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Guidance Note

SIGTAN047 - Points (General)

Endorsement and Authorisation

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Issue record

Issue	Date	Comments
Issue 1	Feb 2001	New Document
Issue 2	Dec 2002	Clamp lock section transferred to RT/E/C/ 1 1774 Updated to include HW 2000 motor control contact settings, recommended
Issue 3	August 2008	Updated to reflect Phase 2A / Engineering reorganisation responsibility change, no technical changes.

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1. PURPOSE

This Guidance Note provides general information relating to point operating equipment used on Network Rail's Infrastructure, together with technical information and where appropriate related historical background.

Note: the clamp lock section which once resided in this Guidance Note has been transferred to [NR/GN/SIG/11774](#) (Clamp Lock Handbook). The longer-term objective will be to extract those sections that are point machine specific to form separate Guidance Notes for individual point machine types (WBS & Co: M2, M3, M3A, Style 63 and ALSTOM HW point machines). In the interim however, and to allow the expedient issue of information, this SIGTAN will be used as a stop-gap for information relating to any point machine type (including clamp locks), to be incorporated later into a Guidance Note where one exists.

2. SCOPE

This Guidance Note provides general information on point operating equipment and associated ancillaries that are in use on Network Rail's Infrastructure.

3. POINT EQUIPMENT, MECHANICAL

3.1. Rodding Runs (Channel and Round)

A considerable amount of equipment is operated by some form of mechanical linkage. This may be by direct connection to the levers in a signalbox or ground frame or may be indirect such as a backdrive from a point machine. For the equipment to operate correctly it is essential that loss of travel in the mechanical linkage is kept to a minimum.

Wear in pins, joints, bushes, crank bosses and studs or loose roller stools all cause loss of travel. Small amounts of lost travel, due to wear or maladjustment can accumulate and may affect the correct operation of the equipment.

If the sleeve of an adjusting crank has to be placed near the end of the crank arm to maintain the travel at a set of points it is a good indication that travel is being lost in the rodding run. Careful inspection will be necessary to assess the remedial action required.

To prevent false operation of a track circuit any rodding crossing the track should be kept clear of the rails. It is also important to keep cross rods clear of running and conductor rails in or near electric traction areas.

3.2. Compensation of Rodding

The practical limit for the manual operation of a set of points is 320 metres (350 yards). The seasonal temperature changes can seriously affect the correct operation of equipment operated by rodding. In winter a rodding run of 320 metres could contract sufficiently to operate a set of points without the lever being moved.

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Yet, during the summer, expansion could cause the same rods to be buckled due to overstroking when the lever is operated.

To counteract the effects of the seasonal temperature changes, rodding runs are arranged so that half the total length of the rodding movement is by pushing and half by pulling. This reversal of movement is achieved by incorporating a system of cranks, levers or compensators, in the rodding run. Any variation in the overall length of the rodding run due to seasonal temperature changes is effectively cancelled by the action of the compensators.

If a set of points require frequent adjustment, the connections and compensators should be carefully examined. If the compensation arrangement is thought to be the cause it should be reported to your manager so that the appropriate remedial action can be arranged.

3.3. Adjusting Cranks, Screws And Joints

The set-screws on the sleeves of adjusting cranks shall be kept fully tightened and their locknuts fitted and secured. The locknuts on adjustable couplings and joints shall also be kept tight. The screw threads should be cleaned and then kept oiled so that adjustment can easily be made when necessary.

3.4. Facing Points Fitted With Lock and Clearance Bars

To prevent facing points being moved during the passage of a train, points were fitted with locks and lock bars. The lock bar was used instead of a track circuit. The lock bar, approximately 15 metres (50 feet) in length, is supported on pivoted arms which are clipped to the stock rail.

To enable the lock plunger to be withdrawn it is necessary for the lock bar to rise above the level of the rail head. If a vehicle is standing on, or passing over the points, the wheel flanges will prevent the lock bar rising and the lock plunger from being withdrawn.

If any of the arms or clips are missing or badly worn, the lock bar may become sufficiently distorted to allow the points to be operated with a vehicle standing on it.

Worn pivot pins will allow the lock bar to fall away from the side of the rail. In this condition the wheel flanges of a vehicle will be unable to prevent the lock bar rising and the lock plunger from being withdrawn. The points could be moved during the passage of a train.

It is therefore essential that facing point locks and lock bar mechanisms are kept in good working condition if they are to operate correctly. Washers shall be fitted to reduce any side play and worn pins are to be replaced.

Excessively worn rails or faulty operation shall be reported to your manager so that suitable remedial action can be arranged.

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If it becomes necessary for a clip or arm to be removed it is to be replaced as soon as possible to avoid possible false operation. Spares should be readily available before dismantling the assembly.

