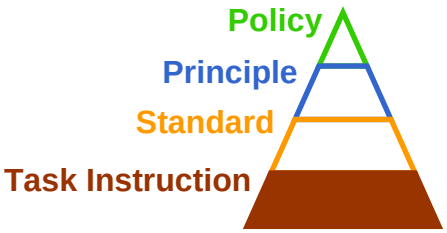

Signals and Telecommunications Task Instruction

Level Crossing Alarms and Barrier Installations

Purpose

The purpose of this Task Instruction is to detail inspection periods and methods of carrying out maintenance to Level crossing alarms and Barrier installations.

Document Control

Document No.	S-TI-MA-2614	**Issue No.**	Issue 1.0
Date Effective	1/07/2017	**Author**	R Wadsworth
Prepared (P) **Reviewed (R)** **Amended (A)**	L Gibb (R)	**Checked and Approved By**	Signals and Telecommunications – Technical Committee
		Authorised for Release By	Professional Head – Signals and Telecommunications

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1. Revision Procedure and History

This is a 'living' document, that will be up dated every five years or whenever KiwiRail determines that changes to it and processing requirements documented herein are appropriate.
If changes arise from the review, this task instruction will be reissued. If no changes arise from the review, the current version of this task instruction will remain in force.
Refer to the **Briefing Note(s) for S-TI-MA-2614 Level Crossing Alarms and Barrier Installations** (at the end of this document) for full document changes.

Issue No	Prepared (P) Reviewed (R) Amended (A)	Authorised for Release By	Date Effective

1.1 Changes in this issue

Issue No	Section	Description	Page(s)

1.2 Withdrawn, closed and superseded

Old Reference	Title	Replaced by

2. Associated Documents

Level	Number	Title

Table of Contents

3. Acronyms and Definitions

Acronyms	Definition
EX	Track Ballast Condition (resistance)
EZ	Receiver Signal Level
GCP	Grade Crossing Predictor. An electronic constant warning time crossing alarm system
HZ	Highest Receiver Signal
LCA	Level Crossing Alarm
LED	Light Emitting Diode
LX	Lowest Ballast Condition (resistance)
SFE	Signals Field Engineer

3.1 Notes, caution and warnings

Icon	Definition
	Note(s) to point out something of special importance.
	Caution or warning – drawing special attention to anything of important reminder or a safety message.

4. Scope

This Task Instruction covers the testing requirements, description, installation and maintenance requirements for level crossing systems.

4.1 Use in the field

This document has been designed to be used in the field. It is expected that this document will be opened in an iPad via 'Briefcase' and used as reference to complete the task. Note as written on the front cover the controlled version is held on iKon. **Printed copies of this document are uncontrolled**.

5. Introduction

Level Crossing systems provide timely warning to road users and pedestrians of approaching rail traffic. They are designed to fail in a safe state.

Level Crossing Alarm and Barrier systems provide an interface and warning system between the general public (road users and pedestrians) and rail traffic.

It is vitally important that inspections and maintenance are carried out by competent trained staff in a tradesman like manner. All tests and inspection results are to be recorded and signed on the appropriate sheet or system.

Level crossings are an area of the rail network that interface directly with both vehicular and pedestrian road users and rail traffic and as such is an area of unpredictability when conducting maintenance activities.

1. Extreme care **must** be taken when working in the vicinity of Level Crossings.
2. Traffic management plans are required when carrying out maintenance work that encroaches on the carriageway.

5.1 Job safety requirements

Before the commencement, of any activity relating to this task instruction are undertaken the following requirements **must** be completed:

1) Personal safety equipment **must** be current and appropriate for task being undertaken.
2) Safety briefing and Job start analysis **must** be undertaken.
3) Any access permission to carry out the task **must** be obtained.
4) Suitable protection system **must** be in place.

6. Testing Requirements

6.1 C14a two weekly or four weekly – all level crossing types

Item	Check / Inspection Actions
Five metre restart view lines	The best possible view lines **must** be maintained at level crossings. The five metre restart view is the view along the track at 5.0 metres from track centre. Section staff to contact roading authority and email confirmation to SFE or manager should escalation be necessary.
All LCA equipment	Operates correctly on test (including barriers and other warning devices if fitted.
Battery condition indicator	Is operating correctly.
Battery fluid levels	Inspect fluid levels.
Battery specific gravity and Cell voltage	Record for flooded lead acid batteries (two year replacement type).
Bells	Operate correctly
Flashing lights	• Lights flashing at the correct frequency (80 – 100 fpm) • Visibility to all road users • Correct alignment • All alternative indication lights / sidelights must be visible to rail traffic. This includes LEDs where fitted to bells as an indication to locomotive engineers.
Limit lines	Are in the correct place (2 m before the flashing light mast). Section staff to contact Roading authority and email confirmation to SFE or manager should escalation be necessary.
Pedestrian gates	• Push the gate towards the closed position to confirm that the full drive force operates. The motor will be in a drive operation for this procedure and there should be significant resistance to this movement. • When the alarms are operating push the gate towards the open position to confirm full drive force. • Check to ensure that emergency exits operate as designed.
Rail head	Visually check that in the vicinity of the crossing that is in use has no build-up of rust or material that would hinder track shunt. Appropriate action (arrange a special bulletin etc.) is to be taken.

