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**INSTITUTION OF RAILWAY SIGNAL ENGINEERS
MINOR RAILWAYS SECTION**

GUIDELINE

ON

**THE MAINTENANCE OF LEVER
FRAMES, SIGNAL WIRE RUNS
AND RODDING**

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1 INTRODUCTION

"The object of good maintenance is to prevent failures by a combination of observation and anticipation rather than wait until failures occur".

This Guideline shows recommended maintenance procedures and any known material constraints to enable wire runs and rodding to remain functionally available.

It is applicable to inspection and preventative maintenance activities required to detect and correct any faults or degradation in performance.

It is specifically applicable to the following

- Signal wire runs, including wire slings and chains
- Point rodding
- Level crossing rodding
- Cranks, compensators and fittings

It is not intended to be a definitive document on how to maintain Lever Frames, Signal Wire Runs and Rodding, but to disseminate best practice and advice on the maintenance required.

The IRSE Minor Railways Section has used its best endeavours to ensure that the contents of this document are factually and technically correct and suitable for its stated purpose but the IRSE Minor Railways Section cannot be liable for any subsequent use to which the document may be put.

2 DEFINITIONS

See also IRSE Guideline document "Glossary of terms for Signalling and Telecommunications".

| | |
|-------------------|---|
| Brush | Brush all loose dirt from apparatus and foundations |
| Check | Visually inspect for mis-alignment, obstructions, breakages, decay and obvious damage |
| Clean | Remove moisture, dirt, corrosion or roughness |
| Cross Rod | Any piece of rodding that passes under the track. |
| Duplex Link | A two piece link designed to connect a wire thimble with another thimble or other piece of equipment. |
| Dust | Dust lightly with a brush or duster |
| Examine | Closely inspect apparatus and connections for wear, security, deterioration, decay and damage |
| Is (are) required | Used to indicate choices where firmer guidance might be indicated. |
| Lubricate | Oil or grease parts to reduce friction or provide protection and wipe off grease |
| May | Used where guidance suggests optional choice. |
| Measure | Apply a measuring instrument or gauge, then read and record the result. Ideally the instrument or gauge should be calibrated. |
| Must | Used only where there is a legal or statutory requirement to the activities being described. |
| Observe | Look at the equipment in use to make sure it is working correctly and is not faulty |
| Protect | Apply an approved protecting agent |
| Record | Enter the obtained measurement reading or observation on the chosen method of record keeping |
| Rectify | Make good any faults discovered |
| RGS | Railway Group Standard published by RSSB |
| RSPG | Railway Safety Principles and Guidance by HSE (now ORR) most of these documents are now obsolete and some have been replaced by the ORR Railway Safety Publications. |
| S and T | Signal and Telecommunications |
| Scrape | Scrape all dirt and surplus grease off apparatus and foundations |
| Should | Used as the primary verb for statements of guidance. |
| Sling | A very flexible length of wire rope that is used to allow changes of direction for signal wires around wheels. |
| Stool | A block, buried into the ground, which carries the rodding rollers. It is usually a concrete " I " section block. |

| | |
|---------------|---|
| Stroke | The distance that the signals wire or rodding has to move so that the equipment operates correctly. |
| Test or Gauge | Examine apparatus and run (or use the appropriate tool, gauge or instrument) it to make sure it is working correctly and is adjusted within the specification |
| Thimble | A metal loop that is used to form a loop at the end of a signal wire to allow the wire to connect with another piece of equipment. |
| Wash | Remove contaminated oils, greases and dirt by applying a cleaning agent, or by using a detergent and water and then drying |
| Wipe | Rub apparatus with a cloth to remove dirt, grease etc. |

3 SAFETY CONSIDERATIONS

Consideration shall be given to the following whilst working on lever frames and mechanical locking:-

