Ref No: PO 05
Issue No: 1.0
Issue date: March 2013

INSTITUTION OF RAILWAY SIGNAL ENGINEERS
MINOR RAILWAYS SECTION

GUIDELINE
ON

THE BASICS OF MAINTAINING S & T EQUIPMENT ON MINOR RAILWAYS

Record of Amendments		
Issue	Date	Amendments
1.0	March 2013	Initial issue

Anyone who wishes to contribute additional items; or correct / amend any of the entries; or wants further information may contact the IRSE Minor Railways Section Document Co-ordinator at mrsdc@irse.org or via the IRSE Headquarters.

Any railway seeking to follow the guidelines in this document should ensure that it is suitable for their particular railway concern. Duty holders are reminded that they must be satisfied that they are doing all that is needed under health and safety duties to control risks. Compliance with this guideline issued by the IRSE is not mandatory as it provides advice on how an issue may be addressed.

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1 INTRODUCTION

The changes to railway legislation over the past few years have imposed more responsibility on operators and maintainers of any railway which has the affect that minor railways need to operate in a more structured and professional manner than has been possible before

This document has been produced to introduce the basics of the processes for maintenance of S & T equipment and systems to those who volunteer to maintain today's minor railways.

This Guideline is not intended to be a definitive document on maintaining S & T equipment, but is intended to help and assist the volunteers on minor railways get started on creating a system for maintaining and preserving their S & T assets.

In preparing this Guideline we have drawn extensively on a paper on the West Somerset Railway given to the IRSE Conference at Kidderminster on 4th November 2006.

The IRSE Minor Railways Section has used its best endeavours to ensure that the contents of this document are factually and technically correct and is 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	Bruch all loose dirty from apparatus and foundations
Check	Visually inspect for alignment, obstructions, breakages, decay and obvious damage
Clean	Remove moisture, dirt, corrosion or roughness
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 measures 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
RSPG	Railway Safety Principles & Guidance by HSE (now ORR) most of these documents are now obsolete and some have been replaced by the ORR Railway Safety Publications.
S & 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.
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
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

Details of the safety hazards on all activities need to be assessed and documented and safe systems of work set up and details included in all task information.

Risk assessments should be undertaken and documented.

4 WHAT IS MAINTENANCE ALL ABOUT?

4.1 Why maintain?

- To keep the equipment and systems safe.
- To keep them operating efficiently
- To maximise the life of the equipment by minimising wear and deteriation
- To keep the equipment operating efficiently
- To conserve to asset

4.1.1 What needs to maintaining?

The answer to this question is simple – everything which we call S & T equipment. It is only the amount or degree of maintenance which varies from asset to asset.

4.1.2 How do we maintain?

- Clean
- Lubricate
- Check
- Replace anything near the end of its life
- Test
- Adjust
- Record
- Major Servicing

4.1.3 When do we maintain?

When starting from scratch, firstly work out what needs to be done, initially by preparing task schedules for each asset to be maintained to determine what has to be done.

Some research is necessary on the standards employed by other similar organisations, recourse to the manufacturers documentation (if it is still available), and possibly the maintenance standards employed on the 'big railway' if the product is in use there.

Initially fixed interval may be the best way to start for instance these are the figures suggested in the paper in the IRSE Heritage Railways seminar in 2006:

- Oil Lubrication 6 weekly
- Grease Lubrication 3 Monthly
- FPL Checks 3 Monthly
- Power Supply Tests 3 Monthly
- Basic Operation Checks 3 Monthly
- Earth Tests Annually
- Full equipment overhaul Annually

This method should only be considered until a maintenance record has been built up allowing maintenance schedules to be tailored to the requirements of the particular asset.

5 MORE DETAIL

5.1 What do we maintain?

Well just about everything! However the amount of maintenance effort has to be proportional to the requirements.

5.1.1 Cleaning

Examples of this are notice boards, signal arms, lamps and lenses, telephones etc.

Much equipment only needs regular cleaning but whilst cleaning the maintainer should make an inspection of the external condition of the asset and that of the connecting cables and the surroundings.

For example:

A Signal Post Telephone needs only cleaning and testing regularly; but whilst being cleaned the state of the mountings, the connecting cable and the state of both the internal and external labels should be checked. If it does not meet the laid down standard the asset should attended to restore it to the acceptable condition.

5.1.2 Lubrication

Oil or grease regularly all metal to metal moving parts.

5.1.3 Check/Inspect

- FPL
- Telephones
- Signals
- Primary Batteries
- Secondary battery check and top up
- Level crossings

For example: operation of signals/ points/ level crossings should be checked that there is not significant loss of travel or motion due to worn or loose equipment.

