Right Of Weight

HGV Priority at traffic signal junctions under MOVA Control

Objective

This paper briefly sets out a simple idea using new technology to overcome an issue at a particular site; further to this it opens up thoughts for further use and explores the potential for the reduction of local pollution.

The Junction

Hanchurch Crossroads, Staffordshire. Please see the indicative drawing in the appendix.

The junction is a busy crossroads near to the motorway network in Staffordshire.
The junction has an approach with an uphill gradient and a high percentage of HGV's, mainly due to a Stobart depot next to the junction. The Stobart depot itself is signalled as part of the junction.

As part of a refurbishment and upgrade programme by Staffordshire County Council and Imtech the junction was to be put on MOVA control. Controller was to be an Imtech PTC-1 and the MOVA unit is an Imtech Chameleon.

The Problem

Larger gaps created by HGV's on the uphill approach whilst retaining MOVA's efficiency with normal traffic. This is something that I have noticed often. Particularly on motorway off slips, where sometimes there is a balance to be made between maintaining tight closure of green and holding for slower vehicles. Motorway off slips can often have a gradient. It is of course easy to set MOVA up for slower vehicles but then you lose some efficiency when the HGV is not in the flow with poor closures.

Solution.

RTEM SP4-C, please see the datasheet in the appendix. This card, amongst other things, can classify vehicles and generate an output based on the class detected. I became aware of this card through doing some work with Martin Wylie in East Sussex. I had the idea for extra extensions for HGV's a few years ago but never had the technology to implement it in an easy and cost effective way. The RTEM SP4-C interfaces very easily with all controllers without the need for extra infrastructure or detection due to being able to classify from a single loop whilst still providing normal detection outputs. This is a great solution as you don't need any extra loops and there are no extra maintenance costs. On this scheme I nominated the IN loop X loop and Stopline Loop to give an SVD (specialist Vehicle Detection) output. This was purely so I could test different configurations on site. Other schemes following on from this only use the IN loop for the SVD functionality.

Using MOVA control for the junction made setting up the extra extension easy. I used the priority model within MOVA. MOVA priority is very flexible and simple to setup, I have a great deal of experience using it for Bus priority and also for linking of Roundabouts and closely associated junctions. I set it up to give a guaranteed extension time from the IN loop position of 12 seconds when the approach is green on receipt of the input. If the approach is red when the input is received there is an extension of 11 seconds to the minimum. These values were validated on site. The extensions will also extend past Max time up to 12 seconds so if the approach was about to max out the HGV would still get through. One further point to note is that the HGV priority is non destructive, ie it will not truncate another approach and will extend only, this is achievable in the MOVA priority model without effecting other priority such as local linking or Bus

62 Fruitlands, Malvern, Worc's, WR14 4XA. Registration – 04541812, VAT - 800 2049 90
Telephone – 07966 663505 E-Mail – dan.preece@integratedtrafficservices.com

Conclusion / further work

I have started using this card to provide vehicle based extensions for HGV / Buses on a few sites with more sites planned and in design phase. So far results have been positive, certainly in terms of preventing premature gapping out on approaches with uphill gradients it must be considered a success.
Whilst observing site operation it occurred to me that there could be a case for reducing local pollution using this technique as it would prevent the instance of heavy vehicles stopping and idling near to the junction, then needing to start off again. I have no data to support this but would welcome feedback from anyone that may have some insight or ideas, particularly if anyone knows of a study that has been done.

The SP4-C card also monitors and logs TMA data by default. I am looking into the possibility of turning the HGV priority on/off based on other site criteria such as occupancy headway etc. On the pollution side of things I am sure without too much imagination it would be possible to connect air quality sensors to the controller which would enable/disable the function dependant on the level of local pollution, this is something I am very keen to investigate.

Thanks

I would like to take this opportunity to thank the following the following people that have worked on and given assistance to this project.

