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Issue	I
Date	February 2001

SIGTAN039 - Signals (General) (formerly RT/E/C/I 9039)

This temporary front sheet facilitates change to the new Network Rail Standards referencing nomenclature.

The Ref above will be formally allocated to this standard when it is next changed in the meantime the contents, date and issue number of this Network Rail Standard are UNCHANGED and with immediate effect it should be referred to as “(new ref) formerly (old ref)”.

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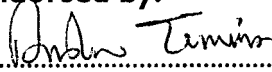


RAILTRACK LINE CODE OF PRACTICE

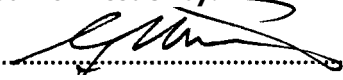
SIGNALLING EQUIPMENT TECHNICAL ADVICE NOTICE (SIGTAN039) SIGNALS (GENERAL)

Approval and Authorisation

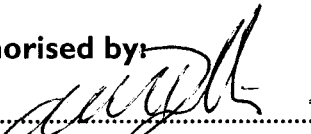
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Summary

This code of practice summarises a range of general issues relating to signals on Railtrack's Signalling Infrastructure.

Issue/Revision Record

This code of practice will be updated when necessary by the distribution of a complete document. Subsequent amendments will be marked by vertical black line in the adjacent right hand margin.

Issue	Date	Comments
1	Feb 2001	Original Issue

Implementation

This code of practice highlights issues arising from operational experience, concerning the installation and maintenance of signalling equipment. Where appropriate, it gives current best practice for mitigating risk and is for implementation from 2 Jun 2001. Alternative practices may be accepted where they can be demonstrated to be as good or better than the contents of this document.

Superseded document reference number	Issue	Date
GS/MS SG00	1	Feb 94
GK/RC 0741 Appendix SI00	1	Sept 96

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Safety

All persons are reminded that all appropriate safety precautions must be observed when undertaking the work covered by this document.

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1. PURPOSE

This document provides a record of best practice general information relating to signals used on Railtrack Signalling Infrastructure, together with relevant technical information and where appropriate, related historical background.

2. SCOPE

This document covers railway signals and associated equipment in use on Railtrack Signalling Infrastructure.

3. REFERENCES

RT/E/S/10660	The Implementation of Signalling Maintenance Work Instructions
RT/E/S/10061	Signalling Maintenance Task Intervals
RT/E/S/10662	Signalling Maintenance Task Interval Change Process
RT/E/S/10047	Management of Safety related reports for Signalling and Operational Telecommunications Failures
RT/E/S/10064	General Instructions to Staff Working on S&T Equipment
RT/E/S/11231	Signalling Maintenance Testing
RT/E/C/19023	Signalling Equipment Technical Advice Notice (SIGTAN023) Signal Post Replacement Switches
RT/E/C/19032	Signalling Equipment Technical Advice Notice (SIGTAN 032) Alignment of Colour Light Signals

RT/E/WI/00003	Signalling Maintenance Work Instruction Signals
SG10	Signal Equipment, Electrical, List
SG11	Signal Equipment, Structure, General
SG31	Signal Equipment, Electrical, Signal Lamp
SG41	Signal Equipment, Electrical, Colour Light Unit
SG42	Signal Equipment, Signal Box, Replacement Switch
SG45	Signal Equipment, Electrical, Flashing Aspect BR991 Unit
SG51	Signal Equipment, Electrical, Route Indicator
SG55	Signal Equipment, Electrical, Fibre Optic Signal / Indicator
SG61	Signal Equipment, Electrical, Signal Position Light
SG71	Signal Equipment, Electrical, Signal Banner
SG91	Signal Equipment, Post Mounted, Replacement Switch
SG95	Signal Equipment, Post Mounted, Telephone
SI21	Signal Equipment, Mechanical, Semaphore Machine (B.P., G.R.S. & S.G.E.)

SI22	Signal Equipment, Mechanical, Semaphore Machine (W.B. & S. Co.)
SI31	Signal Equipment, Mechanical, Post Fittings
SI51	Signal Equipment, Mechanical, Adjusters, Cranks & Wheels
SI52	Signal Equipment, Mechanical, Wires & Pulleys

4. TESTING

The last operation of all maintenance services is to test by operation from the signal box and to observe that the apparatus functions correctly.

5. PERSONAL SAFETY

All appropriate safety precautions must be observed when undertaking the work covered by this document.

This document does not address general personal safety measures. Local instructions including a COSHH assessment may be in operation and these will highlight those measures which must be taken to control any Health and Safety concerns.

6. SIGNALS, ELECTRICAL

6.1 Site Maintenance

Ensure that debris and flammable materials are removed from the immediate vicinity of the cables and signalling equipment to reduce the risk of deliberate or accidental damage.

6.2 Voltage Readings on Signal Lamps

Lamp voltage measurements should be taken with a voltmeter connected across the lamp holder terminals.

6.3 Signal Lamps with No Standby Battery

When the lamps are fed from a transformer / rectifier with no standby battery, the voltage supplied is un-smoothed rectified a.c. Consequently, the majority of meters commonly available, including most digital meters, will not give a true reading of the lamp voltage. The true lamp voltage can be determined with a meter that can read true Root Mean Square (RMS) voltage. These are usually moving iron type meters but can be non-moving iron type. They are expensive and are usually used in technical centres and laboratories, see Caution on next page.

(SIGTAN039) SIGNALS (GENERAL)

The ratio of lamp voltages measured with both a meter capable of reading true RMS and a typical technician's moving coil or digital meter will vary. This is because it is related to the degree of smoothing provided by the combination of the particular rectifier set and its associated lamp-proving relay.

