

USER REQUIREMENT SPECIFICATION

FOR

**ELECTRONIC INTERLOCKING INTERFACE TO
SPOORPLAN INTERLOCKING SYSTEMS: Mk1, Mk1a,
M1b, Mk1c, MkII, MkM, and HR97.**

FOR THE USE IN

**PASSANGER RAIL AGENCY OF SOUTH AFRICA
(PRASA)**

<i>URS for EI Interface to a Spoorplan Interlocking System for the use IN PRASA</i>				<i>Doc No. & Version</i>
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1. SCOPE:

The detailed requirements for the Hardware and Logical I/O software block in EI to interface to the existing Spoorplan Mk1, Mk1a, Mk1b, Mk1c, MkII, MkM and Hybrid HR97 interlocking systems on PRASA/Transnet Freight Rail railway lines.

2. APPLICABLE DOCUMENTS:

The following specifications, standards and drawings of the exact issue shown form a part of this specification to the extent shown herein. In the event of conflict between the referenced document and this specification, the contents of this specification shall be considered a superseding requirement.

2.1. PRASA/Transnet documents.

- 2.1.1. Symbol Catalogue for the SATCOS User Interface Doc – ID 150P_30059-PRJ-SPN-0107; Version E of 2014-02-27.
- 2.1.2. Symbol Catalogue for PRASA MMI Thales: “WCRP TMC SIG SPF 0.0 DOC 00003 Catalogue of Indications Interlocking” of 2016-03-04.

2.2. Interface Control Documents ICDs.

- 2.2.1. User Requirement Specification for EI interface to Hybrid Interlocking Systems HR92, HR97 and HRS the Siemens and Alstom versions BBC6666 version 2 of July 2008.
- 2.2.2. User Requirement Specification for EI interface to Hybrid Interlocking Systems HR92, HR97 and HRS the Siemens and Alstom for use in PRASA.
- 2.2.3. User Requirement Specification for EI interface to SPOORPLAN Mk1; 1a; 1b and 1c Interlockings - BBC6664 version 2 of July 2008.

2.3. Standards.

UIC Code 736i for type N and C signalling safety relays.

CENELEC standards:

- EN 50121-4 Railway applications – Electromagnetic compatibility (EMC) – Signalling and communications.
- EN 50125-3 Railway applications – Environmental conditions for equipment – Signalling and communications.
- EN 50126 Railway applications – The specification and demonstration of Reliability, Availability, Maintainability and Safety (RAMS).
- EN 50128 Railway applications – Software for railway control and protection systems.

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- EN 50129 Railway applications – Safety related electronic systems for signalling.
- EN 50159-1 Railway applications – Signalling and communications – Safety-related communication in closed transmission systems.
- EN 50159-2 Railway applications – Signalling and communications – Safety-related communication in open transmission systems.

2.4. Other PRASA and TFR documents.

Required Operational Capability for Interlocking systems for the use in Passenger Rail Agency of South Africa (PRASA) version 2.

All the Spoorplan Mk1, Mk1a, Mk1b, Mk1c, MkII and MkM Typical Relay Unit wiring diagrams under TFR configuration management.

All Hybrid Interlocking HR97, HR92 and HRS both Siemens and Actom versions Typical Relay Unit wiring diagrams under TFR configuration management.

3. GENERAL REQUIREMENTS:

3.1. Safety approval.

- 3.1.1. The EI must be approved by a reputable railway safety authority such as the “Deutsche Bundes Ampt”, „Office of TÜV”, etc. as complying with a Safety Integrity Level 4 (SIL4) as described in the CENELEC Standards.
- 3.1.2. Generic interlocking core software, after approval, must not be able to be modified during application configuration by unauthorised persons.
- 3.1.3. The safety approval of this interface block is included in the safety approval of the specific EI. The functional and application safety validation approval is by PRASA Strategic Asset Development (Technology Management) . The software safety validation is done by a CENELEC approved Independent Safety Assessor (ISA).

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3.2. Reliability approval.

3.2.1. Reliability approval part of the EI reliability approval.

3.3. System definition.

This interface will be used when the EI interlocking is installed in a station adjacent to a station interlocked with one of the above mentioned Spoorplan or Hybrid interlocking systems.

See **Appendix A** – below.

3.3.1. The “Absolute Line Block” (ALB) section will be controlled by EI.

3.3.2. The interface to the EI being the duplication of the Intermediate Home Signal/s (Real Signal/s control by EI, Dummy Spoor unit/s in Foreign Interlocking only), Advance Starter/ALB Section entry Signal/s (Real Signal/s control by EI, Dummy Spoor unit/s in Foreign Interlocking only), Home Signal/s (Real Signal/s control by Foreign Interlocking, Dummy Logical Signal/s in EI ECD) and Starter Signal/s (Real Signal/s control by Foreign Interlocking, Dummy Logical Signal/s in EI ECD).

3.3.3. All Points-sets between Home Signal/s and Starter Signals duplicated (Real control of Points-set/s by Foreign Interlocking, Logical Points-set/s in EI ECD). Transfer of Detection State of each Points-set (Right/Plus; Left/Minus; Lost) ~~and Mid-stroke (where applicable) Detection~~ from Foreign Interlocking to EI via Q-Buffer Relays and Vital Inputs.

The Logical Points-set/s in the EI must be configured not to require flank protection when in Route.

No serious fault modes SM3/FM3, SM5/FM5 and SM7/FM7 must be activated in the logical points-set/s in EI.

