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DRAFT ADVICE FOR USERS OF COMPACT MOVA

Version: 1

by I R Henderson, M R Crabtree and A Maxwell (TRL Limited)

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Client: Traffic Management Division
         Department for Transport (Mr Suku Phull)

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1 Introduction

This document gives provisional advice for configuring a signalised traffic junction for use with ‘Compact’ MOVA. Compact MOVA is a part of the recently released MOVA M5.0 adaptive signal control system. It allows users to reduce installation and maintenance costs by not requiring IN-detector loops on low-speed approaches, where the 85th percentile speed is no higher than 35mph. This can be done whilst retaining many of the benefits of ‘Standard’ MOVA (MOVA with IN-detectors), although in most cases Standard MOVA will still give the best results.

Compact MOVA has been tested extensively in simulation at a variety of junctions, and has been compared with D-system VA and Standard MOVA. Three site trials have also been completed. The advice resulting from our experience so far is given below. TRL needs to be involved with some of the early installations of sites with Compact MOVA approaches though, so this advice can be reviewed and updated in the light of further experience. Until then, this advice will not be included in the MOVA Application Guides, AG 44 and AG 45.

The latest MOVA Application Guides and MOVA configuration program, MOVA Setup, are available for download from the TRL software website, http://www.trlsoftware.co.uk

Warning
Compact MOVA approaches must carry low-speed traffic where the 85th percentile speed is 35 mph or less.

Please contact TRL if you are planning to use Compact MOVA.

1.1 Example junction with Compact MOVA approaches

An example junction with Compact MOVA approaches is shown in Figure 1, below. A Compact MOVA approach is one where the IN-detectors are omitted from all long lanes. A junction can have a mixture of Standard (with IN-detector) and Compact (without IN-detector) approaches, as well as all Standard or all Compact approaches. Compact MOVA approaches must always be low-speed however.
Figure 1: Example junction with Compact MOVA approaches; IN-detectors have only been placed on the major approaches, where they are easier to position and provide more benefit. IN-detector (Standard MOVA approaches ONLY). X-detectors (Compact MOVA and Standard MOVA approaches). No IN-detectors on Compact MOVA approaches, reducing installation and maintenance costs. Parked cars make IN-detector positioning problematic.
2 Recommendations for configuring a Compact MOVA approach

This section describes in detail how Compact MOVA configuration for an approach without IN-detectors differs from Standard MOVA.

A list of the differences when configuring a Compact MOVA approach using the MOVA Setup configuration program is given in section 5.

2.1 Detector placement

Compact MOVA is designed for low-speed approaches. Issues to consider when deciding whether to omit IN-detectors on an approach include:

- Whether the approach is minor. If so, an IN-detector is less likely to provide a significant improvement in junction performance;
- The cost and difficulty of providing ducting for the IN-detector;
- The cost and difficulty of installing and maintaining the IN-detector;
- Difficulty in siting the IN-detector, for instance because of parked cars.

On Compact MOVA approaches, X-detectors should be placed slightly further upstream than would be the case on approaches with IN-detectors. The reasons for this are discussed more fully in section 2.3. Table 1 should be used for determining the distance of the X-detectors from the stop line (DX in MOVA Setup) on approaches without IN-detectors.

Table 1: Recommended distance (in metres) of the X-detector from the stop line on Compact MOVA approaches, according to saturation flow and cruise speed

<table>
<thead>
<tr>
<th>Saturation Flow (v/h)</th>
<th>Cruise Speed (m/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>7</td>
</tr>
<tr>
<td>&lt;= 1400</td>
<td>39.5</td>
</tr>
<tr>
<td>1500</td>
<td>39.0</td>
</tr>
<tr>
<td>1600</td>
<td>38.5</td>
</tr>
<tr>
<td>1700</td>
<td>38.5</td>
</tr>
<tr>
<td>1800</td>
<td>38.0</td>
</tr>
<tr>
<td>1900</td>
<td>38.0</td>
</tr>
<tr>
<td>&gt;= 2000</td>
<td>37.5</td>
</tr>
</tbody>
</table>

Note that the X-detector distance does not need to be exact: +/- 2m is easily tolerated, provided the DX specified in the dataset accurately reflects the actual distance from stop line to X-detector on-site. DX should be in the range 35m <= DX <= 50m.