Staffordshire County Council
Darren Sleight
John Railton
Martin Fenlon

Imtech
Rick Daniels
Paul Anderson
Pete Elwell

RTEM Ltd
Anup Lekshmanan
Derek O'Garr

JSTSM Ltd
John Spence
Derrick Witts

Dan Preece

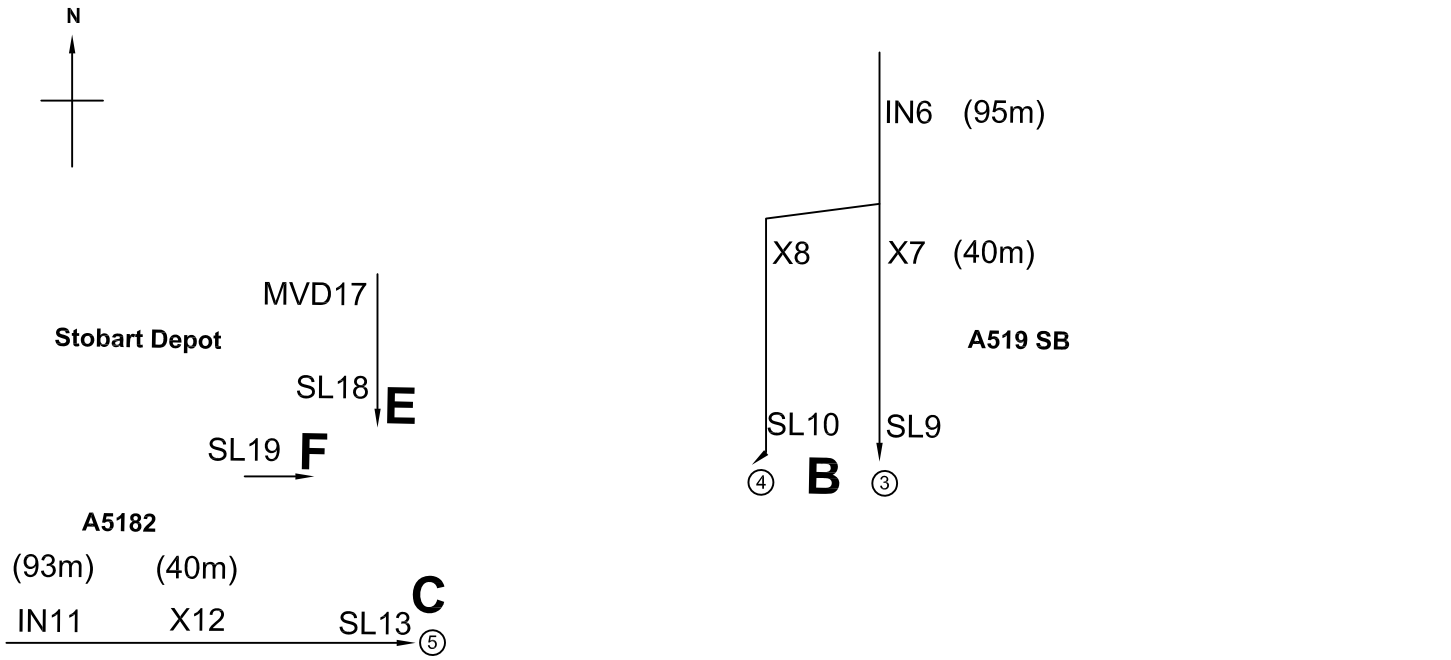
Integrated Traffic Services Ltd
62 Fruitlands, Malvern, Worc's, WR14 4XA. Registration – 04541812, VAT - 800 2049 90
Telephone – 07966 663505 E-Mail – dan.preece@integratedtrafficservices.com

