

Ref:	NR/L2/SIG/11201/ Mod X10
Issue:	1
Date:	03/09/2011
Compliance date:	03/09/2011

Level 2

Signalling Design: Module X10 – Level Crossings: Automatic Half Barriers

Endorsement and Authorisation

For endorsement and authorisation, please refer to
NR/L2/SIG/11201

This document is the property of Network Rail. It shall not be reproduced in whole or part nor disclosed to a third party without the written permission of Network Rail.
© Copyright 2011 Network Rail.

Uncontrolled copy once printed from its electronic source.

Published and Issued by Network Rail, Kings Place, 90 York Way, London. N1 9AG.



Ref:	NR/L2/SIG/11201/ Mod X10
Issue:	1
Date:	03/09/2011
Compliance date:	03/09/2011

Issue record

Issue	Date	Comments
1	03/09/2011	First Issue

Compliance

This Network Rail standard is mandatory and shall be complied with by Network Rail and its contractors if applicable from 03/09/2011.

When this standard is implemented, it is permissible for all projects that have formally completed GRIP Stage 3 (Option Selection) to continue to comply with the issue of any relevant Network Rail standards current when GRIP Stage 3 was completed and not to comply with requirements contained herein, unless stipulated otherwise in the scope of this standard.

Reference documentation

Disclaimer

In issuing this document for its stated purpose, Network Rail makes no warranties, express or implied, that compliance with all or any documents it issues is sufficient on its own to ensure safe systems of work or operation. Users are reminded of their own duties under health and safety legislation.

Supply

Copies of documents are available electronically, within Network Rail's organisation. Hard copies of this document may be available to Network Rail people on request to the relevant controlled publication distributor. Other organisations may obtain copies of this document from IHS. Tel: 01344 328039.

Ref:	NR/L2/SIG/11201/ Mod X10
Issue:	1
Date:	03/09/2011
Compliance date:	03/09/2011

Contents

1 AUTOMATIC HALF BARRIER CROSSINGS.	4
2 TRAIN DETECTION SYSTEM CONTROLS.	4
3 POSITIONING OF STRIKE-IN POINT.	5
4 OPERATING SEQUENCE AND CONDITIONS.	6
5 CONTROLS SPECIFIC TO DOUBLE LINES.	9
6 FAILURE MODES.	11
7 LOCAL CONTROL.	12
8 HAND OPERATION.	14
9 AHB INDICATIONS.	14
10 SIGNAL REGULATION.	16
11 SPAD MITIGATION AT AHB CROSSINGS.	16
12 ROUTE AWAY CONTROLS.	17
13 APPROACH LOCKING AT AHB CROSSINGS.	19
14 STOPPING/NON-STOPPING CONTROLS.	19
Figure 1 – AHB Full warning with 10 second delay.	9
Figure 2 – Using the overlap joint to initiate the crossing at an AHB.	10
Figure 3 – Reducing the signal overlap at an AHB.	10
Figure 4 – Strike-in controls with signal at 37 – 60 secs warning time.	11
Figure 5 – Route away controls (Treadles omitted for clarity).	17
Figure 6 – Trains standing on the exit tracks.	18
Figure 7 – Stopping / non-stopping.	20
Table 1 – Distances to strike-in points	5
Table 2 – AHB Indications	14
Table 3 – Control table for initiation sequence.	17

Copyright Network Rail

Ref:	NR/L2/SIG/11201/ Mod X10
Issue:	1
Date:	03/09/2011
Compliance date:	03/09/2011

1 AUTOMATIC HALF BARRIER CROSSINGS.

1.1 GENERAL DESCRIPTION.

1.1.1 The crossing is worked automatically by the passage of trains.

1.1.2 Protecting signals shall be provided within 10 minutes running time at permissible speed. This limit shall not apply in RETB or ERTMS areas where there is continuous voice communication between train and signal box or arrangements are in place for each train to contact the signaller and obtain permission before proceeding over the crossing.

1.1.3 Where a protecting signal is not directly controlled or slotted by the signal box supervising the crossing, arrangements shall be in place to alert the signaller controlling the protecting signal to replace it to danger quickly in an emergency.

NOTE In an absolute block area, then sending "6 bells" is sufficient. In other areas an emergency alarm or similar shall be provided.

1.1.4 Automatic half barrier crossings have barriers pivoted at the nearside of the road and of length up to the centre line of the road. The exit sides of the roads are kept clear to allow slow moving vehicles to clear the crossing.

1.1.5 Each road approach is protected by a minimum of two road traffic light signals (RTL's). One unit is sited on each side of the road approach.

1.1.6 Audible warnings are provided for pedestrians. There is a minimum of two units. They shall be normally sited at the diagonally opposite nearside corners of the crossing facing onto the crossing area. Larger crossings may use four audible warning devices with one at each corner.

1.1.7 A scaled ground plan defines and locates all equipment sited at the level crossing.

1.1.8 Telephones for users are provided. (the normal system used at AHB crossings is the P.E.Ts system).

1.1.9 The maximum length of trains permitted to operate over the level crossing shall be documented in the design details.

