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Variable Message Signs

GENERAL

The Road Traffic Regulation Act 1984¹ (RTRA) defines a traffic sign as: “any object or device (whether fixed or portable) for conveying to traffic on roads or any specified class of traffic, warnings, information, requirements, restrictions or prohibitions of any description...”. Lawful traffic signs must either be prescribed by regulations or authorised by the Secretary of State.

The Traffic Signs Regulations and General Directions 2002² (TSRGD) define a variable message sign as: “a device capable of displaying, at different times, two or more aspects...”. These aspects may take the form of a sign prescribed by TSRGD, a legend in accordance with Schedule 15 to TSRGD, a non-prescribed temporary sign or a blank grey or blank black face. Thus, the expression “variable message sign” (VMS) encompasses all types of variable sign from simple flap-type fixed signs to complex light-emitting panels.

This leaflet provides guidance to inform the use of light-emitting VMS capable of displaying text and/or pictograms. It does not apply to matrix signs as prescribed by regulation 46 of TSRGD and contained in Part I of Schedule 11 to the Regulations.

On all-purpose roads, VMS will generally be located in the nearside verge. On motorways and wide all-purpose roads (especially those with a hard shoulder) mounting on gantries may be necessary to prevent obscuration by large vehicles in the nearside lane(s).

The requirements in respect of siting, lateral clearance, etc are the same as those set out in Chapter 1 of the Traffic Signs Manual³ for fixed signs.

On roads where the 85th percentile approach speed of private cars, as determined in accordance with TA 22/81⁴, is greater than 40 mph, it is recommended that two VMS displaying the same legend are provided where possible. This is especially important if the information to be displayed is likely to conflict with that on fixed directional signs, for example a VMS message indicating a mandatory or advised diversion.

SIGN HOUSING ETC

A VMS may only be placed on or near a road if it is of a type approved by the Secretary of State. This type approval applies to the equipment in its entirety, including the content of all instructions stored in or executable by it, and any equipment used in connection with the sign. The requirements and approval process are set out in Highways Agency document TR 2516B⁵, “Performance Specification for Discontinuous Variable Message Signs”.

All parts of the sign other than those facing traffic should be coloured grey or black or be in a non-reflective metallic finish. Any lettering required for identification purposes should be no more than 25mm high on the sign housing or, if applied by means of a label, should be printed on a label that is either transparent or the same colour as the sign housing. On no account should any label or any part of the sign housing comprise retroreflective material.

VMS must conform to the requirements of BS EN 12966-1:2005+A1:2009⁶.

Any part of the sign surrounding the rectangular area used to display a message should be coloured grey or black. There must be no text or symbols on the surround as this would render the sign unlawful.



Figure 1 VMS displaying a tactical traffic legend

FORM OF DISPLAY

Regulation 58 of TSRGD permits a VMS to display most of the fixed signs prescribed in TSRGD as well as legends prescribed in Schedule 15. Special provisions apply to vehicle activated VMS and these are explained in detail in Traffic Advisory Leaflet 1/03, "Vehicle Activated Signs".

Text on a light-emitting VMS must be displayed in white, off-white or yellow. A prescribed sign incorporating a black legend or symbol on a white or yellow background may be displayed with the colours reversed, i.e. as a white, off-white or yellow symbol on a black background. Any red triangle or circle forming part of the sign must be retained.

A VMS should exhibit a black or grey rectangular area to approaching traffic when no message is being displayed.

Where the construction of the VMS permits, the text should be displayed in the form of the Transport Medium Alphabet prescribed in Part I of Schedule 13 to TSRGD. Otherwise, the alphabet prescribed in Part V of that schedule must be used. The size of characters in the transport alphabet is expressed in terms of x-height, which is the height of a lower-case letter "x". Upper-case displays are defined by the height of the characters. The height of upper-case letters is 1.4 times the height of the lower-case "x" for fixed signs and 1.2 times for VMS. The values in Table 2 and 3 have been determined using this method and thereafter adjusted to match technology.

Regulation 58 of TSRGD requires that a VMS "shall be of a size appropriate to display the messages ... having regard to the normal speed of traffic on the road on or near which the sign is situated."