The rodding from the operating lever is connected at one end of the lock bar and the drive for the lock plunger at the other. If the equipment becomes disconnected from the operating lever the presence of a vehicle will prevent the lock bar rising and the lock plunger being withdrawn.

If temporary repairs require alternative arrangements to be put in place the above method of fail safe operation shall be maintained.

3.5. Decking or Boxing

In some instances, timber decking or boxing is fitted for staff safety and to provide the equipment with protection from the weather and operating environment.

Always replace any decking or boxing which has been removed for maintenance purposes and secure as appropriate. If any decking or boxing is missing, damaged or decaying the matter should be reported to your local manager so that the appropriate remedial action can be arranged.

3.6. Timber Decay

Benches or any timber supporting signalling equipment should be checked that they are in good condition. Decay will not be immediately obvious in its early stages as it normally occurs at or just below ground level. Any such decay shall be reported to your manager so that the appropriate remedial action can be arranged.

3.7. Winter Weather Precautions

To reduce the effects of freezing temperatures on the correct operation of point equipment, an anti-frost lubricant such as "Kilfrost", can be applied to mechanical detectors, points, and cranks etc. "Kilfrost" is similar to grease and is available from the National Railway Supplies in 25 kg and 215 kg drums. The lubricant can be applied by brush or grease gun as appropriate. To assist penetration of some mechanisms, oil may be mixed with the grease to reduce its viscosity.

The anti-frost lubricant should be applied in autumn. Repeat applications may be necessary during the winter months according to the operational environment, severity of the prevailing conditions and dilution, if any, to assist application.

The anti-frost lubricant can also be used to lubricate other equipment / components associated with mechanical signals, such as cranks and signal arm spindles. It is not recommended for use on the internal components of point machines or level crossing barrier equipment which may require a lighter grade of lubricant.

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4. POINT EQUIPMENT, ELECTRICAL DETECTOR

4.1. BR 998 Electrical Detector - False Detection

A serious Wrong Side Failure condition occurred in which a supplementary detector in part of a cross over detection circuit permitted a false Normal detection to be obtained whilst the entire cross over was lying Reverse. The cause was attributed to electrical leakage within one of the micro-switches caused by water and corrosion. The primary cause was extensive damage to the cover, part of which was missing.

A programme was instigated requiring that all detectors be inspected. The inspection included the condition and security of the cover, cable glands, the micro-switch bellows and the "O" ring seal which should be fully concealed between the switch body and the box casting. The terminal box lid was only to be removed if it was loose and/or the integrity of the seal was in doubt. Any damaged detectors were to be recorded so that they could be repaired or replaced as appropriate.

The inspection procedure defined in 4.2 is required to be carried out for all BR998 detectors. The electrical testing detailed in 4.3 is required to be carried out for all BR998 configurations other than those exceptions identified in clause 4.3. This is consistent with actions previously defined in [RT/SIN070](#).

The detection circuit in question was found to be particularly vulnerable to such a failure and a series of electrical tests were devised to be applied to all detectors except those in the following category:-

Detectors in a detection circuit wired directly to a SSI points module without intermediate relays

or

forming part of a circuit which feeds polar or phase sensitive detection relays (e.g. BR 961, VLI) over a two wire circuit indicating both Normal and Reverse detection

or

there is an additional detector, clamp lock or point machine in the circuit between the detector and the detection relay(s)

4.2. Inspection (applies to ALL BR998 detectors)

Check the condition of the grey plastic cover of each BR 998 detector for damage. Any covers which have holes, sections missing (other than minor chips from the flange) or cracks extending to the top surface shall be renewed.

Examine the cable entry glands for security, paying particular attention to the seal around each cable. Tighten or renew as necessary.

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Check that both micro-switches are secure and are seated snugly into the terminal box. The rubber bellows boots should be undamaged. No part of the O-ring seal between the switch body and the box casting should be visible. If damage has been noted in the cover above either micro-switch, give particular attention to any signs that the switch mounting has been disturbed.

Examine the terminal box lid and check that both securing nuts bear evenly on the lid and a good seal is achieved. Only remove the lid if there are doubts about the integrity of the seal.

If any defects or problems found in the foregoing checks they are to be reported.

4.3. Testing

Listed below are three BR998 detector configurations:

- a) the detector is part of a detection circuit wired directly to a SSI points module without intermediate relays;
- b) *the detector forms part of a circuit which feeds polar- or phase-sensitive detection relays (e.g. BR 961, VLI) over a **two wire** circuit indicating both Normal and Reverse detection;*
- c) *there is another detector, clamp lock or point machine in the circuit between the detector and the detection relay(s)*

For detector configurations that satisfy any of the above configurations, no further electrical testing is required.

For detector configurations that do not satisfy any of the above configurations, electrical testing in accordance with [NR/SIN070](#) should be carried out which will be replaced by an NR/SMS in due course.