Other considerations concerning detector placement, as discussed in the MOVA Application Guides (AG 44 Appendix B and AG 45 Appendix C), still apply. For instance, X-detectors on adjacent lanes should still be placed at approximately the same distance from the stop line as shown in Figure 2.
As discussed in the Application Guides, side-by-side placement is necessary to avoid vehicles passing over both detectors (double-counting) or between the detectors (not being counted at all). In general, adjacent detectors should be placed at the furthest distance indicated by Table 1: in Figure 2 the X-detectors are both placed at 49m rather than 43.5m. However where drivers must slow down considerably as they approach the stop line, for instance when making a sharp left turn into a narrow exit, X-detectors are better brought forwards to the nearest distance indicated by Table 1: in this circumstance, the X-detectors in Figure 2 would both be placed at 43.5m rather than 49m. Detectors might not be placed side-by-side at all where there is a very big difference in cruise speed between adjacent lanes and little chance of lane changing. This situation is unlikely on low speed Compact MOVA approaches though.

The issues discussed in Section 4.1 of AG 44 should also be considered when deciding where to site X-detectors. Using the values of DX given in Table 1 will increase the maximum value of MOVA’s calculated minimum green: the amount of green time required for the queue between stop line and X-detector to discharge. The calculated minimum green is vulnerable to a certain degree of error where vehicles change lanes between X-detector and stop line, and where there are X-sinks and sources such as driveways between X-detector and stop line. Wasted green may therefore be more likely on a given approach when flows are low if the X-detector is located further from the stop line. This may be more noticeable at major/minor type junctions: MOVA could run the minor road stage for longer than necessary on some cycles to the detriment of the major approaches.

Also note that if vehicles travelling away from the junction are likely to cross an X-detector, for instance exiting vehicles crossing over to the other side of the road to overtake a parked car, a unidirectional loop should be installed.

### 2.2 Oversaturation detection

MOVA M5.0 uses a different method for detecting oversaturation in the absence of IN-detectors (i.e. with X-detectors only). When a dataset is created for a junction with Compact MOVA approaches, the user specifies long lanes that have no IN detector by setting DSHORT to 999. The MOVA configuration program ‘MOVA Setup’ calculates suitable default configuration data for detecting oversaturation on those lanes. The following default data is calculated by MOVA Setup:

- XOSAT set to 1 for detecting oversaturation with the X-detector, or 2 for a combination X-detector (if present, this is used in preference to individual X-detectors). Where IN-detectors exist, these are still used in preference to X-detectors (XOSAT=0).
OSATCC set to an estimate of the number of whole vehicles that can queue downstream of the X-detector as far as the stop line. This is based on DX, the distance of the X-detector from the stop line.

OSATTM, a new item of configuration data in MOVA M5.0. This is set to an estimate of the time from the start of leaving amber taken for OSATCC vehicles to queue in the space between X-detector and stop line when the approach is oversaturated.

Using this data, oversaturation is detected when OSATCC vehicles are detected downstream of the X-detector after the start of leaving amber and before time OSATTM. Typical values for OSATCC and OSATTM might be 5 vehicles and 14 seconds respectively.

It is recommended that the default values for XOSAT, OSATCC and OSATTM calculated by the MOVA Setup program are used in the first instance at a given junction. If MOVA is found not to detect oversaturation correctly using the default values, OSATCC and OSATTM can be modified by the user accordingly in MOVA Setup. For instance:

- If MOVA is not detecting oversaturation when oversaturation is present at the junction. OSATTM may not be generous enough and could be increased by a couple of seconds. This might be the case if the lane is on an uphill approach for example. Alternatively, OSATCC may be set too high. This is less likely, but may be the case on lanes carrying a very high proportion of heavy vehicles - it could therefore be decreased by one vehicle in this situation.