The manual cranking modes: Disabled Mode and Release to Crank Mode does not apply to the Logical points-set/s.

3.3.4. The Interface to the EI being the duplication of the “A-Track/s” (Axle Counter Evaluator to EI and vital outputs/Q-buffer relays to Foreign Interlocking system), “O-Track/s” (TR to Foreign Interlocking Spoor Unit/Q-Buffer Relay rack transfer to EI via Vital Inputs to logical TC element/object), Track sections over Points-set/s between Home Signal and the starter signal/s (TR to Foreign Interlocking Spoor Unit/Q-Buffer Relay rack transfer to EI via Vital Inputs to logical Points-set element/object).

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- 3.3.5. Duplication of the “Berth Track” sections of all the Starter Signal/s (TR to Foreign Interlocking Spoor Unit/Q-Buffer Relay rack transfer to EI via Vital Inputs to logical TC element/object). Destination Dummy Signals for Routes from the Dummy Home Signal/s in the EI.

This interface will be required for interfacing to existing applicable Spoorplan systems on the PRASA lines that are not going to be re-signalled and on TFR lines where the fringe station to a PRASA line is controlled by applicable Spoorplan *or Hybrid* interlocking system.

These interfaces are required under the re-signalling projects of the three metro poles: Gauteng, Durban and Cape Town.

3.4. Interface Relays:

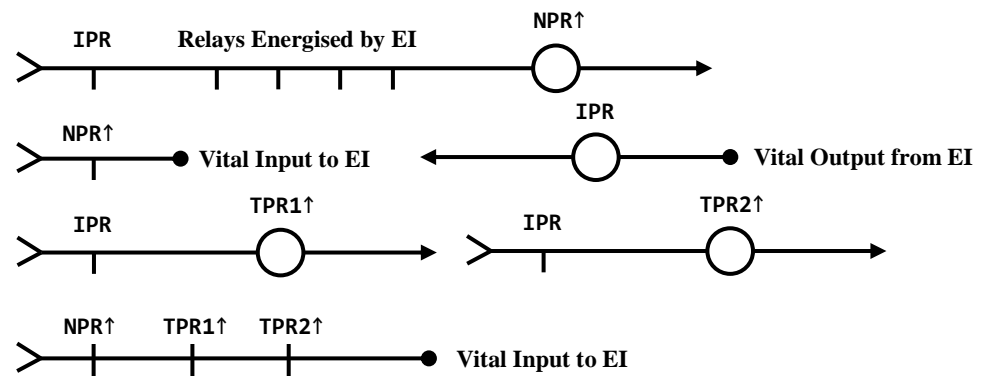
3.4.1. All vital outputs:

- 3.4.1.1 If a primary relay (e.g. BRB900 series) is energised by the vital output. The relay must be proven not stuck up in the interlocking energising the relay and when proven stuck up the interlocking must be taken to a fail-safe state.
- 3.4.1.2 If two secondary relays (e.g. Siemens K50 series) are energised in parallel by the vital output. The relays must be proven not stuck up in the interlocking energising the relays and when one or both proven stuck up the interlocking must be taken to a fail-safe state.

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3.4.1.3 When the EI energises relays as described above these relays must be proven Normal (All normally de-energised Relays can be proven Normal in one Normal energised Relay of which the integrity with all the other Normally energised Relays must be proven not stuck up) with the setting of any “Yellow Route” in both directions involving the duplicated elements in the Interface. When proven not Normal the Interface to the specific ALB section must be passivated until the Fault has been cleared *and proven by a successful Integrity test.*

See Example Circuit Diagrams Below:



NPR↑ = Normally energised Normal Proving Relay

IPR↑ = Integrity Proving Relay

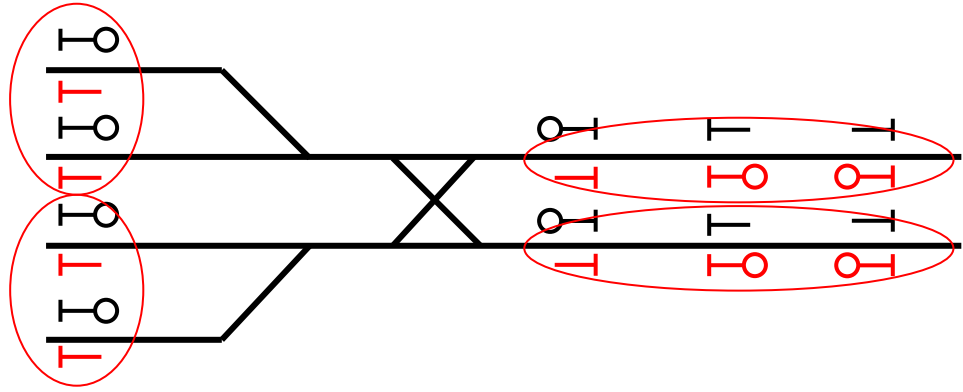
TPR1↑ = Normally energised Repeat Relay of TR1 Relay

To save relays and vital Inputs to EI – the Normally energised Relays proving a group of Relays in the Interface energised by the EI that they are not energised, can be grouped. Home, Advance Starter and Intermediate Home Signals of the same ALB is a logical grouping as the ALB must be passivated if any of their relays are stuck up.

The grouping of Starter Signals reading to the same ALB can also be considered – however the Availability must be also a consideration.

See Diagram below for possible groupings:

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- 3.4.1.4 The Final signal clearing vital output from EI must be two Q-buffer relays so that when one has got a false feed or vital output a short the other can force it to a fail-safe state.
- 3.4.1.5 The TPR/s and KR/s energised by the foreign Interlocking to transfer to EI must be proven in the customary proving circuits for the specific Foreign Interlocking (TPR/s – Train normalisation spoor, etc.).