Tables 2 and 3 set out the minimum sizes of characters recommended for use on text-only and mixed text/pictogram VMS. They do not apply to regulation 58(7) which requires the use of special character sizes for VMS displaying "SLOW DOWN". Note that these character sizes are different from those that appear in the performance specification, TR 2516B⁵ which should only be used for selecting the appropriate optical performance class.

A VMS that displays a sign shown in one of the Schedules to TSRGD must do so at the prescribed size appropriate to the traffic approach speed unless special authorisation has been obtained. In practice, the more complex pictograms contained within many warning signs lose resolution at smaller sizes and so the largest size (generally 1500 mm) should be used wherever possible to ensure adequate clarity.



Figure 2 Travel time VMS legend

MESSAGES

VMS may only be used to display traffic signs, as defined in the Road Traffic Regulation Act. Their use to display any other message renders the installation unlawful.

Messages should be as short as possible while being fully comprehensible to drivers. They should not normally consist of more than eight words or six units of information. All messages must be displayed on a single sign aspect. **It is unlawful to display messages that require the use of multiple displays ("paging") or scrolling text.**

For the purposes of message construction and the use of Tables 2 and 3, the principles in Table 1 apply:

Table 1 - Number of Words comprising Units of Information	Units of information	Number of words
Place name or other destination, even if it consists of more than one word, eg STOKE-ON-TRENT or FORTH ROAD BRIDGE	1	1, 2 or 3
Place name with associated compass point, eg READING (E) or SLOUGH (WEST)	1	1
Place name with associated route number, eg DORKING A24 or LAMPTON (M11)	1	2
Location comprising route number, junction number or numbers and compass point, eg M6 J20-21 NORTH	2	3
Distance, eg 600 YDS or 3 MILES	1	1
All other words, with the exception of prepositions, regardless of length, eg FOG or WORKFORCE	1	1
Driver information consisting of up to three words (as defined above), eg ACCIDENT, LONG DELAYS or REJOIN MAIN CARRIAGEWAY	1	1, 2 or 3
Prescribed sign, eg warning triangle, speed limit roundel or wicket (lane closure) pictogram	1	1
Supplementary information associated with warning signs, eg 3 MILES or ICE	1	1
Arrow or emergency diversion route symbol	1	0
Punctuation marks, dashes, etc	0	0

Wherever possible, the prescribed messages in Schedule 15 to TSRGD should be used. See Annex A.

A temporary VMS may be used to display messages for the same purposes as a temporary fixed sign. Regulation 53 of TSRGD permits the placing of temporary signs to convey to traffic:

- information about convenient routes to be followed when large volumes of traffic are likely to be attracted to: a sporting event; an exhibition; or any other public gathering
- information about diversions or alternative routes
- information about the availability of new routes or destinations
- information about changes in route numbers
- warnings about, or information on how to avoid, any temporary hazards caused by –
 - a) works being executed on or near a road

- b) adverse weather conditions or other natural causes
- c) the failure of street lighting or malfunction of any other equipment etc used in connection with the road or situated on or near it
- d) damage to the road itself.

- requests by the police for information in connection with road traffic accidents
- warnings or information about a civil emergency or the prospect of a civil emergency.

All other messages, whether displayed on permanent or temporary VMS, require authorisation by the Secretary of State. This is also the case where Schedule 15 of TSRGD messages are to be displayed in mixed (sentence) case text or where pictograms to be incorporated into messages are either not prescribed in TSRGD or are prescribed for a different purpose. An example of the last is the sign to TSRGD diagram 584 which, when used as

a fixed sign with a supplementary plate, means that queuing traffic might be encountered, whereas it is used on VMS to indicate the actual presence of a queue ahead.

To assist driver assimilation of VMS, non-prescribed legends should broadly follow the same principles as the prescribed legends in Schedule 15. Strategic traffic and diversion legends should be constructed such that the information appears in the following order:

- a) Location eg M1 J3-4 NORTH
- b) Problem eg ACCIDENT
- c) Effect eg LONG DELAYS
- d) Guidance eg USE M40

Depending on the capability of the VMS, some information might have to be omitted. In general, the effect is more important than the problem. Guidance should only be given when it will be supported by other signing in the area.