A519 Hanchurch Crossroads, Staffordshire

Method of Control, Detector Location, and Mova Lane / Link configuration

① = Indicates link / lane number

LK1 = Indicates link / lane number



MVD17
LK7 - Det.17

SL18
LK8 - Det.18

SL19
LK9 - Det.19

Call all red
LK10 - Det.20

Hold C
LK11 - Det.21

Hold D
LK12 - Det.22

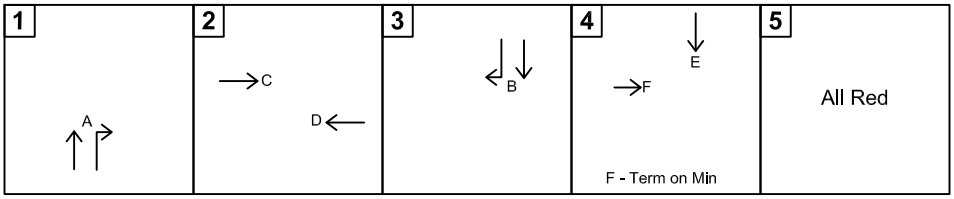
BIN6 Q
LK13 - Det.23

HGV - IN6
LK14- Det 24

HGV - X8
LK15- Det 25

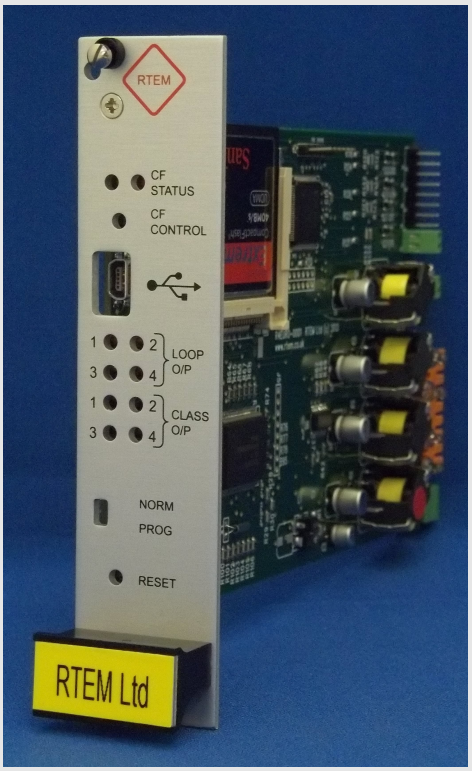
HGV - SL10
LK16- Det 26

Method of Control



Road Traffic Equipment Manufacturers
Home of 'Single loop Classifier' & Axle detection using loops

SP4-C combined SCOOT & Bus Detector Card



The **SP4-C** is a 3U mounted detector card suitable for installation in standard 19" rack systems. A direct development of the proven SP4 platform, the **SP4-C** provides all the functionality of the SP4-II signature-profiling standalone classifier in a more standard format for use in signal controller cabinets. In addition to the standard SP4 the SP4C card provides 8 outputs, Four of the outputs provide SCOOT loop output as direct replacement of existing card. The other 4 outputs are SVDS outputs that can be configured to trigger on any vehicle type.

SCOOT Outputs

The 4 SCOOT output doesn't require any setup. It is set to go on powerup. The SCOOT output operation from re-tuning time to sensitivity can be adjusted using the MicroDial front-end program or using Engineers terminal if required.

SVDS Outputs (Selective Vehicle Detection)

The 4 SVDS output can be programmed to trigger on detecting a specific vehicles, such as BUS, HGV, Motorbike. This output is most commonly used for bus detection.
The increased number of outputs designed into the **SP4-C** allows for *both* SCOOT *and* SVDS outputs to be produced for up to 4 channels from a single card.

Ease of use

Without any configuration, the **SP4-C** will provide 4 SCOOT outputs, making it an easy choice for replacement of existing detector cards and minimising time spent at the roadside. SVDS operation (such as bus detection can then be configured if/when it is required).
These factory default settings also mean that in the event of a reset – either by an engineer or as a result of power failure – SCOOT outputs will resume automatically.