When the KR/s, read in by EI is in series chain of repeat relays with the last repeat relays energised in the Spoorplan unit they don't have to be wired for down proving. With Spoorplan Mk1, Mk1a and Mk1b the last KR/s in the Spoorplan unit is a single Secondary relay and the KR/s on the buffer rack (Primary Relays) must be wired into the Spoors – If not already done – Chief Engineer Instruction.

- 3.4.1.6 The Final Signal output clearing that must be transferred to the EI (Dummy – only Spoor unit or Real Signal Interface) must be proven Normal in the customary circuit: CR – Spoorplan, GR- Hybrid, etc. for call relays.

3.4.2. All vital inputs:

- 3.4.2.1 If a primary relay (e.g. BRB900 series) is used it must be wired over independent two front contacts to two equivalent vital inputs to the EI. When the safety function testing the integrity of the vital inputs, according to the safety case, fails the interlocking must be taken to a fail-safe state.

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- 3.4.2.2 If two secondary relays (e.g. Siemens K50 series) are used it must be wired over independent front contacts of the two separate relays two equivalent vital inputs to the EI. When the safety function testing the integrity of the vital inputs, according to the safety case, fails the interlocking must be taken to a fail-safe state.

4. Operational Requirements.

4.1. Clearing Starter Signals 638G, 640G or 642G (See Appendix A below):

4.1.1. Clearing request from CTC:

The TCO at Foreign interlocking station must set the route from starter signal G638/G640/G642 to Home signal G660/D840G and Overlap from D840G to D860G and Call applicable starter signal 638/640/642PB + AGPB (Main Aspect) or 638/640/642PB + BGPB (Shunt Aspect if applicable) must be fed in parallel to EI interface program (not mandatory).

4.1.2. The interface program in EI must then set a route from D638G/D640G/D642G Dummy to 840G, set an overlap from 840G to 860G and clear D638G/D640G/D642G Dummy to a Main or Shunt Aspect as applicable (not mandatory).

4.1.3. The manual route setting from D638G/D640G/D642G Dummy to 840G, and setting an overlap from 840G to 860G and clearing D638G/D640G/D642G Dummy to main or shunt aspect must be possible in the EI.

4.1.4. Proving the route and overlap in the EI in the Spoorplan interlocking:

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4.1.4.1 When D638G/D640G/D642G Dummy clears a vital output from the Interface functional block must pick a relay “D638/D640/D642 AG OK” or “D638/D640/D642 BG OK” as applicable that must be cut into the real Signal clearing control of the Real Signals 638G/640G/642G main or Shunt as applicable in the foreign Interlocking, allowing the Real Signal to clear to a main or Shunt Aspect.

When these primary relays D638/D640/D642 AG OK or D638/D640/D642 BG OK are stuck up after cancellation or train normalisation. Setting a Yellow Route will pick this up, the Interface to 840G must be passivated (No setting of Routes from D638G/D640G/D642G Dummies to 840G possible in EI until Fault cleared).

The integrity of these relays with the generic Integrity test (prove all relays normal), initiated when any Route is set over the Interface and when either or both stuck up the Interface to applicable ALB section must be passivated.

4.1.4.2 The Yellow-, Green-, Blue- and Emergency-route and Overlap indications over all points-set/s 619W, 631W, 660T and 840T when clearing the starter signal will be separately displayed for the Foreign Interlocking and EI, with the same origins as normal in these two interlocking systems.

4.1.4.3 The TK indications over all points-set/s 619W, 631W, 660T and 840T when clearing the starter signal will be separately displayed for the Foreign Interlocking and EI, with the same origin as normal in these two interlocking systems.

4.1.5. *When a Starter signal/s in foreign interlocking reads with some Route/s to the EI ALB (Interface relevant) and with other Route/s to Foreign interlocking ALB/Destinations – the dummy starter signals primary relays from the EI wired in the control of these starter signals must be vitally bridged out in the control of the applicable starter signal when proven that the signal was called for route not leading to the ALB.*

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4.2. Clearing Intermediate home Signal 860G (See Appendix A below):

4.2.1. Clearing request from CTC:

The clearing request for 860G can be fed in parallel via Remote control to the foreign interlocking and the EI interface program (not mandatory). The EI interface program must then set a route from 860G to D660G Dummy and an overlap from D660G Dummy to D600G/D640G Dummy (Default configured Overlap) when AG on 860G.

The manual setting, by the TCO, in EI interlocking of a route from 860G to D660G Dummy and an overlap from D660G Dummy to D580G/D638; D600G/D640G; D620G/D642G Dummy and AG on 860G must be possible.

The Overlap/s from the Dummy Home Signals in the EI must be configured not to require Head Protection.

4.2.2. The TCO at the Foreign Interlocking station should set a Route from D860G to 660G and an Overlap or Route from 660G to 638/640/642G or 658G/600G/620G respectively and call D860G (Overlap/Route must correspond to the ones in EI).

4.2.3. The automatic route setting from D860G Dummy to 660G, setting an overlap from 660G to 640G/600G (Default Overlap in Foreign interlocking) and clearing D860G Dummy is allowed (not mandatory). Default Overlap configured in Foreign interlocking must correspond to EI interlocking configured Default Overlap.