VMS can also usefully be deployed to forewarn drivers of events that might affect future journeys. These could include road works or major events. Advance or remote notice of road works should follow the order and style of the information on signs to diagrams 7002A to 7003.1 in TSRGD. Advance notice of major events should follow the same broad principles. Dates and times must be expressed in the formats prescribed in TSRGD, as explained in Chapter 7 of the Traffic Signs Manual⁸. An indication of the year is seldom required on VMS; months must be expressed in words, abbreviated if necessary, and not as numbers; times must be shown as “am” and “pm”. The 24 hour clock must not be used under any circumstances.



Figure 3 Vehicle activated VMS with flashing amber lamps

FLASHING LAMPS

Regulation 58 of TSRGD permits the display of flashing amber lamps (see figure as specified in regulation 46(7) of TSRGD) with certain types of display:

- (a) the speed limit roundel to TSRGD diagram 670;
- (b) certain of the matrix signs shown in Part I of Schedule 11; or
- (c) a legend of the type shown in Schedule 15.

This means that they may only be displayed with immediate safety-related and tactical diversion messages and certain vehicle activated signs. They may not be displayed with other types of message such as advance notice of special events or strategic diversion messages. When a non-prescribed legend is specially authorised, flashing amber lamps may only be used with that message if the authorisation expressly permits it.

REFERENCES

1. The Road Traffic Regulation Act 1984, TSO <http://www.legislation.gov.uk/ukpga/1984/27/contents>
2. Statutory Instrument No.2002/3113, the Traffic Signs Regulations and General Directions 2002 (as amended), TSO <http://www.legislation.gov.uk/uksi/2002/3113/contents/made>
3. The Traffic Signs Manual, Chapter 1, Introduction, TSO <https://www.gov.uk/government/publications/traffic-signs-manual>
4. TA 22/81, Vehicle Speed Measurement on All Purpose Roads, HA <http://www.dft.gov.uk/ha/standards/dmrb/vol5/section1/ta2281.pdf>
5. TR 2516B, Performance Specification for Discontinuous Variable Message Signs, HA <https://tssplansregistry.dft.gov.uk/login.asp>
6. BS EN 12966-1:2005+A1:2009, Road Vertical Signs, Variable Message Signs <http://shop.bsigroup.com/ProductDetail/?pid=000000000030185063>
7. Traffic Advisory Leaflet 1/03, Vehicle Activated Signs, DfT <https://www.gov.uk/government/publications/traffic-advisory-leaflets-1989-to-2009>
8. The Traffic Signs Manual, Chapter 7, The Design of Traffic Signs, TSO <https://www.gov.uk/government/publications/traffic-signs-manual>

		x-height of transport alphabets (millimetres)				Upper case letter height (millimetres)							
		Verge mounted signs				Verge mounted signs							
85th percentile approach speed of private cars mph	Number of words in longest message to be displayed	Motorways and all purpose dual carriageway roads with hard shoulders		All purpose roads without hard shoulders D = dual carriageway roads S = single carriageway roads		Motorways and all purpose dual carriageway roads with hard shoulders		All purpose roads without hard shoulders D = dual carriageway roads S = single carriageway roads					
		2 lane	3 lane	4 lane	1 lane D 2 lane S	2 lane D 4 lane S	3 lane	4 lane	1 lane D 2 lane S	2 lane D 4 lane S			
Column 1	Column 2	Column 3	Column 4	Column 5	Column 6	Column 7	Column 8	Column 9	Column 10	Column 11	Column 12	Column 13	Column 14
Up to and including 30	2 4 6 8				75 100 100 150	100 150 150 150	150 150 200 200				100 100 100 200	100 200 200 200	200 200 250 300
Over 30	2 4 6 8	150 200 200 250	200 250 250 250	250 250 300 300	100 150 150 150	150 150 200 200	150 200 200 250	200 250 250 300	250 300 300 300	300	100 200 200 200	200 200 250 250	200 250 250 300
Over 40	2 4 6 8	200 200 250 250	250 250 300 300	300 350	150 150 200 200	150 200 200 250	200 200 250 250	250 250 300 300	300 300 350 350	300	200 200 250 250	200 250 250 300	250 250 300 300
Over 50	2 4 6 8	200 250 250 300	250 300 300 350	300 350	150 200 200 250	200 200 250 250	200 250 300 300	250 300 300 350	300 350 400 400	350	200 250 250 300	250 250 300 300	250 300 300 350
Over 60	2 4 6 8	250 250 300 350	250 300 350 400	300 350 400	150 200 250 250	200 250 250 300	250 250 300 350	300 300 350 400	300 350 400 400	350	200 250 300 300	250 300 300 350	300 300 350 400

