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The Use of Variable Message Signs on All-Purpose and Motorway Trunk Roads

Summary: This Advice Note considers the applications for variable message signs, the criteria for selecting the most suitable type of sign and operating methods.

VOLUME 8	TRAFFIC SIGNS AND LIGHTING
SECTION 2	TRAFFIC SIGNS AND ROAD MARKINGS

TA 60/90

**THE USE OF VARIABLE MESSAGE
SIGNS ON ALL-PURPOSE AND
MOTORWAY TRUNK ROADS**

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1. INTRODUCTION

1.1 There are many different forms of Variable Message Sign (VMS) currently available or being developed. The purpose of this Advice Note is to provide guidance on the application, performance and operating method requirements. These should enable the correct selection of VMS type to be made to meet the performance specification and establish a degree of uniformity and consistency which is presently not available.

1.2 This document should be read in conjunction with the Departmental Standard on the use of variable message signs on all-purpose and motorway trunk roads (TD 33/90) which gives the mandatory requirements for the use of VMSs on trunk roads.

2. SCOPE

2.1 The recommendations contained in this Advice Note cover the selection, siting and operation of Variable Message Signs on All-Purpose and Motorway Trunk Roads. The information may also be applicable for the use of VMSs on other roads.

2.2 This Advice Note is applicable to all types of Variable Message Signs listed in Appendix A with the exception of the following types:-

- a) Lane control light signals (diagrams 5001 to 5004 in Schedule 5 of the Traffic Signs Regulations and General Directions 1981).
- b) Light emitting matrix signals when used in motorway signalling systems (diagrams 6001 to 6032 in Schedule 6 of the Traffic Signs Regulations and General Directions 1981).

3. APPLICATIONS SUITABLE FOR USE OF VARIABLE MESSAGE SIGNS

3.1 Variable Message Signs have been developed to satisfy a desire for greater flexibility in displaying information. The two most common requirements are for the ability to:

- a) display a single legend during limited periods of the day;
- b) select from a 'menu' of messages and thereby alter the sign to cater for varying traffic conditions.

3.2 The classification of the different types of Variable Message Sign is given in Appendix A.

3.3 VMSs may be used as advance direction signs (ADS) to temporarily divert traffic away from areas of congestion caused by road-works, physical barriers, or seasonal weather hazards. They may be constructed as an independent sign which could be trailer mounted or form part of a larger fixed advance direction signs may also be used to direct traffic to destinations of only transitional interest such as exhibitions, organised events etc. or in conjunction with traffic management schemes.

3.4 Traffic Management schemes may involve tidal flow systems, peak hour traffic restrictions and other time dependent restrictions on traffic movement within certain areas, such as residential and pedestrian zones. The regulatory signs used in these schemes generally need to be displayed, masked or altered depending on the time.

3.5 Variable Message Signs providing information or warnings can also be used to divert overheight or overweight vehicles, provide parking advice, inform drivers that they are travelling too fast or too close to the vehicle in front, advise of queuing or congestion ahead, or apologise for delays.

4. SELECTION CRITERIA FOR VARIABLE MESSAGE SIGNS

4.1 A decision to select a VMS should only be made when it can be shown that a normal fixed plate sign would be inadequate.

4.2 In selecting the particular type of VMS to be used consideration should be given to the following factors:

4.2.1 The number of legends or messages required for the particular application.

The Types of Variable Message Sign presently available may be broadly classified into two types:-

(a) Those that may be programmed with an infinitely variable number of messages - (Matrix Display type).

(b) Those that are capable of displaying a limited number of messages - (Rigid plate display, flexible roller blind, fibre optic and Trans-illuminated Display face type).

In every case care should be taken to adopt the shortest practical message.

4.2.2 The type of sign face

A VMS that can display a sign face identical to the normal fixed sign is to be preferred. Therefore whenever possible a VMS comprising a rigid plate display, flexible roller blind or trans-illuminated display face should be used. This is particularly important for signs displaying warning or regulatory messages where the familiarity to drivers of a normal sign face will aid recognition.

4.2.3 The required frequency of alteration of a message

In selecting a VMS it should be ensured that it is capable of meeting any limiting requirements, such as displaying alternate messages in rapid succession e.g. Slow-Queue ahead. The only type of VMS presently capable of effectively providing this facility is the matrix display.