4.2.4. Proving the route and overlap in the Foreign interlocking in the EI interlocking:

4.2.4.1 The Signal control output from the spoor-unit for D860G in the foreign interlocking, proving it clear (proving the route from D860G Dummy to 660G and the overlap from 660G to 638G/640G/642G) must pick a relay “D860G OK”. This D860 OK relay must be via vital inputs transferred to the EI and proven in the control of the real signal 860G in the EI.

When this primary relay D860G OK is stuck up after cancellation or train normalisation it must be proven down in the customary circuit in foreign interlocking (CR – picking in Spoorplan, GR picking circuit in HR97).

The D860G Dummy will not be able to be cleared again preventing the real signal 860G in the EI to clear until fault corrected.

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- 4.2.4.2 When the vital input reading the state of primary relay D860G OK goes faulty the signal D660 Dummy in the EI must be blocked as a destination signal (setting route 860G to D660G Dummy in the EI not possible anymore) *or something similar that will prevent 860G in EI to be called/cleared again, until fault cleared.*
- 4.2.4.3 The Yellow-, Green-, and Emergency-route when clearing the intermediate home signal 860G and D860G Dummy as well as for the overlaps over the points-sets in the foreign interlocking and in the EI will be separately displayed for the foreign and EI, with the same origins as normal in these two interlocking systems.
- 4.2.4.4 The TK indication for the 631T-, 619T-, 660T- and 840T-track will be separately displayed for the hybrid and EI, with the same origins as normal in these two interlocking systems.

4.3. Clearing the home signal 660G (See Appendix A below):

4.3.1. Clearing request from CTC:

The setting of the required route and clearing request for 660G may be fed in parallel to the Foreign interlocking and the EI interface program (not mandatory). Foreign interlocking must set a route from 660G to 638G/640G/642G and clear 660G with AG or BG. All the interlocking to clear 660G signal is in the foreign interlocking and therefore can be allowed to clear. The control output of 660G proving it has cleared must energise a “660G AG Clear” or “660G BG Clear” primary relays respectively for a main or shunt aspect cleared on 660G.

Relays 660AG OR 660BG in the hybrid interlocking is used to automate setting route and clearing of signal D660G Dummy in the EI (Not mandatory). These two relays must be down proven in foreign interlocking customary circuit for 660G (CR – pick up circuit Spoorplan, GR pick up circuit HR97, etc.). The Route from 660G in Foreign interlocking must be the corresponding Route from D660G in the EI.

- 4.3.2. The interface program must then set a route from D660G Dummy to D580G/D600G/D620G dummy in the EI and clear D660G Dummy according to the AG or BG done on 660G in the foreign interlocking (Foreign interlocking Route must correspond to Route in EI).

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- 4.3.3. The “660G AG Clear” or “660G BG Clear” energised by the foreign interlocking must via vital inputs be transferred to the EI and proven in the clearing of D660G so that aspect steering for main signal can be done to the EI controlled Intermediate home signal 860G.

The 660G BG clear Relay may not be necessary when the Interlock preventing the 860G in EI to clear onto a Home signal displaying a shunt aspect is done via D860G dummy in foreign interlocking that is prevented in this situation and proven in 860G in EI.

When Route from G660 to D580G/D600G/D620G is no braking distance the Home signal must be controlled by the EI (Yellow + White aspect does not exist in foreign interlocking). The “660G AG Clear” relay changes to 660G AG OK and must be cut via primary Relays and vital inputs to the EI’s control of 660G. The information if Signals 580G/600G/620G has cleared must also be fed via primary relays and vital inputs to EI to determine the display or not of the white light on the home and Intermediate Home signals

- 4.3.4. When 660G is cleared to a running aspect in the foreign interlocking 660G AG Clear energised and fed via vital input to the EI and proven in the control of D660G to enable a green aspect OR a flashing green OR flashing yellow aspect on 860G depending on the route for which 660G was cleared.

In the problem situation with a Yellow + White Aspect on the Home signal 660G – the EI controls the real 660G and all aspect steering back to the Intermediate Home signal 860G is done in the EI.

- 4.3.5. The manual setting of the route D660G Dummy to D580G/D600G/D620G dummy and clear D660G Dummy in the EI must be possible. When this D660G is not cleared with a reverse movement the reverse cancellation in the EI will not take place (Routes must correspond in Foreign and EI interlocking systems).

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4.4. Clearing the Advance Starter signal 840G (See Appendix A below):

- 4.4.1. The Advance starter/ALB section entry signal 840G in EI must be cleared – all the interlocking proving is in the EI and it therefore can be allowed to clear.
- 4.4.2. The EI must with a vital output energise a primary relay “840G Clear” proving the clearing of 840G that must be wired into the control of D840G in the foreign interlocking – so that aspect control back to the cleared starter signals can be done.
- 4.4.3. The route from D840G to D860G in the foreign interlocking must be set and D840G cleared (only with “840G Clear” relay energised).
- 4.4.4. When 840G is cleared “840G Clear” relay energised by the EI and wired in control of D840G in foreign interlocking will enable a green aspect on 640G and a flashing green OR flashing yellow on 638G/642G depending on the turnout speed of 619W/631W respectively when these signals are cleared.

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4.5. Clearing emergency signal aspect on 638/640/642G, 660G, 840G OR 860G (See Appendix A below):

- 4.5.1. Clearing an emergency signal aspect on one of the starter signals 638G/640G/642G controlled by the foreign interlocking.

The corresponding emergency aspect must be cleared in the EI on D638G/D640G/D642G energising with vital outputs D638G NG OK/D640G NG OK/D642G NG OK primary relays and wiring them into the emergency aspect control of 638G/640G/642G in foreign interlocking.