- Application of lever collars and or other reminder devices.
- Wearing of hard hats and other Personal Protective Equipment as necessary in the under-floor areas.
- Any hazards that may arise from the removal of the operating floor for access purposes.
- Consideration should be given to scheduling the work when the line is under possession or closed, in order to minimise or avoid degraded working. Most Minor railways have appropriate periods to carry out such work without the normal operation of trains.
- Ensure that there is adequate lighting to undertake the works required, arranging temporary lighting as required.
- Consider any issues that may arise from working at height

4. MAINTENANCE REQUIREMENTS

4.1. LEVER FRAMES and MECHANICAL LOCKING

4.1.1. Frame Mechanical Security and Cleanliness

The lever frame and mountings shall be examined for general condition and mechanical security. Main supporting girders, standards and segments etc, shall be checked for security ensuring no movement when the frame is operated.

All castings shall be examined for signs of fracture particularly adjacent to bolt holes. All elements of the frame shall be maintained free of loose debris and soiling.

Remedial action shall be taken if any deficiencies are discovered.

No disarrangement of the locking shall take place unless appropriate arrangements have been made and suitable, competent staff are available.

Whilst conducting maintenance around the Lever Frame precautions must be taken to ensure the protection of wiring near the frame.

4.1.1.1. Split Pins and Fastenings

All fastenings and fixings shall be examined for general condition and security. Where locknuts are necessary these shall be correctly fitted and secure.

All pin joints shall be checked for general condition and security and shall be sufficiently lubricated to ensure correct operation. Cotter pins shall be free to rotate but with no excessive movement.

Split pins shall be examined for correct fitment to ensure that they are secure and have both legs sufficiently opened to prevent longitudinal movement within the hole.

Remedial action shall be taken where any deficiency or damage is found.

4.1.1.2. Lever Operation

All lever equipment shall be examined for general condition and security to ensure effective operation including:-

- Examination of catch handles and pins for wear and sufficient lubrication to ensure correct operation and provision of sufficient lift on the catch block. Catch handle knuckles shall be securely fixed to the catch rod
- A check of catch handle springs (where provided) to ensure proper fitting and tension.
- Examination of catch blocks for wear and for correct engagement on the quadrants.
- Examination of catch rods and rockers for signs of fracture and sufficient lubrication to ensure correct operation.
- Examination of lever shoes for correct fitment and security.
- Examine the operation of the lever to ensure that both it, and the apparatus it controls, operate correctly with adequate stroke and without undue strain.

Any deficiencies found shall be rectified to maintain the designed operation.

4.1.2. Quadrants

Quadrants shall be examined for wear and correct fitting and necessary action taken to repair or replace any found worn.

4.1.3. Lever Bearings and Spindles

Bearing mechanisms shall be examined for proper fitment, security and any wear to ensure the correct operation of lever movement within the frame.

The mechanisms shall be suitably lubricated to ensure correct operation and to minimise the effects of mechanical wear.

Any deficiencies found shall be rectified to maintain the designed operation.

4.1.4. Lever Painting

The levers shall be checked for correct paint colour for the function, the paint condition, and any necessary remedial action arranged if deficiencies are found.

4.1.5. Name and Pull Plates (Lever Leads)

Name and pull plates shall be checked for correctness, security and legibility. Remedial action to repair or replace shall be taken if deficiencies are found with the name and pull plates.

4.1.6. Connection to Electric Locks

All connections and fixings between the lever frame and any electric locks, economiser contact and circuit controllers shall be examined for general condition and security to ensure that the equipment operates correctly in relation to the lever frame.

4.1.7. Balance Weights

Balance weights and all linkages to the lever (where fitted) shall be examined to ensure they are secure and correctly fitted.

4.1.8. MECHANICAL LOCKING

4.1.8.1. Security and Condition of Locking

The locking and supports/mountings (including locking trays) shall be examined for general condition and mechanical security to ensure continued correct operation. Care should be taken not to disturb the locking unless appropriate arrangements have been made and suitable competent staff are available. Where locking is held down by the covers (rather than specially provided straps) removal of the covers constitutes a disarrangement of the locking.