4.2.4 Target value

VMSs of the matrix type with their inverted colour contracts can have less target value than signs using the standardized colour combinations. Flashing amber warning signals are often fitted to Variable Message Signs to improve their target value. However, they should only be incorporated where the requirements of Departmental Standard TD 33/90 are met. The proliferation of these lamps without real need will otherwise undermine their effectiveness. The target value of matrix signs may also be improved in other ways and reference should be made by the Regional Office (T) to the appropriate HQ Division for further advice. However, scrolling text should not be used.

4.2.5 The environmental conditions on site

In areas of intense cold or high chill factor, problems may be encountered with the actuating mechanisms of flexible roller blinds and rigid plate displays. Reference should be made to the manufacturer to ensure that the product can cope with these situations satisfactorily. In areas prone to poor visibility or fog, light emitting VMSs having fibre optic or bulb matrix displays are more effective.

4.2.6. The availability of a power supply

Only flexible roller blind or rigid plate display type Variable Message Signs may be operated by purely mechanical means and do not require a power supply. The provision of a power supply for these types of signs is therefore unnecessary provided there is no need for night-time illumination; flashing amber lights or remote control.

4.2.7 The need for remote control

An electrical or electro-mechanical sign may be preferred in order to provide remote control, either via automatic detectors or from an urban traffic control centre. It should be noted that the provision of an approved communication cabling, interfacing and a power supply will also be required to complete this type of installation.

4.2.8 The effects of a power failure

Fluorescent dot matrix and electro-mechanical roller blinds and rigid plate display type signs are least affected since they only require power while the message is being altered and may be protected against power loss during a transition period by having a battery back-up. All light emitting type Variable Message Signs will lose their displays since it is impracticable to try to maintain the sign through a battery back-up facility.

5. SITING REQUIREMENTS

5.1 Variable Message Signs can be of very large dimensions dependent upon the number of lines of text and/or the height of the text chosen. When choosing a site for erecting a VMS care should be taken to avoid obscuration problems with other street furniture, bridges, gantries and vegetation. The sign should be mounted high enough to deter casual vandalism but be provided with easy maintenance access. Additionally, because VMSs are fragile and expensive to replace adequate safety fence provision should be made to protect the sign's structure from the effects of errant vehicles.

5.2 A large VMS may also be visually intrusive on the surrounding area. Environmental considerations should be taken into account when selecting a suitable site.

5.3 A sign positioned on the near-side verge of a carriageway can suffer from the possibility of heavy vehicles obscuring the legend from those drivers in the outer lanes. It may be possible to overcome obscuration difficulties by providing an identical repeater sign, mounting the signs on a gantry, or by duplicating the message on a sign installed within the central reserve area.

5.4 The use of gantry mounting is a very effective but expensive alternative for improving sign conspicuity. The provision of a gantry for mounting a VMS should therefore only be considered where VMSs are required for a permanent installation, and/or where the siting of the VMS on the left of the carriageway is not practicable.

5.5 The mounting of a second sign within the central reservation of a dual carriageway or motorway can be difficult due to the restrictions of clearances and the maximum size of sign that can be erected in this position. The problems of access for maintenance may also be unacceptable.

5.6 A scheme incorporating a number of VMS and fixed plate signs should be designed so that drivers have enough time to absorb all the information provided. When applying the siting requirements in Departmental Standard TD 33/90, care should be taken to ensure that for each sign sufficient distance and response time is maintained for traffic to alter direction safely.

5.7 Problems may be encountered if light emitting type Variable Message Signs are positioned so that the sun shines directly at the display. Contrast may be lost (wash-out) or messages may be visible to drivers when the sign is not switched on (phantom). Some means of shading using a hood or louvres may be necessary, depending on the type of sign, to help to reduce these effects.

5.8 Problems with specular reflection may also be encountered whenever Variable Message Signs are enclosed behind a front screen. Careful site orientation and the use of "non reflective" or specifically designed front screens are ways to minimise this effect.

6. OPERATING CONSIDERATIONS

6.1 Illumination of Variable Message Signs

When VMSs are illuminated, the form of lighting used will depend on the type of sign. Whatever system is adopted it should be designed to provide an even distribution of illumination over the sign face and also be readily accessible.

6.1.1 Rigid plate display type signs do not generally require a weather protective front panel and can therefore be satisfactorily illuminated in the conventional manner using external overhead or ground mounted luminaires.

6.1.2 The fluorescent dot matrix type sign faces need to be protected behind a clear "non-reflective" front screen panel. They may be illuminated in the conventional manner by external overhead or ground mounted luminaires. The positioning of these luminaires is critical since the framing effect of the front screen panels can throw shadows on the dot matrix elements making them illegible at night.