Table 2 - Sizes of Characters on Verge Mounted VMS

Note: Where, exceptionally, a VMS is mounted on the central reserve of a motorway or all-purpose dual carriageway, the character height for 2, 3 and 4 lane roads should be as column 6, 7 and 8 or 12, 13 and 14 respectively.

Table 3 - Sizes of Characters on VMS Mounted over the Carriageway

85th percentile approach speeds of private cars mph	Number of words in longest message to be displayed	x-height of transport alphabet (millimetres)		Upper case letter height (millimetres)	
		Signs mounted at approx 6m above road surface*	Signs mounted at approx 7.5m above road surface*	Signs mounted at approx 6m above road surface*	Signs mounted at approx 7.5m above road surface*
Up to and including 30	2	150	200	200	200
	4	200	200	250	250
	6	200	200	250	250
	8	200	200	250	300
Over 30 Up to and including 40	2	200	200	250	250
	4	200	200	250	300
	6	200	250	300	300
	8	250	250	300	350
Over 40 Up to and including 50	2	200	200	250	300
	4	250	250	300	300
	6	250	250	300	350
	8	250	300	350	350
Over 50 Up to and including 60	2	200	250	300	300
	4	250	250	300	350
	6	300	300	350	400
	8	300	300	400	400
Over 60	2	250	250	300	350
	4	250	300	350	350
	6	300	300	400	400
	8	350	350	400	400

* Measured to the lower edge of the sign. Any proposals for other mounting heights should be referred to the appropriate Overseeing Organisation

ANNEX A – Schedule 15 to TSRGD, “LEGENDS FOR USE ON VARIABLE MESSAGE SIGNS”

Care must be taken when interpreting Schedule 15 to ensure that only the permitted combinations of text are used. Certain of the legends specified in PART III may only be used in conjunction with certain other legends (sub-paragraph 2) while others may be used either on their own or in conjunction with those other legends (sub-paragraph 3). Legends specified in PARTS IV and V may not be used on their own.

Examples

Message combining PART III and PART IV: DEBRIS IN ROAD

Message combining PART III and PART V: SKID RISK SLOW DOWN

Message combining PARTS III, IV and V: ROAD CLOSED AT [place name]

FOR [place name] USE [route number]

Note that “AHEAD” (PART V) may only be used after “QUEUE” or “ROAD CLOSED”.

Individual elements of a message will generally be displayed on separate lines, thus:

V	E	H	I	C	L	E		F	I	R	E
	S	L	O	W		D	O	W	N		

Where this is not possible, care should be taken to ensure that the message is still easily understood.

Abbreviations should be avoided wherever possible. Incomplete words are especially difficult to read and assimilate on VMS that display only upper case characters.

Similarly, in advising drivers to reduce speed, the full text, “SLOW DOWN” (PART V, paragraph 2(q)) should normally be used. Only if the VMS cannot accommodate both words, should “SLOW” (PART V, paragraph 2(p)) be used, in which case it should be separated from the rest of the message by a dash, thus:

W	O	R	K	F	O	R	C	E		I	N
R	O	A	D		-		S	L	O	W	

SCHEDULE 15
LEGENDS FOR USE ON VARIABLE MESSAGE
SIGNS
PART I
PRELIMINARY

1.—(1) In a legend prescribed by this Schedule the number of a junction shall be shown in the form of the letter “J” followed by the number of the junction.