- If MOVA is detecting oversaturation when oversaturation is not present at the junction. OSATTM may be too generous and could be decreased by a couple of seconds, or OSATCC may be set too low and could be increased by one vehicle.

### 2.3 Green extension

MOVA calculates several periods of green:

1. Variable minimum green: a period of green calculated as sufficient for vehicles queued between X-detector and stop line to discharge;
2. Saturated flow: the period of green following the calculated minimum where vehicles that were queueing upstream of the X-detector at the start of green are discharging. Saturation flow ends when a ‘critical gap’ is detected at the X-detector;
3. Delay optimisation: this period of green is based on a ‘cost-benefit’ analysis contrasting the benefit to vehicles at green against the disbenefit to vehicles at red of extending the green period.

The delay-optimisation algorithm used by MOVA is reliant mainly on IN-detector data. MOVA will carry out much less delay optimisation for long lanes without IN-detectors. This is the main reason why MOVA with IN-detectors will normally provide better performance, and why IN-detectors may still be cost effective on major approaches at low-speed junctions. There is however a number of ways to improve the performance of Compact MOVA approaches late in green during undersaturated periods:

- Place the X-detectors slightly further upstream than normal and reduce the value of GAMBER for Compact MOVA approaches to one second. This increases the size of the delay optimiser window for Compact MOVA approaches, shown below in Figure 3. MOVA will therefore be able to carry out more delay-optimisation based on the X-detector alone, something that was found in simulation, and helped MOVA cope better with queue length imbalances between lanes on a link. The detector distances shown in Table 1 should be used for Compact MOVA approaches.
Adopt a more conservative link-lane structure. MOVA marks the end of saturation for a stage when all the links ending green that stage have reached end-of-saturation. Links are marked end-of-saturation when only the first of their constituent lanes reaches end-of-saturation. Therefore the more separate links there are, the longer MOVA’s saturation flow period is likely to last, and the less MOVA will rely on the weakened delay-optimiser on Compact MOVA approaches. MOVA will therefore be less likely to end green while undischarged queues remain upstream of any X-detectors. Lanes must only be placed together on the same link if they have identical turning movements on Compact MOVA approaches, as well as obeying the other restrictions discussed in AG 44 (i.e. that traffic forms similar length queues and discharges simultaneously at a similar rate). Placing more lanes on separate links will help MOVA cope better with queue length disparities between lanes on Compact MOVA approaches. N.B. long lanes with and without IN-detectors must not be placed together on the same link.

Set all COMTIM values to zero. COMTIM is the time into green when MOVA should start using combination X-detectors to detect saturation flow on flared approaches, in preference to individual X-detectors. If vehicles are not using the extra space provided by flares efficiently (perhaps for good reason), MOVA may detect the end of saturation early. For Standard MOVA approaches, the delay-optimiser will still extend green if there is enough traffic, but Compact MOVA approaches lack an effective delay-optimiser. Green may therefore end soon after the variable minimum green with undischarged queues remaining. It is therefore recommended that combination detectors are used from the start of green (COMTIM=0) on Compact MOVA approaches.

Avoid using ESLMAXs to force MOVA to end its saturation flow detection period at a set time (this is a seldom used option anyway). If ESLMAXs are set too low, green is likely to end immediately after the ESLMAXs expire on Compact MOVA approaches, due to the reduced effectiveness of the delay-optimiser on lanes without IN-detectors. Default values set by MOVA Setup should be left unchanged.