Castings shall be examined for signs of fracture. All locking elements shall be maintained secure, supported and free of loose debris and soiling (suitably lubricated where appropriate to minimise wear) including:-

- Tappets and pins.
- Drive links.
- Spacers.
- Locking bars and butts.
- Swivel pins.
- Packing pieces.
- Holding down strips/rollers.
- Cams.

Any supplementary locking mechanisms, such as Annett's Key, shall be examined to ensure they are securely and correctly fitted and are in effective order.

Any locking tray dust covers should be marked and replaced in the same place after any examination of the locking, most covers need to be refitted in their original place for best results. Tray lids shall be properly fastened with securing straps.

Remedial action shall be taken if any deficiencies are discovered in order to prevent failure.

4.1.8.2. Connection to Supplementary Equipment

Equipment connected to the locking, such as electric locks and circuit controllers (breakers), shall be examined to ensure it operates correctly relative to locking movement.

4.2. SIGNAL WIRE RUNS

4.2.1. Wire Run Condition

All signal wire runs, including wire wheel chains and slings, shall be examined at sufficient frequency to ensure that they remain fit to withstand anticipated working loads. Any damage or obstruction shall be noted and necessary remedial action taken to prevent failure.

4.2.2. Wire Joints, Terminations and Connectors

Joints and terminations in the signal wire shall be examined for general condition and continued security. The position of all joints and terminations shall be assessed to ensure that the possibility of snagging with other wire or equipment is eliminated throughout any part of the stroke. All signal wire connectors shall be of an approved type and shall be correctly fitted. When any deficiencies are discovered the joint or terminations shall be replaced using an appropriate method.

4.2.3. Wire Run Support

The pulleys, their fixings and supports shall be examined to ensure:-

- The wire is not obstructed during its normal movement.
- All supports are mechanically secure and in good condition.
- All fastenings are secure.

Wire wheels or cranks shall be examined to ensure:-

- The wire is not obstructed during its normal movement.
- All supports are mechanically secure and in good condition.
- All cranks and wheels move freely and are appropriately lubricated.

Wire runs which cross the track shall be examined to ensure that they do not make contact with the bottom of the running rails and any other cables and wires including when under tension.

When any deficiencies are discovered, necessary remedial action shall be taken to prevent failure.

4.2.4. Signal Wire Insulations

The condition and security of any insulation fitted in the wire run shall be examined. Any damage shall be noted and replacement arranged.

4.2.5. Signal Wire Stroke and Adjustment

Signal wires shall be checked to ensure they are correctly tensioned and that there is sufficient stroke to work the signal, ensuring satisfactory provision for expected climatic conditions.

All mechanical point detectors in the signal wire run shall be examined to ensure that they are adjusted to enable the correct operation of the signal when the position of the points is correctly detected. All mechanisms affecting signal wire stroke or adjustment shall be examined to ensure that they are secure, operate correctly and have the correct identification labels.

Arrangements shall be made to remedy any deficiencies found with signal wire stroke and adjustment.

4.2.6. Boxing, Trunking and Piping

Any decking, boxing, trunking or piping shall be examined for general condition and to ensure that it continues to fulfil its original purpose of either or both of the following:-

- Providing protection for the wire run
- Providing staff with a safe and unobstructed walking route

When any deficiencies are discovered, necessary remedial action shall be taken to prevent failure or danger to staff.

4.3. RODDING RUNS

4.3.1. Rodding Condition and Operation

All rodding runs, shall be examined at sufficient frequency to ensure that they remain fit to withstand anticipated working loads. Any damage or obstruction shall be noted and necessary remedial action taken to prevent failure.

4.3.2. Rodding Run Support

The rodding rollers, their fixings and supports shall be examined to ensure:-

- The rodding is not obstructed during its normal movement.
- All supports are mechanically secure and in good condition.
- All fastenings are secure.

Cranks and compensators shall be examined to ensure:-

- The rodding is not obstructed during its normal movement.
- All supports are mechanically secure and in good condition.