The Interlocks to prevent an Emergency aspect on the Starter signal when an Emergency Aspect is already displayed on the Advance starter signal that it is reading onto or to prevent an Emergency Aspect on the Advance starter signal when an Emergency Aspect is already displayed on the Starter signal reading onto it must be handled as follows:

- 4.5.1.1 *With Spoorplan MkII and MkM these two interlocks were omitted. These interlocks must both therefore be done in the EI the D638G NG OK/D640G NG OK/D642G NG OK out of EI via primary relays wired into the emergency aspect control of 638G/640G/642G in foreign interlocking will prevent Advance starter signal to be cleared to an Emergency Aspect and the Advance starter already cleared to an Emergency Aspect will prevent any of D638G NG OK/D640G NG OK/D642G NG OK to become active.*
- 4.5.1.2 *With HR97 interlocking system these two interlocks are done and it is not necessary to do them in EI - D638G NG OK/D640G NG OK/D642G NG OK Relays not necessary. Non vital synchronisation may still be done.*

- 4.5.2. Clearing an emergency signal on the Home signal 660G controlled by the foreign interlocking.

The corresponding emergency aspect must be cleared in the EI on D660G energising with a vital output D660G NG OK a primary relay and wiring it into the emergency aspect control of 660G in foreign interlocking.

The Interlocks to prevent an Emergency aspect on the Intermediate Home signal when an Emergency Aspect is already displayed on the Home signal it is reading onto or to prevent an Emergency Aspect on the Home signal when an Emergency Aspect is already displayed on the Intermediate Home signal reading onto it must be handled as follows:

- 4.5.2.1 *With Spoorplan MkII and MkM these two interlocks were omitted. These interlocks must both therefore be done in the EI the D660G NG OK out of EI via primary relays wired into the emergency aspect control of 660G in foreign interlocking will prevent Intermediate Home signal to be cleared to an Emergency Aspect in EI and the Intermediate Home signal already cleared to an Emergency Aspect will prevent D660G NG OK becoming active and therefore preventing Home signal to clear to an Emergency Aspect.*

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4.5.2.2 *With HR97 interlocking system these two interlocks are done and it is not necessary to do them in EI - D660G NG OK Relay not necessary. Non vital synchronisation may still be done.*

4.5.3. Clearing an emergency aspect on the Advance starter/ALB section entry signal 840G controlled by EI.

The corresponding emergency aspect must be cleared in the Foreign interlocking on D840G energising D840G NG OK a primary relay and transferring it to the EI via a vital input and proving it in the control of the emergency aspect of 840G.

When Interlocks done in EI (Sporplan MkII and MkM) - D840G NG OK a primary relay and transferring it to the EI not needed.

4.5.4. Clearing an emergency aspect on the Intermediate Home signal 860G controlled by EI.

The corresponding emergency aspect must be cleared in the Foreign interlocking on D860G energising D860G NG OK a primary relay and transferring it to the EI via a vital input and proving it in the control of the emergency aspect of 860G.

When Interlocks done in EI (Sporplan MkII and MkM) - D860G NG OK a primary relay and transferring it to the EI not needed.

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4.6. Cancellation on the Starter signals (See Appendix A below):

4.6.1. Cancellation request on 638/640/642G signals:

- 4.6.1.1 The 638/640/642PB + CaPB can be fed in parallel to the foreign interlocking and the EI interface program (Not mandatory). The interface program must initiate a normal route cancellation on 840G (cancelling the route from D638G/D640G/D642G Dummy to 840G and the overlap from 840G to 860G). The manual normal route cancellation on 840G must also be possible.
- 4.6.1.2 When the berth track of 638G/640G/642G is occupied the corresponding berth track of D638G/D640G/D642G will be occupied and the route in the EI will be in in the 1st defined state and would take time to cancel.
- 4.6.1.3 When the Routes from the starter signals 638G/640G/642G are entered the corresponding Routes from the D638G/D640G/D642G in the EI will also be entered and will be in the final defined state with their overlaps that will only allow Emergency Route cancellation. The Emergency Route and Overlap cancellation still functions separately in the foreign and EI to cancel Routes being entered in both.

4.7. Cancellation on the intermediate home signal (see Appendix A below):

4.7.1. Cancellation request on D660G Dummy signal in the EI:

- 4.7.1.1 When route 860G to D660G Dummy signal is not in the final defined state and a normal route cancellation is performed on D660G Dummy in the EI the interface program can initiate a normal Route cancellation on Route from D860G Dummy signal to 660G Home signal in the foreign interlocking (Not mandatory).
- 4.7.1.2 Performing a manual normal Route cancellation on Route from D860G Dummy signal to 660G Home signal in the foreign interlocking must also be possible.
- 4.7.1.3 When the berth track of 860G is occupied in EI the route will be in in the 1st defined state and would take time to cancel.

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- 4.7.1.4 The berth track of D860G Dummy in the foreign interlocking does not exist (always occupied) and will therefore always takes time with a normal Route cancellation
- 4.7.1.5 When the Routes from 860G in EI and D860G in foreign interlocking is entered in parallel – only emergency route cancellation possible, that must be separately done on both interlocking systems the same way as normal to that interlocking system.

4.8. Cancellation on the Advance starter signal (see Appendix A below):

- 4.8.1. Cancellation of Advance starter signal 860G in EI is the same as normal.
- 4.8.2. The cancellation of the Dummy D860G in foreign interlocking is as normal.
- 4.8.3. Both must be cancelled when Advance starter 860G was cleared.