Item	Check / Inspection Actions
Signage	Within the rail corridor is correctly located and is legible.
Time switches	Correctly set.

6.2 C14b 3 monthly - All level crossing alarm types

Item	Check / Inspection Actions
Battery	• Record battery cell voltages at standing load for all batteries o battery float voltages NiCad 14.2 V – 14.9 V o lead acid 13.2 V – 13.8 V. • Check security of battery leads and terminal lug connections.
Barriers	• Check barrier pre fall time delay (as per plan). • Confirm correct barrier snubbing. • Internal inspection of barrier mechanism. • Test the power off free fall of all Kyosan and any other barrier mechanism that is fitted with a mechanical ‘hold clear’ mechanism.
Grade crossing predictor	Record EZ, EX, HZ and LX values and error codes taking action as required. (Report all errors to SFE)
Pedestrian gates	• Check the geometry of the installation to ensure that all fencing, barriers and equipment are located as designed. • Inspect fastenings of the gate hardware.

6.3 C14c yearly – all level crossing types

Item	Check / Inspection actions
Level crossing alarms	• Alignment of warning lights on road approaches at required distances. • Inspect LED arrays for minimum output requirements.
Grade crossing predictor	• The operation data from level crossing GCP’s and constant motion detectors must be downloaded researched and discussed with the SFE within one week of downloading. • An visual inspection of all bonds, shunts and bypass shunts is to be carried out. • The track circuit component of the GCP inspection is dealt with in S-TI-MA-2616
Traffic light interface	Verify the correct operation into the traffic light system.

<table>
<tr><th>Item</th><th>Check / Inspection actions</th></tr>
<tr><td>Barrier Mechanism</td><td>

Verify power off operation for all barrier types and pre fall delays are within spec.
Inspect the condition of relays and contacts.
Quiet bells have a minimum sound level of 75 dB.

</td></tr>
<tr><td>Pedestrian Gates</td><td>
1. Disconnect the power from the motor drive and check that the gates close completely using the return spring tension only. Adjust spring tension if necessary.
2. Check the following readings during the normal operation of the gate:
<table>
<tr><th>Operation</th><th>Terminals</th><th>Reading (AC volts)</th></tr>
<tr><td></td><td>1-2</td><td>110 V</td></tr>
<tr><td>Closed</td><td>12-13</td><td>20 V</td></tr>
<tr><td>Closed</td><td>12-14</td><td>40 V</td></tr>
<tr><td>Open</td><td>12-13</td><td>33 V</td></tr>
<tr><td>Open</td><td>12-14</td><td>15.5 V</td></tr>
</table>
Note these tests are to determine capacitor health.
3. Check the opening and closing times for the gate. Time taken should be between 5 – 7 seconds for each operation.
4. Apply sufficient grease to the hinge grease nipples to force fresh grease through the hinge assembly, clean away any surplus grease.
</td></tr>
<tr><td>Harvest alarm monitor systems</td><td>
Verify operation of:

lights
bells
busbar voltage
battery voltage
half battery voltage
power supply and charger

After performing these tests a full test of alarm operation must be carried out.to ensure correct operation of lights and bells as well as battery charger operation.
</td></tr>
</table>

6.4 R14 reliability instructions – all level crossing types

Item	Check / Inspection Actions
Barrier Mechanisms	• Visually check all mounting bolts are tight. • Visually check Barrier mechanism internal condition including contacts for wear, cleanliness, contact pressure and fracture. • Insect control measures are adequate. • Visually check Condition of wiring and terminations. • Visually check gearbox oil level and greasing points and change if contaminated. • Visually check Brake operation, adjustment and attachment. • Visually check Motor brush / brush holders and commutator and clean if necessary. • Observe clutch operation and motor current with clutch slipping. • Motoring up and down operating times (adjust if necessary)refer to manufacturers documentation for times. • With arms in excess of seven metres the mast must be inspected for fatigue cracks. • Visually check door seals for water tightness.
Batteries	• Test specific gravity of NiCad batteries. • Test the electrical integrity of battery terminal connections.
Bells Mechanical	• Measure and maintain a nominal 12 V at the bell terminals. • Ensure all mounting bolts and fixings are tight. • Clean inside the bell and contacts. • Inspect the contacts and adjust if necessary. • Oil the door hinges. • Inspect the internal components for corrosion, fatigue, damage or wear. • Oil all pivots use SAE 20 grade oil. • Ensure insect control measures are adequate.
General	• Condition of all other hardware, location box and equipment. • Relay and equipment rack wiring. • Cable terminations and equipment for insulation deterioration and rodent damage. • Condition of pushbuttons and faceplates. • Test operation of pushbuttons.

Item	Check / Inspection Actions
LCA Light Heads	• All mounting bolts are tight. • Clean lenses. • Ensure that insect control measures are adequate.
Time Switches	Operation of time switches will be tested in conjunction with adjustments made for daylight saving.

