

Traffic Advisory Leaflet 1/08

December 2008



Wig-wag Signals



This leaflet gives advice on the use of wig-wag signals and associated equipment. It also deals with the use of warning lights for cattle crossings. It does not cover warning lights at school crossing places.

The signals and signs to be used are prescribed in the Traffic Signs Regulations and General Directions 2002¹ (TSRGD). References to “diagram” in this leaflet shall mean “TSRGD¹ diagram”.

WIG-WAG SIGNALS

Light signals to diagram 3014 are commonly called wig-wag signals. They are used to control road traffic at level crossings, swing or lifting bridges, tunnels, airfields or in the vicinity

of premises used regularly by fire, police or ambulance service vehicles. Their use is prescribed by TSRGD¹ Regulations 39 and 40.

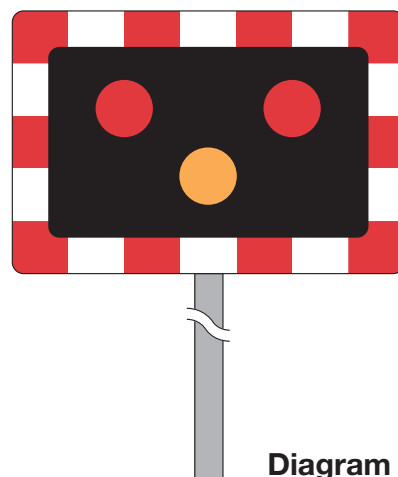


Diagram 3014

TSRGD¹ requires the controller to be of a type approved by the Secretary of State. Apart from equipment used at a level crossing, this approval is administered by the Highways Agency, against specification TR 2513², "Performance Specification for Wig Wag Signal Control Equipment". Level crossing signal controllers are incorporated into the railway control equipment.

The wig-wag signal is used where the need for a vehicle to stop is paramount but often difficult for a driver to forecast. This is unlike a signal change at a junction, or stand-alone crossing, where the need to stop is likely to be regular and/or the vehicle driver can often see the reason for the impending change. At a wig-wag installation the change can be due to someone pushing a button, say, in a fire station, or a train arriving at a point on the track some distance away. This unexpected need to stop requires a different type of signal.

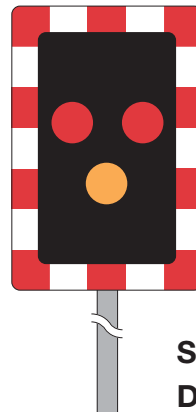
Unlike standard traffic signals, where certain specified vehicles may pass a red signal, there are no such exceptions for wig-wag signals.

GENERAL LAYOUT DESIGN

Many subjects, such as high friction surfacing, visibility and swept path requirements are covered in TD 50/04³, "The Geometric Layout of Signal Controlled Junctions and Signalised Roundabouts".

SIGNAL ASPECTS

TSRGD¹ regulation 39 requires wig-wag signals to diagram 3014 to have signal heads compliant to European Standard EN 12368⁴, the same as standard traffic signal heads – see regulation 33(5). The flashing rate for red signals to diagram 3014 is defined in TSRGD¹ regulation 39.



Signal to
Drawing NP 3015

TSRGD¹ direction 55 requires at least two identical sets of signals per approach. The positioning of the posts and heads will vary from site to site. However, for most applications, unlike standard traffic signals, both signals are on the approach side of the hazard. For level crossings, the "Railway Safety Principles and Guidance, Part 2, Section E, Guidance on level crossings"⁵, sometimes called the Blue Book⁵, gives advice on layout. This is then specified in the Level Crossing Order, see LEVEL CROSSINGS.

There are situations where the standard wig-wag signal cannot be used because of a lack of space. A narrower version is available, to drawing NP 3015 but will need sign authorisation. Details of how to obtain authorisation and a copy of the drawing are available by e-mailing traffic.signs@dft.gsi.gov.uk.

If the wig-wag signals cannot be seen from a fire/ambulance station, additional signals can be supplied facing exiting drivers. These must display the same layout as diagram 3014 and not a three-in-line assembly as in the diagram 3000 series. Blue or white aspects replace the red, but the amber remains the same. These signals must not be visible to drivers on the public highway and ideally should be sited within the fire/ambulance station boundary.

At most level crossings an approaching pedestrian can see the vehicular signal to diagram 3014. TSRGD¹ regulation 52 allows for the use of signals to diagram 4006 where there are problems.