(2) Where this Schedule provides for a route number to be displayed on a sign, a compass point (“NORTH”, “SOUTH”, “EAST” or “WEST”) or an abbreviated compass point (“N”, “S”, “E”, “W”, “NW”, “NE”, “SW” or “SE”) may be added to the route number.

(3) Where any part of a legend prescribed by this Schedule is shown in square brackets, the brackets shall not be displayed on a sign.

(4) Different legends or different parts of the same legend displayed on a sign in accordance with this Schedule may be separated by a dash.

PART II
SIGNS AUTOMATICALLY ACTIVATED BY
VEHICULAR TRAFFIC

2. One of the following legends may be displayed on a sign which is activated by a particular type of vehicle approaching the equipment which controls the sign—

- (a) “OVERHEIGHT VEHICLE DIVERT” with—
 - (i) an arrow;
 - (ii) “USE” and a route number; or
 - (iii) “FOLLOW” and a symbol shown in Part VII of Schedule 13;
- (b) “OVERHEIGHT VEHICLE TURN BACK”;
- (c) “HIGH VEHICLE USE MIDDLE OF ROAD”;
- or
- (d) “ONCOMING VEHICLE IN MIDDLE OF ROAD”.

PART III
LEGENDS GIVING WARNINGS OF ADVERSE
WEATHER OR OTHER TEMPORARY HAZARDS
OR INCIDENTS

3.—(1) A legend specified in sub-paragraph (2) may only be used in conjunction with—

- (a) a legend specified in Part IV;
- (b) a legend specified in Part V; or
- (c) a combination of a legend specified in Part IV and a legend specified in Part V.

(2) The legends specified in this sub-paragraph are—

- (a) “ACCIDENT”;
- (b) “ANIMALS”;
- (c) a route number, a junction number or “EXIT” and “CLOSED”;
- (d) “CONGESTION”;
- (e) “DEBRIS”;
- (f) “DELAYS”;
- (g) “DIVERSION”;
- (h) “EXIT CLOSED”;
- (i) “FLOODS”;
- (j) “FOG”;
- (k) “FOG PATCHES”;
- (l) “INCIDENT”;
- (m) “LANE CLOSURE”;
- (n) “LANE[S]” followed by a number or numbers and “CLOSED”;
- (o) “LARGE LOAD”;
- (p) “LONG DELAYS”;
- (q) “MOBILE WORKS”;
- (r) “MOTORWAY CLOSED”;
- (s) “NO PHONES”;
- (t) “OBSTRUCTION”;
- (u) “PEDESTRIANS”;
- (v) “QUEUE”;
- (w) “ROAD CLOSED”;
- (x) “ROAD WORKS”;
- (y) “SKID RISK”;
- (z) “SLIP ROAD CLOSED”;
- (aa) “SMOKE”;
- (bb) “SNOW”;
- (cc) “SNOW PLOUGH”;
- (dd) “SPRAY”;

- (ee) "STRANDED VEHICLE";
- (ff) "[STRONG] WINDS";
- (gg) "[The name of a tunnel] TUNNEL CLOSED";
- (hh) "WEIGHT CHECK";
- (ii) "WORKFORCE".

(3) The following legends may be displayed on their own or in conjunction with another legend as mentioned in sub-paragraph (1)—

- (a) "[The name of a bridge] BRIDGE CLOSED";
- (b) "BUS LANE CLOSED";
- (c) "GRITTING IN PROGRESS";
- (d) "NEXT SERVICE AREA CLOSED";
- (e) "ONCOMING VEHICLE";
- (f) "SETTING OUT ROAD WORKS";
- (g) "SLOW MOVING LARGE LOAD".

(4) In sub-paragraphs (2) and (3) square brackets are used to indicate things which may be omitted.