5.1.4 Replace

Any faulty replaceable parts should be replaced as soon as possible after the check has revealed the need. It may not be possible to carry out the work immediately but it should be put in hand as soon as possible.

For example; Signal lamps, primary batteries etc

Some items of trackside equipment (such as signal machines, telephones and point machines) are best worked on in a workshop and the faulty equipment should be replaced with a spare if one is available.

5.1.5 Adjust

If the Check indicates that the equipment is out of adjustment it should be brought back into its specified parameters and tested before maintainer leaves the site.

5.1.6 Test

Some items only require a simple test and clean – such as lineside telephones but many items will require test equipment or gauges.

Examples of this are, signal and point machines, single line instruments, track circuits and mechanical locking frames.

Any item which has been changed or adjusted should be tested and signed off that it operates and is within the specified parameters.

5.1.7 Record

All maintenance activities should be recorded and what, why, how and when noted for later evaluation.

5.1.8 Major Overhaul

Many assets operate as self-contained units and require more intrusive maintenance which can often be serviced using replacement by a serviceable spare allowing the overhaul to be carried out in a more convenient time frame.

Items such as:

- Single line instruments
- Point machines
- Signal Machines
- Lineside telephones
- Signalling Relays

These activities may require a higher level of test equipment, facilities and skill and should this not be available the work may have to be contracted out.

5.1.9 Time limited equipment

- Signalling Relays
- Equipment with electrolytic capacitors

5.1.10 Regular Activities

Some activities require carrying out at regular but extended periods.

- Earth Tests
- Primary Battery tests
- Secondary Battery Tests
- Power Supply
- Insulation
- Track Circuits
- Standby battery Test
- Colour Light Signals

5.1.11 Periods of Extended Shutdown

After such periods an inspection walkthrough and test should always be carried out.

5.2 Maintenance Records

Use of the techniques described will allow the build up of useful data over the early years of the use of the system to be fed back into refining the maintenance periods and activities to provide cost, and resource, effective maintenance.

Generally the following items are recorded:

- Date of the visit
- What was tested
- Condition of the equipment, including batteries if fitted.
- Who made the test
- What was replaced or adjusted
- Condition of connecting cables

6 HOW IS A MAINTENANCE REGIME SET UP?

6.1 Getting Started

Firstly there is a need to specify what has to be done. These should be based on logical grouping of equipment. On the 'big railway' Network Rail has maintenance specifications for each piece of equipment or system.

Examples of these are: points, signals, telephones, level crossings, signal box concentrators, equipment rooms or housings, rodding and wire runs.

6.2 Who carries out the work

Not everyone involved in maintenance can do everything and some tasks like mechanical locking, electronics and telecommunications require specialist skills

Much of the work may be carried out by volunteers often as a hobby, many of whom have limited time for such activity and who cannot undertake long periods of training but may be able to concentrate on one aspect of the work. It is important to encourage people to work on things they enjoy.

6.2.1 Disciplines

The maintenance work can be defined on the basis of disciplines such as:

- Outdoor mechanical
- Indoor; mechanical locking, frames
- Telecommunications, telephones; concentrators and PABX's
- Cabling
- Signal box equipment:
- Point and signal machines

6.2.2 Competence

An approval system is required for volunteer staff? Maintenance can be passive or intrusive, intrusive requires more skill and what about testers competence?

7 REQUIREMENT FOR RENEWAL

How is a need for renewal or replacement decided?

Whether an asset is renewed like for like, changed to another style or rolled up into a greater scheme needs to be considered in the context of what is appropriate or affordable.

For example records of failure history, beyond repair and demonstrated as not likely to last until it is next maintained.

7.1 Modern Problems

- Wire degradation - there is a chemical reaction which degrade occurs where s the insulation.
- Silver migration – occurs where there is, or was, moisture and an electrical potential exists across silver contacts separated by a thin piece of bakelite. Mainly in BR 930 series relay bases.

8 STRUCTURES

The equipment mounted on signalling structures is undoublively signalling but often the post, girders and struts are structural.

Many structures will have been erected many years ago and are slowly deteriorating especially below ground. Consideration needs to be given to specialist structural assessment to be employed on this task.

9 REFERENCES

RSSB Railway Group Standards see www.rgsonline.co.uk

IRSE Publications

Paper “Maintaining for Safe Performance”, IRSE Conference at Kidderminster 4th November 2006 www.irse.org

IRSE Licensing at http://www.irselicensing.org/

IRSE News Issue 121 February 2007

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)

Railway Safety Publication 4; Safety critical tasks - Clarification of ROGS regulations requirements, (ORR 2007)

Railway Safety Publication 5; Guidance on minor railways, (ORR 2007)

GoSkills – Sector Skills Council for passenger transport

http://www.goskills.org/

10 APPENDICES

None

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