A typical use could be at a skew level crossing where a pedestrian might pass the diagram 3014 signal before reaching the pedestrian stop line. A signal to diagram 4006 could then be used alongside the marking to diagram 1003.2. See the Blue Book⁵. Diagrams 4006 and 1003.2 must be used together.





Diagram 4006



Diagram 776

For some automatic open level crossings, the Level Crossing Order may also require a sign to diagram 776, ANOTHER TRAIN COMING. This is illuminated from the moment that the first train arrives at the crossing.

INSTALLATION REQUIRING COMBINED WIG-WAG AND STANDARD SIGNALS

There are situations where both standard signals to diagram 3000 and wig-wag signals to diagram 3014 will be used.

One example would be a signal-controlled junction which includes a rail track across one arm. On the approach of a train a hurry call would force the standard signal controller to a non-conflicting stage, whilst wig-wags control approaching vehicles at the level crossing.

Another example, in Fig.1, involved two lifting bridges across a river. Each bridge acts as one carriageway of a dual carriageway. These two sections join on the south side as one two way flow, across which the traffic authority wished to install a Toucan crossing.

The wig-wags were left on the north side and standard Toucan vehicular signalling provided on both sides of the Toucan on the south side. The wig-wag signals on the south side were then re-installed parallel to the Toucan northbound vehicular signals.

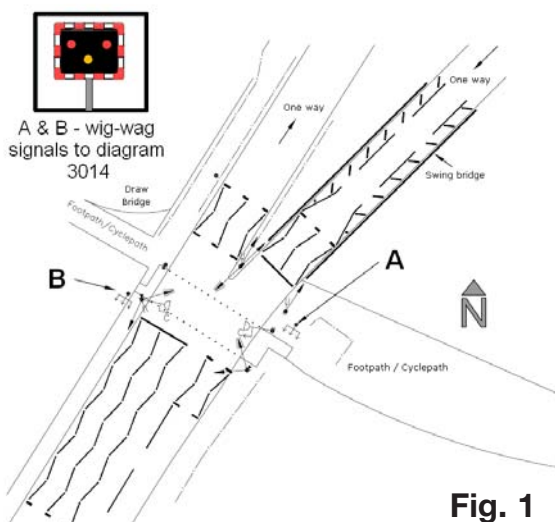


Fig. 1



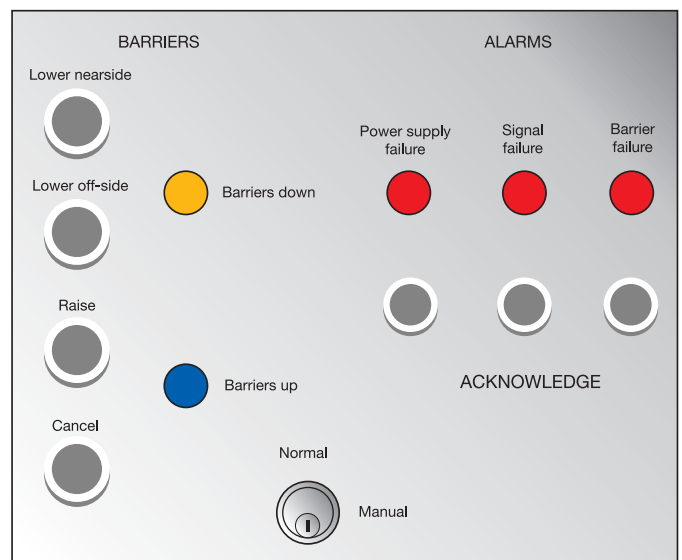
The normal amber time, for a wig-wag signal, specified in TR 2513² is 5 seconds, whereas that for the Toucan crossing is 3 seconds. As there was a need to synchronise the ambers at both installations, a variation to TR 2513² was required. In such cases, it is recommended that the Department is contacted at an early stage.

POSTS

See Traffic Advisory Leaflet 1/06, General Principles of Traffic Control by Light Signals⁶, Part 1.

CONTROLLERS

Control equipment, other than that at level crossings, should be installed as detailed in Local Transport Note 1/98⁷, "The Installation of Traffic Signals and Associated Equipment". However, unlike signal control at junctions, or



at stand-alone crossings, there may be a need to have a control panel in a fire/ambulance station, bridge control room etc.

Remote monitoring is essential and should be considered at an early stage. Many wig-wag sites are in isolated locations and do not operate regularly. By the very nature of the sites, any accident is likely to involve serious injury and/or fatalities. The correct operation and full display of aspects is essential to minimise the risk.