- All cranks move freely and are appropriately lubricated.
- All compensators are correctly positioned in the run to cope with the temperature variations likely to be encountered.

Rodding runs which cross the track shall be examined to ensure that they do not make contact with the bottom of the running rails and any conductor rails, including during movement.

When any deficiencies are discovered, necessary remedial action shall be taken to prevent failure.

4.3.3. Rodding Connections

Connections in the rodding run shall be examined for general condition and continued security.

The position of all connections shall be assessed to ensure that the possibility of fouling with other equipment is eliminated throughout any part of the stroke.

When any deficiencies are discovered the necessary remedial action shall be taken to prevent failure.

4.3.4. Insulations

The condition and security of any insulations fitted in the rodding run shall be examined. Any damage shall be noted and replacement arranged.

4.3.5. Rodding Stroke and Adjustment

Rodding runs shall be checked to ensure there is sufficient stroke to work the equipment.

All mechanisms affecting rodding stroke or adjustment, including adjustable cranks, shall be examined to ensure that they are secure, correctly adjusted and operate correctly.

Arrangements shall be made to remedy any deficiencies found with rodding stroke and adjustment.

4.3.6. Boxing, Trunking and Piping

Any decking, boxing, trunking or piping shall be examined for general condition and to ensure that it continues to fulfil its original purpose of either or both of the following:-

- Providing protection for the rodding run
- Providing staff with a safe and unobstructed walking route

When any deficiencies are discovered, necessary remedial action shall be taken to prevent failure or danger to staff.

5. GOOD PRACTICE FOR MAINTENANCE

5.1. LEVER FRAMES AND MECHANICAL LOCKING

See safety considerations in section 3

5.1.1. Levers and Quadrants

When levers and frames are cleaned care shall be taken not to allow debris to be deposited on other parts of the equipment.

Quadrants shall be examined for wear in the form of chamfering of corners at the ends and on any mid-stroke notches.

5.1.2. Balance Weights

Balance weights connected to the levers for assisting in pulling signals shall be checked to ensure that they are not heavier than is absolutely necessary.

5.1.3. Locking Maintenance

Disarrangement of the locking is likely to be required subject to the type and extent of maintenance being undertaken and the accessibility afforded by the locking design. No disarrangement of the locking shall take place unless appropriate arrangements have been made and suitable, competent staff are available. This may involve the disconnection of point rodding, signal wires and any electric locking as necessary. The disarrangement process shall include a correlation exercise to ensure that installed locking components are in accordance with the locking diagrams before work commences. The following shall always be regarded as a disarrangement of the locking:-

- Removal of components for cleaning, lubrication and/or examination (rather than dealing only with exposed surfaces in situ whilst the lever is in each position).
- Removal of locking covers where these hold down the locking.

Any necessary remedial action required as a result of the maintenance shall be arranged and a test of the re-assembled locking shall be carried out. The following activities shall be undertaken to fulfil the full maintenance requirements of the locking:-

- Remove and examine all locking bars ensuring that all components including loose locks and packing pieces are correctly stamped with identification and ensure that their profile matches with the locking diagram. Ensure that no conflicting notches or redundant locks are evident.
- Scrape clean locking trays/guide racks and wash with a suitable solvent. Examine trays/racks and all mountings for security and further check for fatigue cracks or casting breakages.
- Examine all cut outs in which tappets slide for damage or excessive wearing of the corners. Worn elements shall be repaired or replaced.
- Clean all locking components and examine to ensure that all fastenings are secure and that fixed locks are securely attached to the locking bars. Check for wear on locking tappet pins and around the notches. Particular attention shall be paid to the striking bevel to ensure no excessive wear. Lubricate all tappet surfaces with a suitable lubricant.
- Ensure that the tappets are correctly and securely attached to their controlling drive links and that there is no excessive wear present. Tappets shall move freely but without excessive play.
- Check that on locking with double travel tappets, that the swivel pin is secure and sufficiently lubricated and is free to swing.
- Examine and lubricate all cam paths (where applicable) with an approved extreme high pressure lubricant.