7. Specific Rules

SR.14.1 Alleged wrong side failure, alleged incorrect operation of LCA equipment, or any collision or accident, renders equipment non-conforming; action must be taken in accordance with instructions.
In all cases:

- Immediate arrangements must be made with the Authorities Section of Network Control for a 10 Km/h. speed restriction to be imposed onto the crossing for all trains.
- For an alleged wrong side failure, or alleged incorrect operation, an investigation in accordance with instructions must be initiated. Additionally, all instances of alleged wrong side failure or incorrect operation are to be referred to the Signals Field Engineer or Authorised Delegate, who will arrange for the installation to be inspected and tested to ensure that alarms operate correctly. SL 98 report will be promptly submitted by the SFE or Authorised Delegate deemed to be the investigating officer.

SR.14.2 Change out of lamps, equipment and other items at a level crossing alarm installation must be recorded on the LCA test sheet.

SR.14.3 A level crossing installation may be left working and a 10 Km/h speed restriction imposed under the following circumstances where:

- a flashing light pole has been demolished and adequate primary flashing light protection is still available for all approaching road traffic
- the primary or only flashing light pole is demolished on one side only and full alarms out of use signage as specified for the ‘alarms disconnected’ case is erected for road traffic approaching on that side of the level crossing.
- a half arm barrier mechanism is defective and has to be taken temporarily out of use and an ‘Barrier not Working’ sign is erected where it is clearly visible to road users
- good road approach views exist the speed restriction imposed may increase to 25 Km/h on authority from the Authorised Delegate

SR.14.4 When level crossing alarms are disconnected because of failure or other event (eg new commissioning), arrangements must be made with the Network Control Manager or the Network Control Authorities section, for a 10 Km/h speed restriction onto the crossing for all trains. The closest of any fixed signals to the crossing within the warning distance or outer approach for each route are to be fixed at stop. ‘Signals Not Working or Barriers not

Working' signs must be fixed to all level crossing alarm masts and also to the masts of appropriate road vehicle warning signs as follows:

- Old type WX 6 'Railway Crossing' signs
- New type WX1L or WX1R "Railway Level Crossing Ahead" (steam engine sign) and WX3 "Railway Level Crossing flashing Lights Ahead" sign
- WXR3 or WXL3 'Railway Crossing on Side Road' and WXL4 or WXR4 'Railway Crossing at T-Junction' signs approaching the level crossing.

Signs are to be positioned for best visibility by road users without obscuring other road signals or crossing alarm light heads. All crossing alarm light heads are to be covered with bright orange covers.

Traffic Management Plans are required for planned suspension of Crossing Alarms.

The Signals Field Engineer should be contacted where unusual circumstances apply.

SR.14.5 Planned suspension of alarms must be arranged in advance with the Network Authorities Section. Warning signs must be provided as described in SR.14.4 above.

SR.14.6 LCA Tests shall preferably be carried out in the latter part of the last week of the specified period or at other times as directed by the Professional Head – Signals and Telecommunications. The Signals and Telecommunications Engineering Office will advise where two (2) weekly testing is required.

SR.14.7 SL261, SL262 and SL263 record form is to be kept at relevant installations showing the date of every code inspection / test. All records are made in a non-erasable pen.

SR.14.8 Signs and Notice boards: Signals and Telecommunications are responsible for signs attached to the alarm masts including any signs to the side on separate mast (bells off, any special signs referring to alarm operation), and the PW 59 sign at pedestrian crossings.
All missing or damaged signage maintained by the roading authority should be reported to them promptly. Signage that falls into this category:

- PW 14 signs (erected outside the rail corridor).
- Do Not Enter Crossing if Exit Blocked signs.
- Any special signs to prohibit long vehicles from entering selected level crossings.

SR 14.9 Time clocks used for night switching of bells are to be adjusted within three days following the commencing or ending of daylight saving.

SR 14.10 Where LED's are used as the light source, if more than nine LED's are out then replace the unit.

Briefing Note(s) for S-TI-MA-2614 Level Crossing Alarms and Barrier Installations

Date Effective 1/07/2017 **Issue No.** Issue 1.0

Background

This document is one of a series that outlines the latest maintenance and inspections requirements for Signals and Telecommunications equipment on the KiwiRail Network and should be referred to by all Signals and Telecommunications field staff when completing these tasks.

Key changes / compliance

This is the first publication. This new document replaces the existing Infrastructure Group Document S005 known as the STE Code.

Implementation

All documents will have the Briefing Note inserted to each document during the next review process or next published version iteration, whichever comes first.

Applicability (Select relevant boxes)	Civil	Signals and Telecommunications	Structures	Track	Traction and Electrical
STE Inspector	☐	☒	☐	☐	☐
STE Managers	☐	☒	☐	☐	☐
STTE Managers	☐	☒	☐	☐	☐
Signals Field Engineer	☐	☒	☐	☐	☐
Signals Supervising Engineer	☐	☒	☐	☐	☐
Signals Inventory Manager	☐	☒	☐	☐	☐