LEVEL CROSSINGS

There are some 9,000 level crossings in Great Britain. Network Rail is the operator for just under 7,700 crossings. The remainder are located on heritage railways, metro systems and industrial railways. Of the total number of crossings some 15% have wig-wag signals; these are at half & full barrier crossings and some open crossings.

The installation and maintenance of the controller and signals to diagram 3014 are the responsibility of the Railway Operator.

The starting point for layout and operation is the Blue Book⁵. The Railway Inspectorate (HMRI) and Railway Operator must be consulted if any changes are planned near level crossings.

Signals at level crossings are installed by railway operators under an individual Level Crossing Order, using powers under the Level Crossings Act 1983⁸. Each Order prescribes the traffic signs (including road markings) to be used. To remain lawful these signs must be maintained in place.



At this un-gated crossing the carriageway is less than 5.0 metres in width and the centre lines have been omitted. See Traffic Signs Manual, Chapter 5⁹, Railway Level Crossings.

The railway operator is responsible for the installation and maintenance of the controller. The traffic authority is consulted on Level Crossing Orders, and provided with a copy of each Order made by HM Railway Inspectorate.

The standard amber duration for level crossing wig-wags is 3 seconds. The barriers begin to lower after a set period. See the Blue Book⁵ for details. Details of the barriers, including the necessary red warning lights mounted on them, are included in the Level Crossing Order.

Pedestrian audible signals are provided at automatic half barrier and open crossings, which start with the commencement of the amber and continue until the intermittent red lights are extinguished. At full barrier crossings the audible signal stops when the barriers are fully lowered.

At automatic crossings where two trains can arrive at the crossing without providing the minimum road opening time, the “warbling” rate of the audible signal for pedestrians may increase to give additional warning.

SWINGING OR LIFTING (MOVEABLE) BRIDGES

The equipment at moveable bridges is normally maintained by the organisation involved; British Waterways, Environment Agency, Harbour Authority etc. The relevant local authority should be aware of the ownership and maintenance arrangements. British Waterways hold useful data on responsibilities. Emergency call-out numbers are provided at some sites.

The equipment at moveable bridges consists of lifting barriers, either full-width or double





half-barriers. The type selected will depend on the site conditions and the method of control is somewhat different in each case.

Details are set out in TR 2513². Both single and double barriers, when lowered, should cover the whole of the carriageway and footways.

Traffic is first stopped by flashing signals, followed automatically, after a set period, by the lowering of the barriers. At double barrier layouts, the nearside barriers on each approach are lowered first. When the bridge is seen to be clear of all traffic, the operator will lower the offside barriers. When the bridge is back in the normal position, the barriers (both nearside and offside in the case of double barriers) will start to rise.

As at level crossings, there are red warning lamps on each barrier boom, which should operate when the boom is in any position except vertical.

Audible signals for pedestrians are provided. The signal starts with the commencement of the flashing amber and continues until the barrier or barriers are fully lowered. The audible signal starts again before the barriers



start to rise. The signal should sound like a single stroke bell so that it cannot be mistaken for other audible warnings.

TUNNELS

The operation is the same as for moveable bridges. The barriers/wig-wags may be brought into operation for a number of reasons; accidents, queues forming, pollution, faulty ventilation etc.

AIRFIELDS

The equipment at airfields or airports is normally maintained by the company involved. The relevant traffic authority should be aware of the ownership and maintenance arrangements. The Airport Operators Association also keeps details.

Wig-wags can be used where there is a need to interrupt the vehicular flow, owing to hazards encountered at airfields or airports.

Whilst the controller is likely to be sited at the roadside, the control panel is more likely to be sited in a control room.

The need for barriers will depend on the reason for stopping the vehicular traffic. If it is being stopped, say, because of sudden noise from low-flying aircraft, barriers would not normally be required. However, if the hazard is at the same level, e.g. an aircraft being towed across the road, then barriers would be used to give added protection. Like other sites with barriers they should extend across the whole highway, including the footways. Thought should be given to providing an audible warning device for pedestrians, as at level crossings and moveable bridges.



