application profiling.

4.4 TRAIN NUMBER DISPLAY

- 4.4.1 The EAS has a train number display function.
- 4.4.2 The train number is displayed in the format as defined by PRASA.

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- 4.4.3 The TCO can insert, change or delete train numbers.
- 4.4.4 The train number is automatically filled and displayed in the optics on the occupied track after the authorisation is complete.
- 4.4.5 The train number contains all relevant driver information such as driver name and driver telephone number.

4.5 REMINDERS AND NOTES

- 4.5.1 The system allows the TCO to add reminders and notes on the system, linked to specific authorisation sections.
- 4.5.2 The reminders and notes are categorised as follows:
- Temporary speed restrictions
 - Occupations
 - Abnormal situations
 - Others

4.6 CREATING AN EA TOKEN

- 4.6.1 The TCO selects the route for the intended movement from the start of the authority to the authority destination.
- 4.6.2 The following objects are allowed to be used as the start of the authority or an authority destination and are configured on the system according to the local operating instruction for the station/area:
- Signal
 - Stop board
 - Kilometre point
 - A defined marker
- 4.6.3 The system determines if the route is available and valid by checking:
- For possible conflict with previously authorised routes
 - If the direction of the intended movement is in line with the defined direction of the line.
 - If the status and position of all points in the route are aligned with the intended movement.
 - If a safe overlap exists between the intended movement and previously authorised routes.
 - If the intended movement complies with all other rules as defined for the specific station / area.
- 4.6.4 The allowed direction of the line is configured according to the local operating instruction for the station / area.
- 4.6.5 An EA token can be issued to the driver of a train to proceed over one or more consecutive authority sections. The portion of line, for which the EA token is issued, may not extend beyond the first place where another train must be crossed, passed, shunted for or where a load is staged, or wagon(s) detached, or maintenance work

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- or shunting is performed on the running lines, or sidings not equipped with derailleurs or runaway points.
- 4.6.6 Should the route not be available or valid, the system warns the TCO accordingly and aborts the process.
- 4.6.7 All EA Tokens must contain a train number, driver name and driver telephone number. The system automatically detects the train number and train driver information from the train number linked to the track occupancy.
- 4.6.8 If no train number is available, the system enforces the TCO to first update the number before the EA token can be created.
- 4.6.9 In addition to authorising occupancy of the authority section within agreed to limits as specified on the EA token, a token may contain other instructions with which the driver or an authorised employee must comply with.
- 4.6.10 The system detects all reminders and notes in the route and forces the TCO to accept or reject each individually.
- 4.6.11 If the TCO rejects any of the reminder or notes, the process is aborted.
- 4.6.12 If the reminder or note is accepted, it is included in the EA token.
- 4.6.13 The system generates the following additional instructions automatically as part of the token, as per the information captured by the TCO:
- Temporary speed restrictions
 - Occupations
 - Abnormal situations
- 4.6.14 If the route is available and valid and all other conditions are met, the system opens a “planned authority” window.
- 4.6.15 The planned authority window displays a summary of the planned authority including the train number, position of the train and the position of points and/or derailer(s) in the intended route of the train.
- 4.6.16 The window also includes rule confirmation boxes that the train-control officer must accept before the EAS will accept the planned authority. The rules and confirmation are randomized to avoid routine clicking by the TCO.
- 4.6.17 After the TCO has positively confirmed adherence to the relevant rules, he/she must accept the planned authority.
- 4.6.18 The EAS will generate the required EA Token for the intended route of the train.
- 4.6.19 The TCO must verify the information/instructions already displayed on the token and the system allows the TCO to update all the other relevant fields with outstanding information.

4.7 AUTHORISATION OVER POINTS

- 4.7.1 Points are clamped in a default position according to operational requirements.
- 4.7.2 The position of clamped points is configured accordingly on the system.
- 4.7.3 If the position of the points has to be changed for the intended movement, the points are cranked to the correct position before the TCO starts the authorisation process.
- 4.7.4 After the authorised person confirmed the position of the points, the TCO sets the position of the points on the system accordingly.

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- 4.7.5 Authorisation over points are only allowed if the points are set in the correct position for the intended movement.

4.8 ISSUING AN EA TOKEN

- 4.8.1 The TCO issue the EA Token to the driver, who completes the EA Token on the prescribed form.
- 4.8.2 The TCO must confirm each part of the EA Token that was issued to the driver.
- 4.8.3 The TCO must confirm each part of the EA Token as the driver reads the instruction back.
- 4.8.4 Once the driver has correctly repeated the EA Token, the TCO use the “Confirm” button on the EAS to indicate that the driver has repeated the information of the EA Token correctly.
- 4.8.5 The TCO can use the “Not Confirm” button to cancel the EA Token. The system forces the TCO to include a reason for the cancellation of the EA Token.

4.9 TRAIN POSITION REPORTING

- 4.9.1 After the TCO has authorised a movement onto an authority section or into a yard, private siding or inter-siding, as the case may be, the driver or the employee in charge of the movement, must confirm the position and completeness of the train or shunting movement after having executed the movement and it is complete standing clear within the clearance marks.
- 4.9.2 The system allows the TCO to update train position according to the information received from the driver and clear the train occupancy and authority for the authority section that the driver has reported as cleared.

4.10 AUTOMATIC TRAIN POSITION REPORTING (ATPR)

- 4.10.1 After the TCO has authorised a movement onto an authority section or into a yard, private siding or inter-siding, as the case may be, the ATPR will send an indication to the EAS confirming the position and of the train or shunting movement after having executed the movement and the driver must confirm that the train is complete and standing clear within the clearance marks.
- 4.10.2 The system allows the TCO to update train position according to the information received from the driver and/or ATPR to monitor the train occupancy.

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