Where the lamps are fed from a transformer / rectifier with no standby battery the lamp voltage must be set using a meter that can read true RMS. An equivalent lamp voltage must also be taken using a meter typically used by the technician. This equivalent voltage must be entered on the Signal Lamp Test Record card or similar document kept at the signal. This voltage must be used when performing maintenance testing associated with that particular signal.

The degree of smoothing can vary between transformer / rectifier sets from the same production batch and between manufacturers. If the rectifier set or the lamp proving relay are changed, the lamp voltage ratio must be checked. If the equivalent voltage is different from the previous reading, the new equivalent voltage reading must be entered on the Signal Lamp Test Record card or similar document kept at the signal.

Caution

Some commercially available meters are marked as capable of reading true RMS voltage. This is only true when the voltage being read is a.c. Often, if the voltage is full wave rectified d.c., or has a d.c. offset, the reading will not be the true RMS voltage even though the marking on the meter may imply this function. In these circumstances the voltage supplying the signal lamp will be incorrect. If the voltage is in excess of the rated value of the lamp, the expected life of the lamp may be seriously reduced.

Conversely, if the voltage is below the specified minimum, the output of the signal lamp and the intensity of the light beam may be seriously reduced.

If the performance of the signal lamps at a signal is below that generally expected, an incorrect voltage ratio may be the cause. Arrangements should be made for the true RMS and equivalent voltage to be checked with the appropriate meters. Any voltage adjustments resulting from the check must be entered on the Signal Lamp Test Record card or similar document kept at the signal.

6.4 Illumination of Auxiliary Filament

The preferred method of illuminating the auxiliary filament is by using the filament disconnection link where fitted (figure 1). Loosening a wire in the terminal block is the non-preferred method although great care is required in ensuring that the wire is not removed / reinstated incorrectly. Tilting the lamp is forbidden.

Tilting the lamp is forbidden because the light output from the lamp could be reduced or lamp operation could become unreliable due to:-

- i Contamination of the glass envelope (see Signal Lamp Contamination).
- ii Weakening or malformation of the lamp holder fingers resulting in the lamp not being held securely causing arcing and high resistance contacts. (See Lamp Holder Contacts).

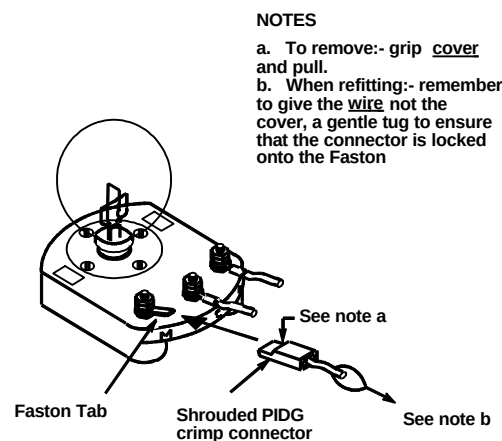


Figure 1 Preferred Method.

Illuminating the auxiliary filament by disconnecting the link.

6.5 Lamp Holder

The position of the lamp holder relative to the lens is set and sealed during manufacture. The lamp holder setting must not be altered otherwise the focus of the signal beam will be incorrect.

6.6 Lamp Holder Contacts

The security of the lamp in the holder and the integrity of the electrical contact rely on the force exerted by the lamp holder contacts on the lamp contacts. If the force is insufficient, vibration of the lamp may cause arcing and burnt contacts resulting in intermittent operation of the lamp or premature lamp failure.

The force can be increased by gently bending the contact finger(s) upwards. If the correct setting cannot be achieved or if the contacts are burnt, the contacts (and lamp) must be replaced.

A small insulated mirror may prove useful for inspecting the contacts.

6.7 Signal Lamp Contamination

The output of **any** type of signal lamp will be reduced if the glass envelope becomes contaminated with oil or grease. When Quartz Halogen (QH) signal lamps were introduced the need to avoid direct contact with the glass envelope to prevent contamination was emphasized. Handling any lamp, even with clean hands, will contaminate the envelope with perspiration or the skins natural oils. The heat from the lamp will cause the contamination to dis-colour (blackening) and the lamp output will be reduced.

If the glass envelope has become accidentally contaminated it must be cleaned. A paper tissue moistened with methylated spirit is ideal for this purpose. When the lamp is dry, use a clean paper tissue, or similar, to avoid further contamination when inserting the lamp into the lamp holder.

If the glass envelope cannot be cleaned or it has become blackened internally the lamp must be replaced with a new clean lamp of the correct type and rating for the equipment. It is important that the optimum light output is maintained to ensure maximum intensity and visibility of the signal aspect at the sighting point, especially for a red aspect, see Signal Light Beam Alignment.

Lamps should be kept dry and in their packaging or in a clean paper tissue to prevent damage, corrosion or contamination until they are to be put into service. Always use the lamp packaging or a clean paper tissue when handling a lamp to avoid contaminating the glass envelope.

New lamps should be observed lit for a short period before being left in service, see Testing Signal Lamps & Signal Light Beam Alignment.

The light output of a QH lamp can also be reduced because of internal contamination. Fibre optic indicators and banner signals are fitted with QH lamps. These lamps are designed to produce a high intensity output and consequently get very hot. Tungsten is released within the glass envelope whilst the lamp is illuminated.

When the lamp is run at its rated value the high temperature of the glass envelope prevents the tungsten from permanently adhering to its internal surface.

If a QH lamp is run below its rated value the temperature of the glass envelope is reduced. The lower temperature of the envelope allows the tungsten to become permanently deposited on its internal surface. This will appear as a blackening of the envelope.