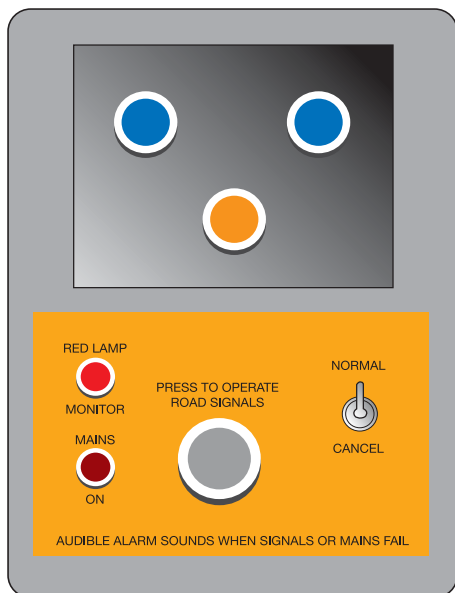


PREMISES USED REGULARLY BY FIRE, POLICE AND AMBULANCE SERVICE VEHICLES

The installation of wig-wags should be considered where there is a special need to provide breaks in steady and fast streams of vehicular traffic outside a fire and/or ambulance station. This allows emergency vehicles to join the appropriate traffic stream with the minimum of delay.

If the emergency vehicles exit into a signal-controlled junction it may be more appropriate to provide a separate stage with a hurry-call facility. See Traffic Advisory Leaflet 1/06⁶, Part 2.

The installation of wig-wag signals, stop lines etc should be determined by regarding the entrance/exit to the emergency station as an approach to a standard signal intersection. See Traffic Advisory Leaflet 1/06⁶, Part 1 for advice. These sites have no barriers.



A control panel is often situated inside the emergency vehicle building. The button is normally pushed by the last person to board the emergency vehicle. This ensures a standard journey time to the junction.

A miniature wig-wag signal is shown on the operators panel mimicking the operation of the main signal. Whilst the amber is the same, there are two blue, or white, aspects replacing the red ones.

If the junction layout is complex it is helpful for the operator's panel to be supplemented by a simple junction layout drawing.

The timings for the wig-wag signals, on receipt of demand, are within the range shown in the Table below:

Period	Signals for general vehicles	Signals for emergency vehicles	Duration (seconds)
a	Amber	Amber	5 (fixed)
b	Red flashing	Blue or white flashing	15 to 45
c	blank	blank	20 (fixed)
d	blank	blank	Awaiting demand

Period c is a minimum period during which no further change can take place. Any demands received are stored.

There may be reasons for varying timings and operation. For example, if:

- the emergency vehicles are further from the public highway than normal, a delay in the appearance of the amber signal may be necessary. This would normally be in the range of, say, 5 to 35 seconds.
- the initiation of a demand is remote from the fire/ambulance station; there can be an inbuilt delay to allow crews to reach the appliances.
- there is a dual carriageway, it may not be necessary to stop the general vehicular flow on the approach furthest from the station, i.e. if the appliance is turning left. Two separate push buttons are required, with a clear unambiguous indication, say, by a junction layout drawing and different coloured buttons. Safeguards need to be in place against operator error, e.g. pressing the left turn-out button, followed immediately by a right turn-out button.

SIGNING

Advice on the use of warning signs is given in the Traffic Signs Manual, Chapter 4¹⁰. This includes sections on level crossings, bridges and tunnels, airfields, fire and ambulance premises and cattle crossings.

If the wig-wag signals are situated a short distance along the exit from, say, a roundabout, or gyratory, it might be necessary to put warning signs on the other approach arms. This needs to be considered at an early stage as the solution might involve traffic sign authorisation, detail of which is available through traffic.signs@dft.gsi.gov.uk.

Stop lines, to diagram 1001, must be provided on each approach controlled by wig-wag signals. The stop line should be set back sufficiently from the wig-wag signal so that waiting drivers have sight of a signal, see SIGNAL ASPECTS. At some types of level crossing, these should be accompanied by stop lines for pedestrians to diagram 1003.2. See The Traffic Signs Manual, Chapter 5⁹.

Although the legend "Police" is not currently included in the current list of permitted variants for diagram 563.1, the Department will give sympathetic consideration to applications for authorisation.

At some installations, such as those at bridges and tunnels, it may be necessary to close barriers for longer than normal, e.g. for bridge maintenance. If this is to be the case, advance variable message signing may be necessary to divert vehicles to another route to avoid the resultant delays. This needs to be at a point where diversions are possible, which may be at some distance from the site. Careful liaison is essential with all interested parties to ensure continuity of signing, suitability of the diversion route etc. See TSRGD¹ regulation 58.