2.4 Calculation of ‘bonus’ capacity for flared approaches

Bonus capacity is the extra near-junction capacity provided by flares and sinks that discharge during the early part of green. In previous versions of MOVA, bonus capacity could not be calculated for long lanes without IN-detectors. MOVA M5.0 calculates bonus capacity for flared lanes without IN-detectors automatically. No extra configuration data is required, and BONTIM, BONBC and BONCUT should be set as normal in the MOVA data configuration program, MOVA Setup.

Also note that MOVA will not end its period of saturation flow detection at BONTIM on Compact MOVA flared approaches when the bonuses are favourable. The end of saturation flow code (ESLI) of 9 should therefore never appear for a Compact MOVA link in the MOVA messages. This helps to ensure that MOVA bases its end-of-saturation decision on a gap in flow - important when the delay-optimiser is less effective at extending green as discussed in section 2.3.
2.5 IN-sinks

IN-sinks are places where traffic can leave an approach before reaching the junction, and are located between X and IN-detectors on typical Standard MOVA approaches. More information on IN-sinks can be found in AG 44, sections 8.2 and 8.3. Examples include:

- Free left turns (as shown in Figure 4 below);
- Side roads;
- IN-sink effects can occur on flares that do not discharge at the same time as their adjacent long lane, for instance flares for opposed or separately signalled right-turners. The X-detectors on such short lanes should normally be marked as IN-sink detectors in the MOVA Setup program for Standard MOVA approaches.

Where IN-sinks exist, MOVA carries out a 2-part end-of-saturation check, checking gaps at the IN-detector as well as the X-detector. If the IN-detector is absent, MOVA may mark the end-of-saturation on an approach if a gap occurs at the X-detector as a result of vehicles leaving through an IN-sink. IN-sinks are also used in the calculation of bonus capacity for flared approaches.

**Warning**

Compact MOVA must not be used on approaches where significant IN-sinks exist without consulting TRL first.

This applies both to IN-sinks with separately installed detectors (see Figure 4 below), and X-detectors that act as IN-sinks, for instance on flares for opposed or separately signalled right-turners (see Figure 5 below). In the latter case, the X-detector may be better specified as part of a combination X-detector if there is no IN-detector (i.e. if the approach is a Compact MOVA approach).

![Figure 4: Standard MOVA approach with independent IN-sink that requires careful configuration for operation with Compact MOVA](image)
2.6 Fault tolerance

Compact MOVA approaches are less tolerant of detector failure, since there is no alternative upstream (IN) detector. If X-detectors fail, green times will be based on maximum minimum greens specified in the MOVA dataset plus green extensions calculated using historical flow rates. In some cases, an alternative downstream detector such as an out or stop line demand detector may be used when the X-detector goes faulty; stop line detectors are often placed on approaches that do not have green in a reversionary stage so that demands can be registered by vehicles that have not crossed the X-detector. A stop line detector used as an alternative downstream detector should allow MOVA to detect the end of saturated flow when the X-detector is faulty. However, stop line detectors are usually set to high-sensitivity and are therefore likely to chatter, so the historical flows collected by MOVA using this detector may be inaccurate: high-sensitivity stop line demand detectors are unsuitable for counting vehicles. The resolution of detector faults will therefore tend to be a higher priority for Compact MOVA approaches.

Figure 5: Standard MOVA approach with X-detector as IN-sink that requires careful configuration for operation with Compact MOVA
3 Guidance for stand-alone pedestrian crossings