- Examine the alignment of hook rack to guide rack (where applicable) and adjust accordingly.
- Examine (where fitted) the security of all lock dog/ finger stud securing rivets

The following shall be undertaken when rebuilding the locking after disarrangement (or in cases where disarrangement has not occurred where the items are accessible and can remain undisturbed):-

- Ensure that any necessary spacers are provided and are effective
- Ensure that all long bars and butts are adequately supported by blocks and/or other supporting pieces.
- Ensure that all loose locks and block pieces are properly held down.
- Examine rivets for security and check that any packing pieces or holding down strips/rollers are correctly fitted and effective.

5.1.3.1. Re-instatement after Maintenance

On completion of any maintenance adjustments, the lever frame shall be tested and observation made that the apparatus is operating correctly. Lever Frames shall only be tested by competent staff. All operations of the signalling system shall be undertaken by arrangement with the signalman.

5.2. SIGNAL WIRE RUNS

5.2.1. Wire Run Condition

Signal wire run condition checks shall look for:-

- Damage to the galvanised coating
- Rusting/corrosion
- Splitting of wire strands
- Kinked wire

Where wires run through protective piping or decking they should, if possible, be completely removed on a regular basis for examination to assess their general condition.

Particular care shall be taken to ensure wires do not snag each other.

Particular inspection shall be undertaken in areas where any works have been undertaken or where evidence of unauthorised trespass is found.

Wire runs in the proximity of industrial or coastal areas may experience accelerated corrosion due to airborne contaminants. Wire runs beneath road crossings may be prone to road-salt contamination. Damage to the galvanised coating is particularly likely where the wire is in rubbing contact with pulleys or the ballast.

Wire runs shall be kept clear of actual and anticipated obstructions including:-

- Lineside vegetation
- Electrical cables
- Accumulated rubbish

- Track materials which may be associated with renewals or recoveries.

5.2.2. Wire Joints, Terminations and Connectors

Wire joint condition checks shall look for:-

- Damage at the joint, such as strands nicked by pliers damaging the galvanised coating.
- Proximity to other joints in adjacent parallel wires, adjacent chains, slings, pulleys, wheel frames or other fixtures, such as sleeper ends, where contact or snagging is possible. There shall be no joints in wires where they cross under rails.
- Kinking of the wire around the termination thimble.

Wire terminations shall be formed around a thimble without the use of pliers (to avoid damage to the galvanising), and termination undertaken as shewn below:



5.2.3. Wire Run Support

When checking wire run fixings and supports the following shall be considered, ensuring wire movement is not obstructed:-

- Pulleys are correctly spaced at intervals which ensure the wire does not foul anything which may cause damage or resistance to movement. Wire pulley posts shall be positioned at a interval of between 8 and 10 yards dependant on the number of wires in the run and angle pulleys shall be used where the run is around a curve.
- Pulley stakes are upright, firm at the base and positioned in line such that the signal wire when in operation passes through the pulley wheel without binding.
- Pulleys shall not be lubricated.

The general condition and cleanliness of the pulley wheels and stakes, ensuring that all fastenings are secure and split/cotter pins are properly inserted and opened up.

When checking wire wheels or cranks the following shall be considered ensuring movement is not obstructed:-

- Security of the wheel frame or crank to the bench or timbers onto which they are mounted. The bench or timber shall not move during operation. Any decay shall be noted and remedial action arranged (treatment or renewal as appropriate).
- Free running of all wire wheels within the frame and correct seating of the sling or chain on the wheel groove. Cranks shall move freely and require lubrication with a lithium based grease where nipples are provided (mineral oil where no grease nipples are provided). Any excess grease or oil shall be removed. Precautions against freezing may also be considered, e.g. anti-frost lubricants for wire cranks and wheels.
- Chain and sling terminations with the signal wire are not obstructed or likely to foul equipment. Wire sling joints shall be checked for damage, e.g. by pliers, ensuring that 'S' hooks at the ends of the chain have been fully closed and cannot obstruct one another
- The length of sling or chain around the wheels sufficient to cater for any expansion, contraction or adjustment of the run. The sling or chain shall remain on the groove of the wheel and not the signal wire. Any slackness of the wire shall not lead to the chain or sling leaving the wheel and tangling.