4.9. Cancellation on the Home signal (see Appendix A below):

- 4.9.1. Cancellation of Home signal D660G in EI is the same as normal from destination dummies D580G/D600G/D620G depending on which route was set.
- 4.9.2. The cancellation of the 660G Home signal in foreign interlocking is as normal.
- 4.9.3. Both must be cancelled when Home signal 660G was cleared.

4.10. Train normalisation:

- 4.10.1. Train normalisation of routes:
- 4.10.1.1 The train normalisation takes place in parallel as normal in both EI and foreign interlocking.
- 4.10.1.2 The reverse normalisation takes place in parallel as normal in both EI and foreign interlocking.
- 4.10.1.3 The Overlap 90 seconds normalisation when destination signal at danger takes place in parallel as normal in both EI and foreign interlocking.

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- 4.10.1.4 When the train normalisation, reverse normalisation or Overlap 90 seconds normalisation do not take place in foreign interlocking because of a dry joint, etc. the cancellation of these routs/overlaps must be done as normal in the foreign interlocking.

5. VALIDATION and QUALITY ASSURANCE PROVISIONS:

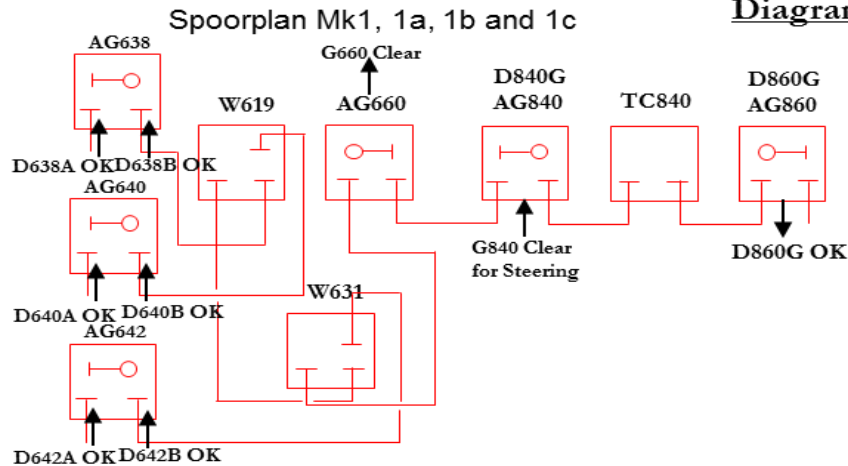
- 5.1. The functionality and safety case of this interface must be proven on a physical model by PRASA Strategic Asset Development (Technology Management).**

6. Appendix A: Diagram Interface EI to:

- 6.1. *Spoorplan Mk1, 1a, 1b and 1c.***
- 6.2. *Spoorplan MkII.***
- 6.3. *Spoorplan MkM.***
- 6.4. *Hybrid Interlocking HR97:***

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Diagram for Interface EI to Spoorplan Mk1,1a,1b,1c:



Clearing of Starter Signal to A or B Signal in Spoorplan:

The corresponding Dummy Signal OK for A or B Signal in EI must be proven in Spoorplan

Clearing of Home Signal to A or B Signal in Spoorplan:

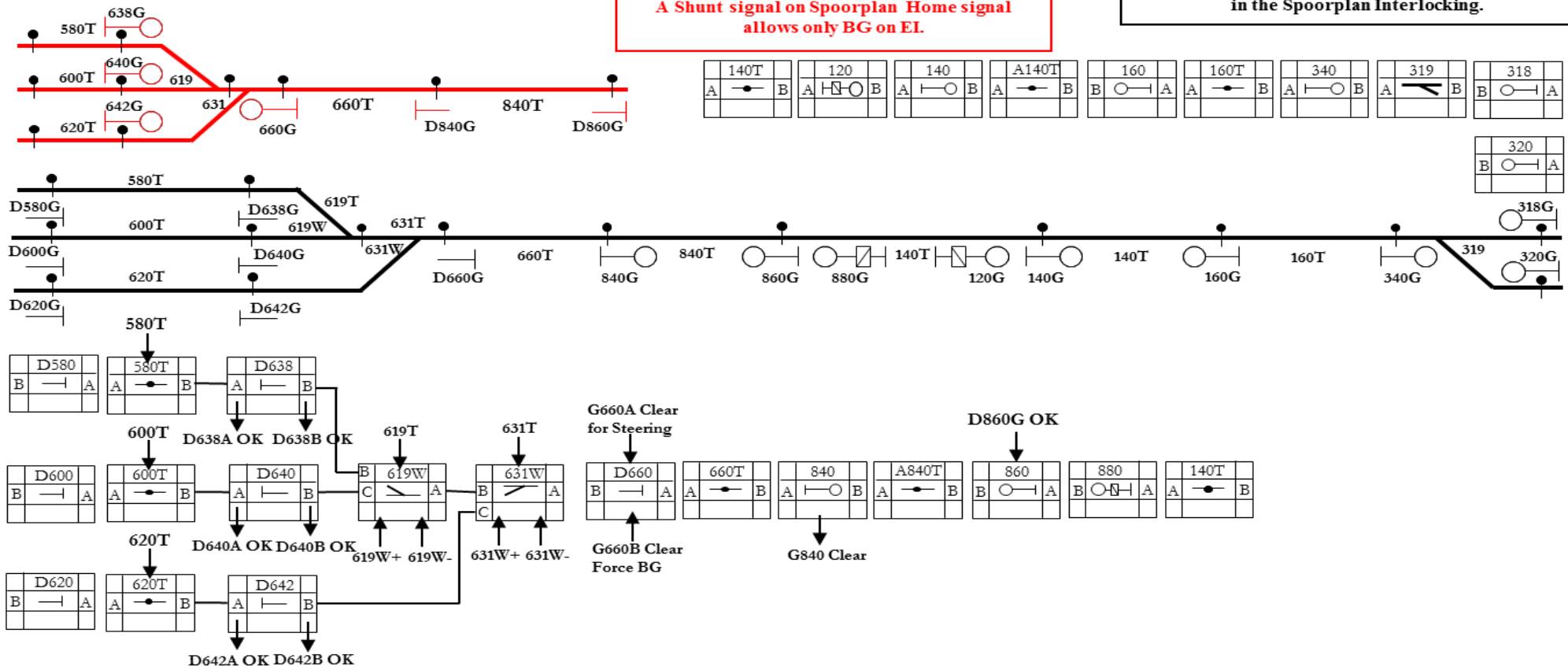
The home Signal can be cleared in Spoorplan but the corresponding A or B Signal on EI Dummy Home Signal must be cleared to Sync Interlocking systems. The Spoorplan Home Signal being Clear must for A Signal's Aspect Steering be proven in EI Dummy Home Signal. A Shunt signal on Spoorplan Home signal allows only BG on EI.