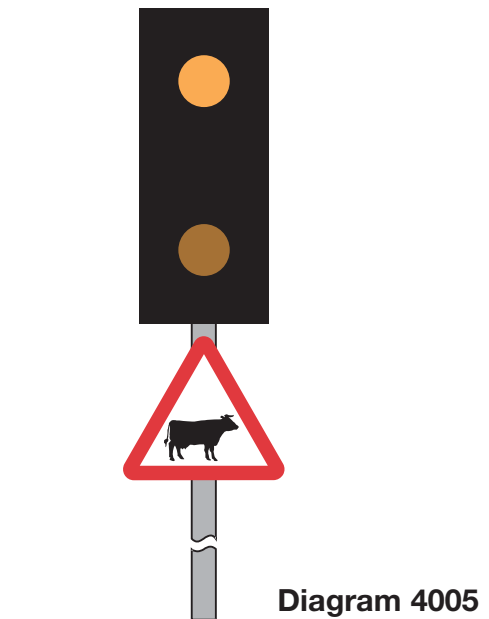
Under a change to the Level Crossings Act 1983⁸, introduced by the Road Safety Act 2006¹¹, the split of responsibilities for signing at level crossings can now be recorded in the Level Crossing Order. Warning signs can be included as a responsibility of the local traffic authority. Although the traffic authority, in many cases, used to take responsibility for warning signs, this change has formalised the situation.

TACTILE PAVING SURFACES

The corduroy hazard warning surface is used to warn visually impaired people of the presence of specific hazards including level crossings. Advice is given in "Guidance on the use of Tactile Paving Surfaces"¹². In addition to level crossings, the advice would be used for other sites with a barrier, such as swing or lifting bridges and some tunnels and airfields.

WARNING LIGHTS FOR CATTLE CROSSINGS

TR 2513² also covers warning lights for cattle crossings to diagram 4005. TSRGD¹ regulation 51 defines the flashing rate for the lights.



The lights have traditionally been constructed from a standard traffic signal head, with the centre aspect blanked off. This has the advantage that the aspects will meet the sections of EN12368 quoted in TSRGD¹ regulation 33 and can have standard signal fittings, mountings and backing boards etc.

Although there is no legal requirement for warning lights on both sides of each approach, this should be considered.

Advice on the suitability of cattle crossing signs and warning lights, including guidance for their use, can be found in the Traffic Signs Manual, Chapter 4¹⁰.

The warning lights can have an automatic time-out sequence, of between 1 and 5 minutes, so that they are not left active unnecessarily, and an inhibit to stop re-use within 5 minutes.

REFERENCES

- 1 Traffic Signs Regulations and General Directions 2002. ISBN 0-11-042942-7. TSO
- 2 TR 2513, Performance Specification for Wig Wag Signal Control Equipment. HA
- 3 TD 50/04, The Geometric Layout of Signal Controlled Junctions and Signalised Roundabouts. TSO
- 4 European Standard BS EN 12368: 2006. BS
- 5 Railway Safety Principles and Guidance, Part 2, Section E, Guidance on level crossings. ISBN 0-7176-0952-9. ORR
- 6 Traffic Advisory Leaflet 1/06, General Principles of Traffic Control by Light Signals. DfT
- 7 Local Transport Note 1/98, The Installation of Traffic Signals and Associated Equipment. ISBN 0-11-552008-2. TSO
- 8 Level Crossing Act 1983. ISBN 978-0-10-541683-8. TSO
- 9 Traffic Signs Manual, Chapter 5, ISBN 0-11-552479-7. TSO
- 10 Traffic Signs Manual, Chapter 4, Warning Signs. ISBN 0-11-552411-8. TSO
- 11 Road Safety Act 2006. ISBN 978-0-10-544906-5. TSO
- 12 Guidance on the use of Tactile Paving Surfaces. See update on www.dft.gov.uk/162259/259428/tactilepavement. DfT

USEFUL ADDRESSES

HA (Highways Agency)
Zone 2/13K
2 The Square
Temple Quay
Bristol BS1 6HA
Tel: 0117 3728475
Web: <http://www.tssplansregistry.org>

ORR (Office of Rail Regulation)
One Kemble Street
London WC2B 4AN
Tel: 020 7282 2000
Web: <http://www.rail-reg.gov.uk>

TSO (The Stationery Office)
PO Box 29
Norwich NR3 1GN
Tel: 0870 600 5522
Web: <http://www.tsoshop.co.uk>

Airport Operators Association
3 Birdcage Walk
London SW1H 9JJ
Tel: 020 7222 2249
Web: <http://www.aoa.org.uk>

BS (BSI British Standards)
389 Chiswick High Road
London W4 4AL
Tel: 020 8996 9001
Web: <http://www.bsi-global.com>

British Waterways
64 Clarendon Road
Watford WD17 1DA
Tel: 0845 671 5530
Web: <http://www.britishwaterways.co.uk>

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