5.2.4. Signal Wire Stroke and Adjustment

The settings of wire adjusters, where fitted, shall be checked to ensure the correct stroke is being achieved at the signal. Any sudden loss of stroke or significant adjustment requirement within the wire run shall be fully investigated to determine the root cause of any problem prior to any readjustment of the wire.

Newly installed or replaced wire shall be revisited and checked for adjustment after the first few days to cater for any stretching.

Wire adjustment shall ensure that there is no excessive sagging along the wire run which may lead to snagging of the wire, wear and abrasion of galvanising or freezing against items during the winter months. It is important that the wires do not foul detector blade notches, point rodding and rollers, trackwork bearers or ballast.

5.2.5. Boxing, Trunking and Piping

The condition of any decking, boxing, trunking or piping provided to protect the wires or provide a staff walking route shall be checked ensuring waste and standing water is kept clear. It is important that all such covers are properly replaced after maintenance activities have been carried out.

Sleeper bays shall be maintained clear of ballast to a sufficient depth to accommodate the wire run. Any trunking or pipes used for cross track wire runs shall be checked for damage and replaced as required ensuring that they do not snag the wires.

5.3. RODDING RUNS

5.3.1. Rodding Run Condition and Operation

Rodding run condition checks shall look for:-

- Damaged channel rodding galvanised coating which would permit corrosion
- Loss of section on round rodding where it engages with the rollers
- Rusting/corrosion
- Severely weakened rodding (bent or buckled) which could fracture

Rodding shall be maintained to ensure free movement through the rodding rollers with no binding on the roller frame sides or top guides. The rodding run shall be as straight as possible and shall be level throughout the run. If the run is not level there may be subsidence. Any height deficiencies shall be corrected.

Particular inspection shall be undertaken in areas where any infrastructure works have been undertaken or where evidence of unauthorised trespass is found. Rodding runs in the proximity of industrial or coastal areas may experience accelerated corrosion due to airborne contaminants. Damage to the galvanised coating is particularly likely where rodding passes through rollers or is in contact with ballast.

The movement of the rodding through the rollers should be a free movement with frictional resistance being kept to a minimum.

The following checks shall be undertaken to ensure the rodding run is not prohibited in its movement:-

- Rodding run rollers shall be spaced at intervals no greater than 2.75m (9 ft). Provided at least 2 supports per complete length of rodding.
- Roller frame assemblies shall be secure to the roller stools, positioned at right angles to the rodding run and in line such that the point rodding when in operation passes through the roller frame without binding. Rod roller ferrules shall be free to rotate and the rollers shall fully traverse along the elongated guide slot in the roller frame.
- Roller frame assemblies shall be maintained clean and with all fastenings secure and split/cotter pins properly inserted and opened up.
- Where rodding runs through protective decking or boxing samples shall be examined to assess general condition.
- Rodding runs shall be kept clear of actual and anticipated obstructions including:-
 - Lineside vegetation
 - Accumulated rubbish
 - Track materials which may be associated with renewals or recoveries.

5.3.2. Rodding Connections

At rodding connections all fastenings, including any channel fishplates and 'T' bolts, shall be checked for wear and security ensuring there is no looseness in the rods.

'T' bolt nuts shall be installed or replaced with the curved face against the rod to prevent damage to the galvanised surface of the rod from the sharp edge of the nut.

5.3.3. Cross Rods

The locknuts of any adjusting mechanism in the cross rod shall be maintained properly tightened as the vibration caused by passing traffic can work them loose and may lead to fretting corrosion and eventual failure of the threads.

5.3.4. Cranks and Compensators

Cranks are used in the rodding run where a change of direction is required.