Bus Priority

The ability to detect buses in mixed traffic lanes allows bus priority to be implemented at junctions where dedicated bus lanes are not practicable. Installing **SP4-C**s can help meet targets on improving bus journey reliability with minimal expenditure.
Where some junctions already have bus priority measures, the **SP4-C** can be used to fill-in gaps, or easily expand the area covered.

Multi-functional – getting the most from infrastructure

The SP4-C can be used for other SVDS applications – wherever an external device needs to be activated by a particular type of vehicle, vehicle speed, lane or combination thereof.
Whether being used for SCOOT, SVDS or both, the SP4-C continually records and stores data on all passing vehicles. This information can be used by local authority Transport Monitoring / Traffic Data teams for historical analysis, reducing the number of separate traffic count sites which need to be maintained. The SP4-C can store up to 50 million vehicle records. Data can be collected manually by removing and replacing the on-board CF memory card, via GSM/GPRS telemetry or Ethernet IP. Data is compatible with all standard analysis packages.
The GPRS/GSM modem or the Ethernet interface is low cost optional addition.

Vehicle Classification

The SP4C operation is same as the SP4-II,see manual. Two different firmware are supported, both support EURO-6 Classification.

Dual loop

With 2-loop arrays, the SP4-C benefits from the same fail-safe system as other SP4 models: if one loop is damaged, the SP4-C automatically defaults to single-loop classification in that lane, to maintain uninterrupted operation.

Single loop

The SP4-C will work with existing SCOOT loops, allowing up to 4 loops to monitored over 4 lanes. Where long loop feeders have to be avoided increase accuracy,

EURO-6 Classification

CLASS ID	DESCRIPTION
1	Motorbike
2	Car – minivan
3	Car – trailer
4	Rigid- Lorries and Minibuses
5	HGV
6	BUS

PC -FRONT-END SOFTWARE

RTEM's ***MicroDial*** engineer's terminal software is easy to use and is supplied *free of charge*. Practical training for engineers is available.

Training & Support

RTEM provide commissioning, maintenance and technical support packages tailored to the customer's requirements.

The **SP4-C** is covered by a 2-year warranty, extendable up to 10 years on request.

Technical Overview:

Inputs

* Power – in the range 5v to 24v DC.
* 4 inductive loop inputs.

Power consumption

Typically 11mA (can be powered by solar/wind where mains power not available). When the LED's are active the power consumption is increased to 0.5mA per LED. The LED's automatically power down when user inactivity is detected.

Loop Scanning Frequency

Default 1 millisecond.

Outputs

The **SP4-C** provides 8 open collector outputs rated 40v. These are passive outputs, effectively pulling to ground when active.
The state of ouput whether active high or low can be programmed, allowing for traffic controller differences.

* Outputs 1-4 are allocated to lanes 1 to 4 for SVDS switching (inc bus detection output). These outputs require configuration using ***MicroDial***.

* Outputs 5-8 are assigned to loops 1 to 4 as SCOOT outputs. These are active irrespective of the unit configuration.

A 10 way connector at the rear of the board provides access to the outputs.

PIN	Description
1	Lane 2 SVDS
2	Lane 1 SVDS
3	Lane 4 SVDS
4	Lane 3 SVDS
5	Loop 2 SCOOT
6	Loop 1 SCOOT
7	Loop 4 SCOOT
8	Loop 3 SCOOT
9	Common Ground
10	Not Used

Memory

Configuration settings and traffic data are stored on a removable non-volatile 4GB Compact Flash (CF) memory card.

Interfaces

The **SP4-C** has 3 interfaces: a USB interface accessible from the front panel, a network interface accessible from the rear and a serial interface accessible from the middle.

* USB – link to engineer's terminal PC for configuration, monitoring, data retrieval.

* Serial RS232 – link to optional peripheral (GPRS/GSM modem, Ethernet interface).

*RS485 - network interface will allow multiple cards, other SP4 or GP8 units or 3rd party equipment to be connected.

Please contact us for more information or to request a demonstration or trial.
Tel: **01296 770765** Email: sales@rtem.co.uk