Clearing of Intermediate Home Signal in EI:

The corresponding Dummy Intermediate Home Signal OK in Spoorplan must be proven in EI Intermediate Home Signal.

Clearing of Advance Starter Signal in EI:

The Advance Starter Signal can be cleared in EI but the corresponding Dummy Advance Starter Signal in Spoorplan must be cleared to Sync Interlocking systems. The Advance Starter in EI being clear must be proven in its corresponding Dummy Signal in Spoorplan for Aspect Steering to the Starter Signals in the Spoorplan Interlocking.



Spoorplan Mk M

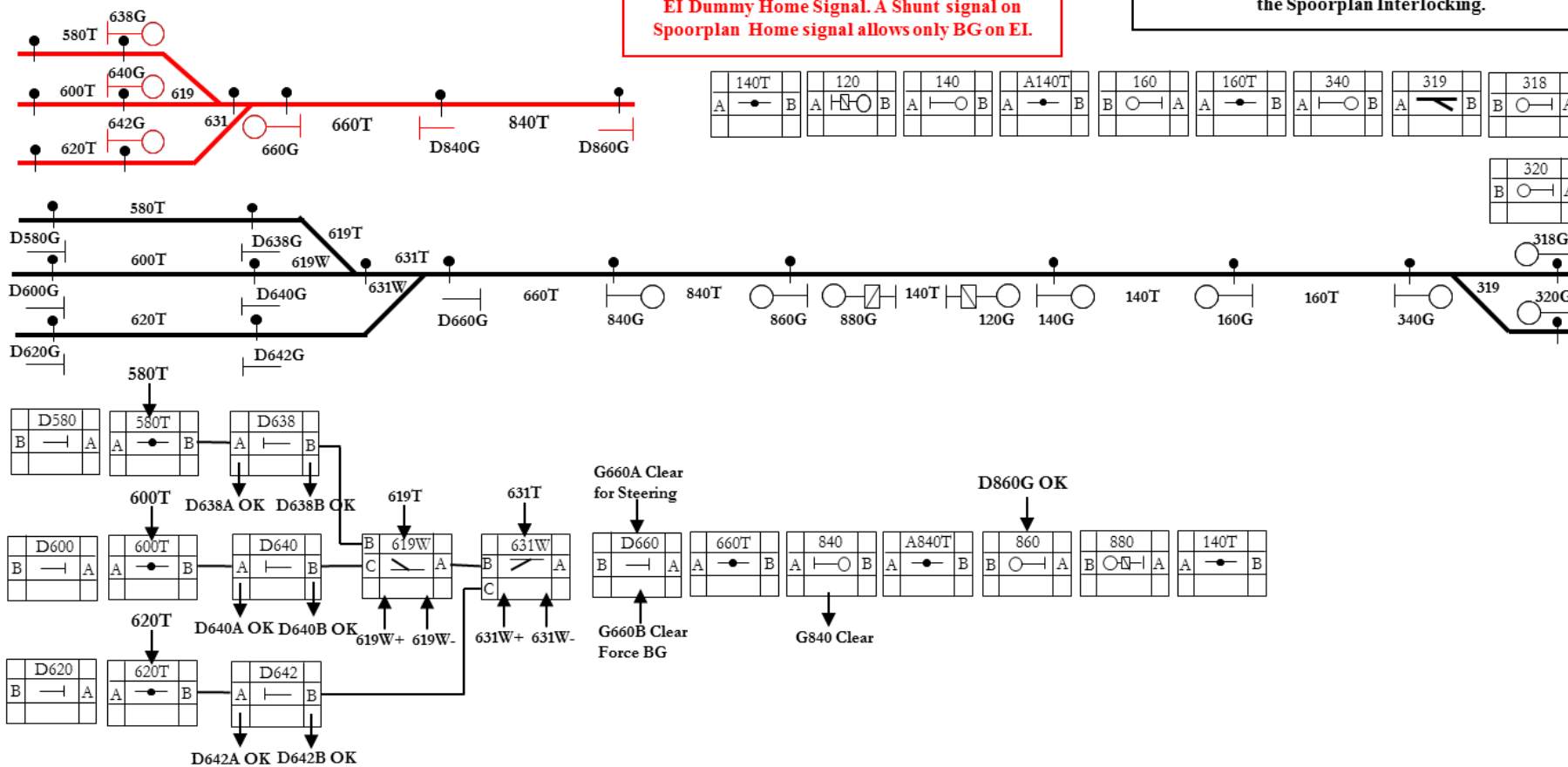
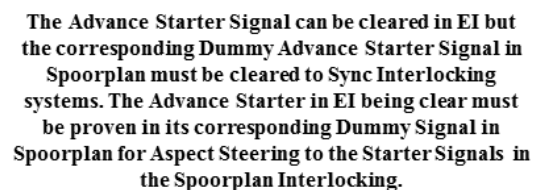