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5. POINT EQUIPMENT - HYDRO-PNEUMATIC

5.1. Hydro-Pneumatic Self Restored Points

Train Operated Points, as they are usually called, are manufactured by Vickers and are designed for train movements in either direction at speeds not exceeding 15 mph. The equipment should only be fitted on C switches. Plastic base plates shall not be used.

A gas filled accumulator connected to the main hydraulic actuator holds the points closed for movements in the facing direction. When the switch is closed and detected, the point indicator will be illuminated or a mechanical signal will operate.

A train movement in the trailing direction will cause the oil in the main hydraulic actuator to be transferred to the accumulator and the switch detection to be broken. The indication will be extinguished or mechanically operated as appropriate. On completion of the movement the points are restored by the energy stored in the accumulator. The restoration of the points is damped to prevent damage to the wheels and rail.

Ramps are provided to protect the equipment from damage by train borne objects. Covers, fitted to the inner face of the switch rails, protect the actuators.

5.2. Accumulator / Actuator Apparatus

The accumulator is a piston type device pre-charged with gas and is connected to a manifold which incorporates an overload safety device and a pressure gauge. The face of the gauge is divided into a red and a white sector. A pressure detection switch is fitted in the feed to the main actuator.

If there is sufficient hydraulic pressure available, the pressure gauge needle will be within the white sector of the gauge, see figure I. If the needle is in the red sector, the apparatus is defective and the signaller or monitoring point and your manager shall be informed.

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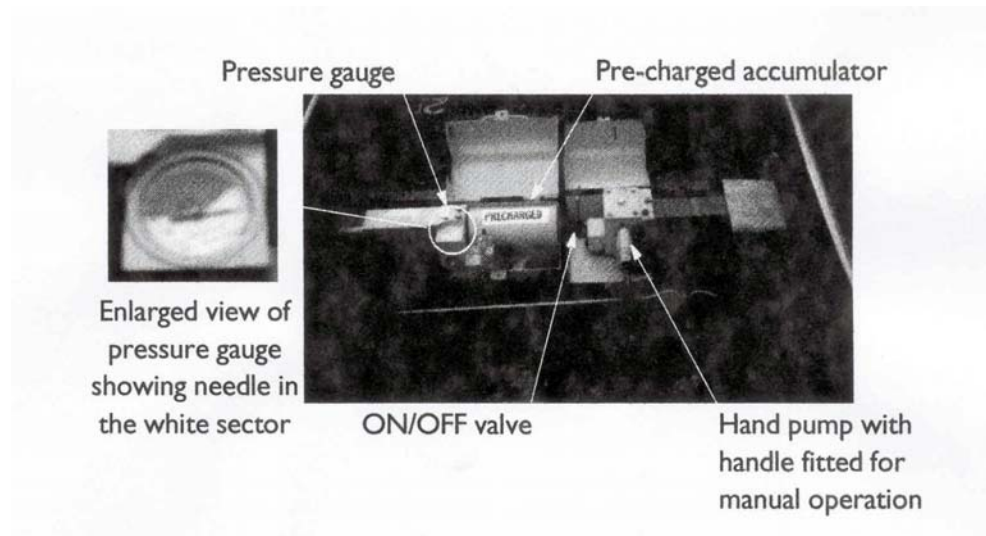


Figure 1

5.3. Hand Pump Apparatus

A hand pump/reservoir unit is provided for emergency operation and is hydraulically separate from the main operating equipment. The hand pump apparatus is connected to a manifold fitted with an ON/OFF valve, see figure 1. A relief valve is incorporated in the feed to the secondary actuator.

5.4. Switch Detection

The points are detected closed (normal) for movements in the facing direction. It is therefore essential that the pressure switch contact is incorporated in the detection circuit to prove that sufficient hydraulic pressure is present so that the closed switch rail will be held firmly against its associated stock rail. See Faulty Wiring.

A manufacturing fault resulted in intermittent detection problems with the microswitches used in some BR Standard 998 Detectors. Consequently a programme was instigated during March 1994 to fit all Train Operated Points with an additional BR Standard 998 Detector in accordance with drawing BRS-SM696 Issue C or later.

5.5. Manual Operation

The pump handle for manual operation is housed in a secure cabinet adjacent to the equipment. To manually operate the points, turn the relief valve ON (lever vertical - valve open) and operate the hand pump. The points will move to the reverse position against the force exerted by the main actuator and accumulator. The points will be restored to their normal lie by the action of the accumulator when the relief valve is turned OFF (lever horizontal - valve closed).

5.6. Faulty Hydraulic Equipment

The main operating apparatus (accumulator/actuator) and the secondary (manual) operating apparatus have separate sealed hydraulic systems and cannot be