There is a potential issue with Compact MOVA in the way it behaves at mid-block crossings when a pedestrian demand is made well after the previous running of the pedestrian stage. At the point of making the demand, it is quite unlikely that any vehicle will be at a point on the Compact MOVA approach such that MOVA will optimise the green (i.e. hold the green). Optimisation will occur only if the vehicle is between the X detector and the time ‘GAMBER’ from the stop line. GAMBER is normally 1.5 or 2.0 seconds. Hence the optimisation distance will be just the 15 metres or so downstream of the X detector. The vehicle stage is, thus, likely to terminate immediately when a late pedestrian demand occurs. This characteristic would not be expected to cause any safety problems on the low speed approaches that Compact MOVA can be used at (after all many local authorities are happy to use pre-timed maximum control which completely ignores approaching traffic in similar circumstances). However, it may be a more comfortable proposition if the optimisation distance is increased as described in section 2.3. The longer optimisation distance is achieved by placing the X-detectors a little further upstream than normal (using the distances in Table 1) and reducing GAMBER to 1 second. The optimisation distance would be increased to around 30 metres if this was done.
4 Expected Compact MOVA behaviour and performance

In practice, full Compact MOVA (without IN-detectors on any approach) is likely to appear different in operation to both Standard MOVA and to VA. Most of the testing of Compact MOVA was carried out using a well-validated microscopic simulation package, HUTSIM. The results generally showed that full Compact MOVA improved upon D-system VA (standard vehicle actuation), but did not quite reach the performance of Standard MOVA. More recent testing at real sites has given TRL some valuable experience in setting up Compact MOVA approaches, and the results broadly agree with the simulation runs. At a MOVA site at Fair Oak in Hampshire, Standard MOVA reduced vehicle delay by 13.5% during the trial period compared to VA, with Compact MOVA at 7.2%. At a Puffin crossing in Bracknell, Compact MOVA produced large reductions in delay for pedestrians of between 6.4 and 7.1 seconds, at a small cost to vehicles of 1.75 seconds.

4.1 Peak periods

Compact MOVA approaches behave similarly to approaches with IN-detectors during periods of heavier flow. The new method of detecting oversaturation has been tried and tested successfully, and bonus calculations have been enabled, allowing MOVA to identify oversaturation and perform short-cycling to maximise capacity in flared situations at junctions with Compact MOVA approaches. Oversaturation is identified at levels close to those for Standard MOVA approaches, and bonus values for flares are also comparable.

Figure 6 and Figure 7, below, show the effect of these oversaturation and bonus changes at a highly flared crossroads with no IN-detectors (i.e. all approaches were ‘Compact’).

![Figure 6: Cycle time variation at a highly flared cross-roads for MOVA with all Compact approaches, without detection of oversaturation and calculation of ‘bonus’ capacity for flares (‘CMOVA’), compared to MOVA with all Standard approaches (‘SMOVA’)](image)

Before the changes were implemented, Compact MOVA ran high cycle times because it was unable to detect oversaturation, and did not generate the bonus capacity data necessary for short-cycling.
Cycle-times are approximately 20 seconds higher for Compact MOVA when compared with Standard MOVA in Figure 6.

Figure 7: Cycle time variation at a highly flared cross-roads for MOVA with all Compact approaches, with detection of oversaturation and calculation of ‘bonus’ capacity for flares (‘CMOVA RERUN’), compared to MOVA with all Standard approaches (‘SMOVA’)

After the changes, MOVA with Compact approaches behaved similarly to MOVA with Standard approaches: it detected when the junction was oversaturated and measured flare bonuses to determine when capacity can be increased by short-cycling. Short-cycling reduces cycle times to allow the flares to fill-up and discharge more often.

4.2 Off-peak periods

Cycle times are likely to be significantly shorter when a junction with all Compact MOVA approaches is not overloaded. This is mainly because the green time will not be extended so often by the delay optimisation process; in the majority of cases, MOVA will end green shortly after queues have discharged for stages running all Compact approaches. The reduction in the amount of delay optimisation is due to the absence of the IN detectors, and gives Standard MOVA a small but noticeable advantage. MOVA can still optimise delay for Compact approaches, however, and has been seen to do so effectively when X-detectors are placed a little further upstream than normal.