They are mounted vertically at the lead off from the lever frame and horizontally elsewhere. The cranks when in operation must provide a smooth change in the direction without restricting the free movement of the run.

Compensators consist of an assembly of two cranks and a link and are necessary to automatically adjust the variations in the length of the rodding run due to temperature variations. They convert 'push' into 'pull' and vice versa with the total length of rodding in 'push' typically equalling that in 'pull'. If frequent adjustment of the run is needed the positioning of the compensators may need to be re-considered.

The following checks shall be undertaken to ensure the rodding run is not prohibited in its movement and is operating correctly:-

- The crank base shall be secure to the bench or timbers onto which it is mounted. The foundations of the bench or timber shall be firm and shall not allow movement when the equipment is operated. Cranks fitted to timbers shall be secured with two coach screws and two through bolts (four through bolts may also be used); cranks fitted with coach screws only are liable to work loose. Cranks fitted to timbers shall not be fitted close to the timber edge as this may break away under load. Checks shall be made for any decay in the timbers and treatment or renewal arranged to suit.
- Cranks shall be maintained free to move. Where grease nipples are provided these shall be lubricated with a lithium based grease. Where no grease nipples are provided the cranks shall be lubricated with mineral oil. Any excess grease or oil shall be removed. Precautions against freezing may also be considered, e.g. anti-frost lubricants.
- Crank fastenings shall be maintained secure and split/cotter pins properly inserted and opened up. Worn crank bosses can be revealed by significant slack or vertical movement. Excessively worn crank bosses shall be renewed or reamed out and re-bushed. Bushes and pins shall be replaced.
- Crank terminations with the rodding run shall be clear of any obstructions and not foul the rodding rollers at all extremes of movement.

5.3.5. Concrete Stools

Concrete stools which carry the point rodding rollers shall be checked to ensure they are firm in the ground with no evidence of movement. The condition of the concrete around the roller mountings shall be checked to ensure the roller frames are held securely.

5.3.6. Wooden Benches

Wooden benches used for mounting cranks and compensators are mounted on concrete legs which are compacted into the ground for stability. During maintenance activities the fastenings holding the benches to the legs shall be checked for security and the galvanising for damage.

The bench assembly shall be maintained firm in the ground with no evidence of movement around the base. The condition of the timber is very important in holding the cranks and suitable checks shall be made for any decay in the timbers and treatment or renewal arranged where required.

5.3.7. Lost Stroke

To ensure that the equipment worked by the rodding run operates correctly it is essential that loss of travel or stroke is kept to a minimum.

A certain amount of lost stroke is inevitable due to wear and the number of intermediate cranks in the run. If this loss of stroke becomes excessive corrective action shall be taken.

Excessive loss of stroke is often indicated by the sleeve of the adjusting crank having to be placed near to the end of the crank arm to obtain sufficient travel to operate the equipment.

5.3.8. Boxing and Trunking

The condition of any decking or boxing provided to protect the rodding or provide a staff walking route shall be checked ensuring waste and standing water is kept clear to avoid corrosion and freezing.

It is important that all such covers are properly replaced after maintenance activities have been carried out and that the rodding is not impeded when the decking is loaded, e.g. when being walked on. Sleeper bays shall be maintained clear of ballast to a sufficient depth to accommodate the rodding run.

6. REFERENCES

- RSSB Railway Group Standards see www.rgsonline.co.uk
- **RSPGs and RSPs Issued by the Office of Rail Regulation** see www.rail-reg.gov.uk
- Railway safety principles and guidance Part 1 (1996) (HSE 1996)
- RSPG Part 2B - Guidance on stations (1996)
- RSPG Part 2D - Guidance on signalling (1996)
- Railway Safety Publication No 3; Safe movement of trains
- Railway Safety Publication 4; Safety critical tasks - Clarification of ROGS regulations requirements, (ORR 2007)
- Railway Safety Publication 5; Guidance on minor railways, (ORR 2007)

7. APPENDICES

None

End of document