6.1.3 Dot matrix sign faces can also be illuminated internally using fluorescent tubes. The incorrect setting of this type of lighting or the build up of dirt on the inside face of the front screen, tends to illuminate the sign unevenly and reduces the contrast between the discs and the matrix background.

6.1.4 In certain siting conditions, due to the relative position of the sun and sign face, it is possible for the sign face to be in shadow. In these circumstances, due to a drop in contrast ratios, the legibility of dot matrix signs can diminish to an unacceptable level. Where this difficulty arises it should be overcome by illuminating the sign face during the daylight hours.

6.1.5 Although the Type Approval procedures (see Section 1.2) will have established that the sign can be read at night with properly adjusted lighting, before these signs are put into operation the correct setting of the luminaires and any reflectors should be checked under night time conditions.

6.1.6 Fluorescent dot matrix signs using Ultra Violet (UV) tubes to specifically activate the fluorescent surface of the discs require the equipment and components to be designed so that when illuminated the sign face appearance remains as a yellow legend on a black background.

6.2 Actuation Methods and Displays

The methods of operating Variable Message Signs depends on their siting and intended use. Those that are required to respond automatically to real-time traffic conditions require inductive loop detectors or other types of sensing transducers. VMSs used as advance direction signs in traffic management schemes may only be required at certain times. In these circumstances remote control in conjunction with urban traffic control should be preferred. Manual operation should be restricted to a back-up control or to signs which are used infrequently, making remote control uneconomic.

6.2.1 Whenever a means exists, signs operated by remote control should be provided with some form of monitoring and local control. This is to ensure that the correct message is being displayed and that an override facility is available. This is especially important for VMSs displaying warning or regulatory messages where failure of the sign could jeopardise safety.

7. MAINTENANCE

The effectiveness of any sign can be severely reduced through poor maintenance. Attention to this aspect is particularly important for a sign which is only occasionally called into service. A definite programme for maintenance should be made which should take into account where appropriate:

- (a) the requirements of the Department's Code of Practice for Routine Maintenance with respect to grass cutting and maintenance of sight-lines. Careful siting of the VMS should ensure that the requirements for grass cutting etc in section 18 of the Code will be sufficient to maintain clear visibility at all times.
- (b) the type of VMS and the need for regular cleaning of the external and internal faces.
- (c) the type of lamp used and its expected life.
- (d) the type of fluorescent material used and its effective life under the lighting conditions to be provided.

Where regular cutting of vegetation is not anticipated consideration should be given to the provision of a paved area in front of the sign for such a distance to ensure no obscuration from vegetation growth occurs.

8. ENQUIRIES

CLASSIFICATION OF VARIABLE SIGNS

1. Table 1 gives the Class Numbers allocated to each type of Variable Message Sign currently available in the UK. Spare numbers have been left to cater for new developments.

2. The classification criteria used in Table 1 are:-

2.1 Mechanical/Manual or Electromechanical

Signs on which the messages (s) are displayed or changed by moving a component, or components to which the message (s) are affixed. The moving components may be either flexible (eg roller blind) or rigid (eg prisms).

2.2 Wholly Electrical (Non-Mechanical)

Signs on which the message (s) are revealed when an internal light source is energised and when there is no mechanical movement of a component of the sign in order to display or change a message.

Appendix A

Table 1- Classification of Variable Signs

Broad Classification		Class No.	Class Description
Mechanical/ Manual or Electro- Mechanical	Matrix	1	Electromagnetic - Fluorescent
		2	Electromagnetic - Fibre Optic with Optical Shutter
		3	Electromagnetic - Tile
		4	
	Flexible Roller Blinds	5	Single Blind - Roller to Roller
		6	Single Blind - Single Roller
		7	
		8	
		9	
	Rigid Plate Display	10	Rotating Plank or Prism
		11	Flap Type - Hinged Plates
		12	Sliding Slat or Plate
		13	Continuous Belt
		14	
		15	
Wholly Electrical (Non- Mechanical)	Matrix	16	Individual Lamps
		17	Fibre Optic - Single Cell Occupancy
		18	Fibre Optic - Multiple Cell Occupancy
		19	Light Emitting Diode (LED)
		20	
		21	
	Other Types	22	Transilluminated Display Face
		23	Shaped Tubing Symbol and/or Letters
		24	
		25	
		26	