Pedestrians appear to be well served at urban junctions with Compact MOVA approaches because of the lower cycle-times in off-peak periods. In simulation, pedestrian delay for Compact MOVA compared favourably with both VA and Standard MOVA, as a Puffin site trial carried out by TRL in Bracknell confirmed.
5 Configuring a Compact MOVA approach with MOVA Setup

The tables below summarise the differences in configuration between Compact MOVA and Standard MOVA approaches. This list can be used as a reference when configuring a MOVA dataset with MOVA Setup. Please refer to AG 45 for full details of the MOVA dataset creation process; this and the latest version of MOVA Setup can be downloaded from the TRL software website, http://www.trlsoftware.co.uk.

Warning
Please remember that Compact MOVA approaches must carry low-speed traffic where the 85th percentile speed is 35 mph or less.

5.1 Data that the user must enter differently

Table 2 lists the data that the user needs to set differently during the MOVA Setup dataset creation process. This table should act as checklist for the user when configuring a MOVA dataset with Compact MOVA approaches.

Table 2: MOVA Setup data that needs to be set differently for Compact MOVA approaches during the dataset creation process

<table>
<thead>
<tr>
<th>MOVA Setup data</th>
<th>Description</th>
<th>Value to set to</th>
</tr>
</thead>
<tbody>
<tr>
<td>LLANES</td>
<td>The link-lane structure. This is used to specify how lanes are grouped together into links.</td>
<td>On a Compact MOVA approach, lanes should only be placed together on the same link if they have identical turning movements, as well as obeying the other restrictions discussed in AG 44 (i.e. that traffic forms similar length queues and discharges simultaneously at a similar rate). Note also that long lanes with and without IN-detectors should not be placed together on the same link.</td>
</tr>
<tr>
<td>DX (m)</td>
<td>Distance of X-detector from stop line</td>
<td>For long lanes without IN-detectors, set to:</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cruise Speed (m/s)</th>
<th>Saturation Flow (v/h)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;= 1400</td>
<td>39.5 45.0 50.0 50.0</td>
</tr>
<tr>
<td>1500</td>
<td>39.0 44.5 50.0 50.0</td>
</tr>
<tr>
<td>1600</td>
<td>38.5 44.0 49.5 50.0</td>
</tr>
<tr>
<td>1700</td>
<td>38.5 44.0 49.5 50.0</td>
</tr>
<tr>
<td>1800</td>
<td>38.0 43.5 49.0 50.0</td>
</tr>
<tr>
<td>1900</td>
<td>38.0 43.0 48.5 50.0</td>
</tr>
<tr>
<td>&gt;= 2000</td>
<td>37.5 43.0 48.5 50.0</td>
</tr>
</tbody>
</table>

DX does not need to be exact: +/- 2m is easily tolerated, provided the DX specified in the dataset accurately reflects the actual distance from stop line to X-detector on-site. DX should be in the range 35m <= DX <= 50m.

In general, X-detectors on adjacent lanes on an approach should be installed side-by-side as described in the MOVA AGs.

| IN     | The IN-detector channel number | Set to 0 for long lanes without IN-detectors |
**DSHORT (m)**  The length of a flare  Set to 999 for long lanes without IN-detectors

**IN-sink detectors**  Significant sinks of traffic between IN and X-detectors  IN-sinks include side roads or free-left-turns where vehicles leave an approach before reaching the junction, and flares for right-turners that discharge opposed or in a different stage to neighbouring straight-ahead traffic.

*N.B. Compact MOVA must not be used on approaches where significant IN-sinks exist without consulting TRL first.*

(In some cases, combination X-detectors may be more appropriate than IN-sinks for flares that discharge at different times.)

**COMTIM (s)**  Time from start of green when combination X-detectors are used instead of individual X-detectors  Set to 0 for long lanes with combination X-detectors, but without IN-detectors.

*N.B. Long lanes without IN-detectors can have combination X-detectors.*

**GAMBER (s)**  Amount of leaving amber used as green  Set to 1 second for long lanes without IN-detectors and associated short lanes.