PART IV LEGENDS INDICATING LOCATION OF TEMPORARY HAZARD OR INCIDENT

4. One of the following legends may be used only in conjunction (either on its own or in combination with a legend specified in Part V) with a legend specified in Part III—

- (a) a route number;
- (b) "ON [name of bridge] BRIDGE" or "ON BRIDGE";
- (c) "AT" together with—
 - (i) a place name,
 - (ii) the name of a bridge or tunnel,
 - (iii) a junction name or number or a junction number and "EXIT", or
 - (iv) "NEXT JCT" or "TOLL";
- (d) "AFTER" together with—
 - (i) a place name,
 - (ii) the name of a bridge or tunnel,
 - (iii) "BRIDGE" or "TUNNEL",
 - (iv) a junction name or number, or
 - (v) "NEXT JCT";
- (e) a number and "MILES";
- (f) "AHEAD" preceded by a legend specified in

- paragraph 3(2)(v) or (w) only;
- (g) "FOR" together with a number and "MILES";
- (h) "IN ROAD";
- (i) a junction number;
- (j) a junction number "TO" and another junction number;
- (k) "ON SLIP ROAD";
- (l) "TO" and a route number.

PART V ADDITIONAL INFORMATION

5.—(1) A legend specified in sub-paragraph (2) may be used only in conjunction with a legend specified in Part III or a combination of a legend specified in Part III and a legend specified in Part IV.

(2) The legends referred to in sub-paragraph (1) are—

- (a) a number and "HR DELAYS";
- (b) ["ALL TRAFFIC"] ["CARS"] ["CARAVANS"] ["HGV'S"] ["HIGH SIDED VEHS"] ["AND"] ["M'CYCLES"] "USE" and a route number or "BUS LANE" or "HARD SHOULDER";
- (c) ["ALL TRAFFIC"] ["CARS"] ["CARAVANS"] ["HGV'S"] ["HIGH SIDED VEHS"] ["AND"] ["M'CYCLES"] "FOLLOW" and a symbol shown in Part VII of Schedule 13 or a place name;
- (d) ["ALL TRAFFIC"] ["CARS"] ["CARAVANS"] ["HGV'S"] ["HIGH SIDED VEHS"] ["AND"] ["M'CYCLES"] and "LEAVE AT NEXT JCT", "LEAVE AT" and a junction name or number;
- (e) "[ALTERNATIVE ROUTE] FOLLOW" and a symbol shown in Part VII of Schedule 13 or a place name;
- (f) "[ALTERNATIVE ROUTE] USE" and a route number;
- (g) "AT" and a place name, the name of a bridge or tunnel, "BRIDGE" or "TUNNEL", or a junction name or number, or "NEXT JCT";
- (h) "AVOID LANE CHANGES";
- (i) "DO NOT USE HARD SHOULDER";
- (j) "FOR" and a place name "USE" and a route number;

(k) "FOR" and a place name "FOLLOW" and a symbol shown in Part VII of Schedule 13 or another place name;

(l) "HGV'S LEAVE MOTORWAY";

(m) "LEAVE AT NEXT JCT";

(n) "LEAVE AT" and a junction name or number;

(o) "REJOIN MAIN CARRIAGEWAY";

(p) "SLOW";

(q) "SLOW DOWN".

(3) In the legends specified in paragraphs (b), (c) and (d) of sub-paragraph (2), one or more of the words in square brackets may be included as appropriate.

(4) In the legends specified in paragraphs (e) and (f) of sub-paragraph (2) anything in square brackets may be omitted.

(5) In the legends specified in paragraphs (b) and (i) of sub-paragraph (2) "HARDSHOULDER" may be substituted for "HARD SHOULDER".

PART VI OTHER LEGENDS

6.—(1) The following legends may also be displayed on a variable message sign—

(a) "SIGNAL[S] UNDER TEST";

(b) "SIGNAL TESTS FOR" and a number of "MILES";

(c) "SIGNAL TESTS ON SLIP ROAD";

(d) "SIGN[S] UNDER TEST";

(e) "END OF SIGNAL TESTS";

(f) "END OF SIGN TESTS".

(2) The legends specified in paragraphs (a) to (d) of sub-paragraph (1) may be displayed with a pattern which has no particular meaning but which is designed to test the functioning of the variable message sign on which it is displayed.

(3) In the legends specified in paragraphs (a) and (d) of sub-paragraph (1) the letter shown in square brackets may be omitted.

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