Diagram for Interface EI to Spoorplan MkII:

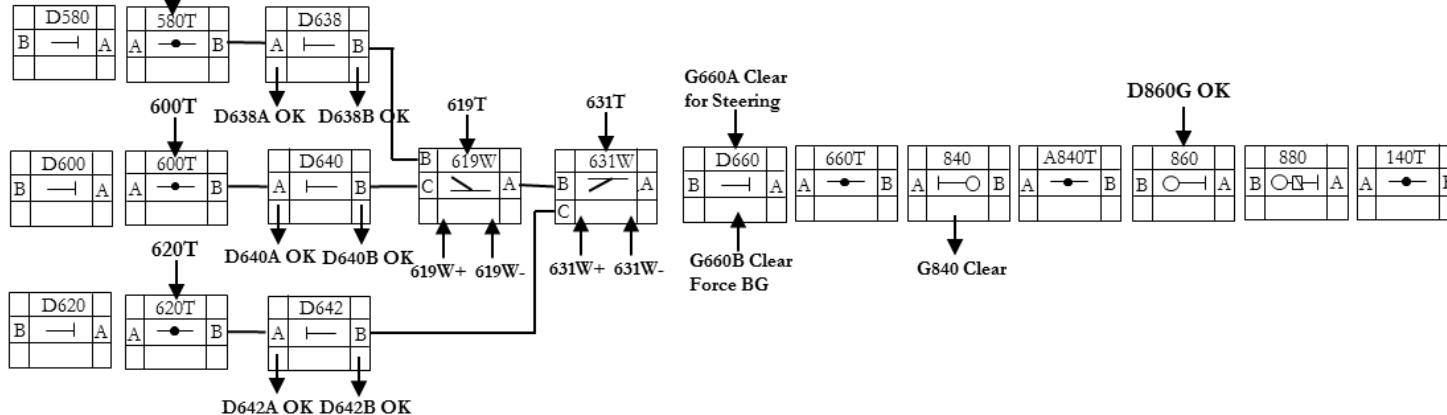
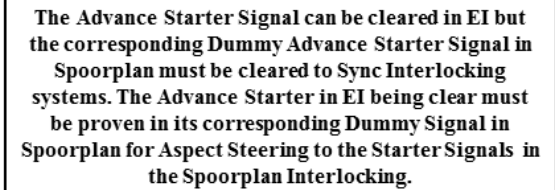
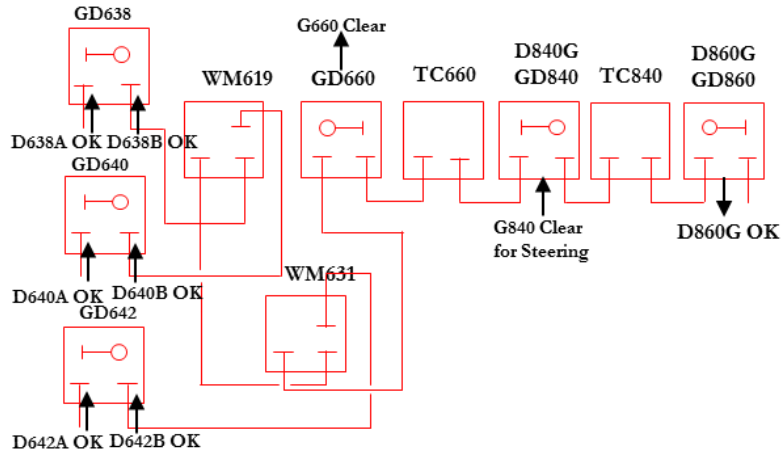


Diagram for Interface EI to Hybrid HR97 Interlocking:

Hybrid HR97



Clearing of Starter Signal to A or B Signal in Hybrid:

The corresponding Dummy Signal OK for A or B Signal in EI must be proven in Hybrid.

Clearing of Home Signal to A or B Signal in Hybrid:

The home Signal can be cleared in Hybrid but the corresponding A or B Signal on EI Dummy Home Signal must be cleared to Sync Interlocking systems. The Hybrid Home Signal being Clear must for A Signal's Aspect Steering be proven in EI Dummy Home Signal. A Shunt signal on Hybrid Home signal allows only BG on EI.

Clearing of Intermediate Home Signal in EI:

The corresponding Dummy Intermediate Home Signal OK in Hybrid must be proven in EI Intermediate Home Signal.

Clearing of Advance Starter Signal in EI:

The Advance Starter Signal can be cleared in EI but the corresponding Dummy Advance Starter Signal in Hybrid must be cleared to Sync Interlocking systems. The Advance Starter in EI being clear must be proven in its corresponding Dummy Signal in Hybrid for Aspect Steering to the Starter Signals in the Hybrid Interlocking.