2 TRAIN DETECTION SYSTEM CONTROLS.

2.1.1 Track sections situated within the crossing control area once occupied shall initiate the crossing operation. The crossing operation shall be maintained (by means of a stick control), until:

- The train has been proved to clear the crossing by sequential operation, or;
- A suitable time has elapsed after the track has cleared.

2.1.2 Failure of a track section shall result in the following consequences:

2.1.3 If a random track section occupation occurs which subsequently clears, - the operating sequence shall be initiated. At a suitable time after track circuit clearance,

Ref:	NR/L2/SIG/11201/ Mod X10
Issue:	1
Date:	03/09/2011
Compliance date:	03/09/2011

(default of three minutes), the operating sequence shall be cancelled. (Unless other track sections within the crossing control area are also occupied).

2.1.4 If a random track section occupation occurs which does not subsequently clear, - the operating sequence shall be initiated. After a suitable time, (default of three minutes), the monitoring point shall receive an indication that the level crossing has failed. The operating sequence shall be maintained until the fault is cleared.

2.1.5 If an exit track section fails to clear after the passage of a train, (which means a train movement has correctly initiated and subsequently cancelled the operating sequence), then after the exit track section has been occupied for a period, (default 3 minutes or such greater period as moving trains may legitimately occupy the exit track section), the operating sequence shall re initiate and the monitoring point shall receive an indication that the level crossing has failed. The warning sequence shall be maintained until the fault is cleared. Where however trains may legitimately stand on an exit track circuit for a time, e.g. due to a station or signalling, this feature is disabled and alternative protection arrangements provided that prevent another train approaching until the fault is cleared.

3 POSITIONING OF STRIKE-IN POINT.

3.1.1 The minimum warning time allowed at AHB crossings is 27 seconds. This figure applies for crossings up to 15m long. Over this length an additional 1 second warning is required for each additional 3m of crossing length or part thereof.

3.1.2 Further time is added to allow for equipment response times. For a relay controlled crossing this is normally 2 seconds. For an electronic interlocking, the maximum response time shall be either known or shall be worked out before the crossing is designed.

3.1.3 The strike in point shall also take account of minimum road open time where a second train could approach (second train has already struck in by the point the barriers would rise for the first train). This is taken as 10 seconds. Therefore strike-in points can be calculated as:

- Single lines require 27 seconds + equipment response time + 1 sec for each 3m over 15m length or part thereof;
- Double lines require 37 seconds (10 sec for ATC) + equipment response time + 1 sec for each 3m over 15m length or part thereof.

3.1.4 Distances to strike-In points shall be in accordance with the (table 11).

Table 1 – Distances to strike-in points

Permissible Speed (MPH)	27 Secs (Metres)	29 Secs (Metres)	37 Secs (Metres)	39 Secs (Metres)	Add for each Additional 1 sec (Metres)
10	-	-	-	-	-
15	181	195	249	262	7
18	218	234	298	314	9
20	242	260	331	349	9
25	302	325	414	436	12

Ref:	NR/L2/SIG/11201/ Mod X10
Issue:	1
Date:	03/09/2011
Compliance date:	03/09/2011

Permissible Speed (MPH)	27 Secs (Metres)	29 Secs (Metres)	37 Secs (Metres)	39 Secs (Metres)	Add for each Additional 1 sec (Metres)
30	363	389	497	524	14
35	423	454	579	611	16
40	483	519	662	698	18
45	544	584	745	785	21
50	604	649	828	872	23
55	664	714	910	959	25
60	725	778	993	1047	27
65	785	843	1076	1134	30
70	845	908	1158	1221	32
75	906	973	1241	1308	34
80	966	1038	1324	1395	36
85	1026	1102	1406	1482	38
90	1087	1167	1489	1570	41
95	1147	1232	1572	1657	43
100	1207	1297	1655	1744	45

3.1.5 When calculating strike-in points, values shall always be rounded up to the nearest metre and the rail joint shall be sited within 19m of the calculated value. The practice of using the nearest existing insulated rail joint to a calculated strike-in point shall, as far as practicable, be avoided. It is not normally acceptable to extend strike-ins in order to utilise existing block joints.

3.1.6 Where bi-directional signalling is provided, wrong direction strike-in points shall be calculated in accordance with the permissible speed of the bi-directional signalling system. Where bi-directional signalling is not provided, wrong direction speeds shall be agreed with the infrastructure manager, but shall normally be half the normal direction permissible speed, subject to a maximum of 50mph (80kph).

3.1.7 Wrong direction strike-in points shall be denoted by a wrong direction speed board located 5m before the strike-in point.

4 OPERATING SEQUENCE AND CONDITIONS.

4.1.1 The normal operating sequence to close the crossing to road shall be initiated automatically by an approaching train and proceed as follows:

- The amber lights shall be illuminated and the audible warning for pedestrians shall begin to sound. The duration of the amber lights shall be three seconds;
- After 3 seconds the red road lights shall begin to flash;
- After between four and six seconds of flashing red road lights, the barriers shall begin to descend. The barrier boom lights shall illuminate as the barriers move to below 83 degrees;
- Six to ten seconds after the barriers begin to move, they shall become fully lowered.