*N.B. This will need to be changed from the automatically calculated default after dataset creation.*

### 5.2 Data that is set differently by default

Table 3 lists data that needs to be set differently for Compact MOVA approaches, but is automatically set to appropriate defaults by MOVA Setup. This table is provided for information purposes.

**Table 3: MOVA Setup data that is given appropriate defaults during the dataset creation process**

<table>
<thead>
<tr>
<th>MOVA Setup data</th>
<th>Description</th>
<th>Value to set to</th>
</tr>
</thead>
<tbody>
<tr>
<td>XOSAT</td>
<td>The detector used for identifying oversaturation in a lane</td>
<td>Default automatically calculated and updated by the MOVA Setup program. For long lanes without IN-detectors, this is set to 1 (‘use X-detector’) unless a combination X-detector exists in the long lane, in which case it will be set to 2 (‘use combination X-detector’). Should not be changed without consulting TRL.</td>
</tr>
<tr>
<td>OSATCC (veh)</td>
<td>The number of vehicles arriving after the start of leaving amber in a lane considered to indicate oversaturation</td>
<td>Default automatically calculated and updated by MOVA Setup program. Can be changed from the default as described in section 2.2 if oversaturation is being detected too often or not often enough.</td>
</tr>
<tr>
<td>OSATTM (s)</td>
<td>The time taken for OSATCC vehicles to arrive after the start of leaving amber in a lane if oversaturation exists</td>
<td>Default automatically calculated and updated by MOVA Setup program. Can be changed from the default as described in section 2.2 if oversaturation is being detected too often or not often enough.</td>
</tr>
</tbody>
</table>
5.3 Data that should be set as for Standard MOVA approaches

All other MOVA Setup data for Compact MOVA approaches should be set as for Standard MOVA approaches. This includes the data listed in Table 4, which is discussed elsewhere in this document in connection with Compact MOVA.

Table 4: Some MOVA Setup data that should be set as for Standard MOVA approaches

<table>
<thead>
<tr>
<th>MOVA Setup data</th>
<th>Description</th>
<th>Value to set to</th>
</tr>
</thead>
<tbody>
<tr>
<td>BONTIM (s), BONBC (veh) and BONCUT</td>
<td>Bonus capacity recalculation time, base count and priority</td>
<td>BONTIM and BONBC defaults automatically calculated by MOVA Setup. Set these, and BONCUT, as for Standard MOVA approaches. See AG 45 section 3.11 for more information on bonus data.</td>
</tr>
<tr>
<td>ESLMAX (s)</td>
<td>A fixed time from the start of green that can be used to force MOVA to end its detection of saturation flow on a link</td>
<td>For long links without IN-detectors, this time should not be decreased from the defaults calculated by MOVA Setup. (The defaults are equal to the stage maximums, possibly combined if the link runs in successive stages.)</td>
</tr>
</tbody>
</table>
Acknowledgements

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Jonathan Mundy, Adrian Grey, Simon Brownlie; Hampshire County Council
Siemens Traffic Controls Limited.

References


The latest MOVA Application Guides AG 44 and AG 45 are available from the TRL software website, http://www.trlsoftware.co.uk. Printed copies are available from the TRL Software Bureau for a fee of £25. Contact details can be found below.
Contacts for further MOVA advice and information
TRL Software Bureau

Address:
TRL Limited
Crowthorne House
Nine Mile Ride
Wokingham
Berkshire
RG40 3GA

Telephone:
+44 (0)1344 770758
+44 (0)1344 770176
+44 (0)1344 770018

Fax: +44 (0)1344 770864
Email: softwarebureau@trl.co.uk
Web: www.trlsoftware.co.uk

For information on specific manufacturer implementations of MOVA and equipment maintenance enquiries, please contact the manufacturers directly:

Microsense: www.microsense.co.uk
Peek: www.peek-traffic.co.uk
Siemens PLC: www.siemenstraffic.com