

TRAFFIC SIGNS FOR MOTORWAYS

Final Report of Advisory Committee



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CONTENTS

	<i>Paragraphs</i>
TERMS OF REFERENCE	1
INTRODUCTION.	2-5
METHOD OF WORK	6-9
GENERAL PRINCIPLES	10-41
Layout	12-13
Lettering	14-18
Size of Lettering	19-21
Colour	22-24
Illumination	25-30
Mounting and Siting	31-37
Content of Signs	38-41
Place-Names	38-39
Mileages	40
Route-Numbers	41
DETAILED DESIGN OF RECOMMENDED SIGNS	42-145
Motorway Symbol	43-46
Joining the Motorway	47-65
Signs at Distant Points	47-50
Signs on the Immediate Approach to Junctions with the Motorway	51-57
Supplementary Direction Signs at the Junction itself	58-60
Signs Indicating Motorway Regulations.	61-65
On the Motorway	66-84
Confirmatory Signs	66-67
Telephone Signs	68-71
Emergency Signs	72-84
Leaving the Motorway	85-132
Intermediate Junctions	85-101
Advance Direction Signs	85-90
Exit Distance Markers	91-93
Supplementary Exit Signs	94-95
Carriageway Markings	96
Final Advance Direction Sign on the Slip Road	97-98
Sign Indicating End of Motorway Restrictions	99
White Arrow on a Blue Ground	100
Merging Traffic	101
Junctions of Two Motorways	102-115
Advance Direction Signs	102-109
Supplementary Direction Signs	110-111
Merging Traffic	112-115

	<i>Paragraphs</i>
Cloverleaf Junctions	116-121
Junctions Close Together	122-125
Terminal Junctions	126-131
'End of Motorway' Signs	126-127
Advance Direction Signs	128
Exit Distance Markers	129
Sign Indicating End of Motorway Restrictions	130
White Arrow on a Blue Ground	131
Fly-Over Junctions with All-Purpose Roads	132
Urban Motorways	133
Miscellaneous Signs	134-145
Signs for Service Areas	134-143
'Bend' Signs	144
'Road Narrows' Signs	145
ACKNOWLEDGMENTS	146-151
	<i>Page</i>
APPENDIX I	34
APPENDIX II	35
APPENDIX III	43
APPENDIX IV	46

Advisory Committee on Traffic Signs for Motorways Final Report

To the Right Hon. Ernest Marples, M.P., Minister of Transport

Terms of Reference

1. We were asked: 'To consider and advise the Minister of Transport and Civil Aviation what traffic signs should be provided on the new motorways.' We have interpreted our terms of reference as covering not only the signs needed on the motorways themselves, but also those needed on all-purpose roads for the guidance and direction of traffic wishing to join the motorways.*

Introduction

2. We made an interim report to your predecessor in October, 1958. The problem of signposting dual carriageway roads without level intersections, many of them carrying three lanes of traffic in each direction and all designed for speeds of 70 m.p.h. and restricted to certain classes of traffic, is entirely new in this country, and we thought it desirable that before making final recommendations we should have the opportunity of seeing the effect of provisional proposals under working conditions. The opening of the short length of the Preston By-Pass some twelve months in advance of the first section of the London-Yorkshire Motorway provided such an opportunity. Treating the traffic signs on the By-Pass as a sort of pilot scheme was in keeping with your predecessor's policy of regarding the By-Pass for the first year as an experimental length on which to try out what rules, regulations and devices might be most appropriate for the motorway system generally in this country, and our interim report was accepted on that basis.

3. We have since been able to see the signs on the Preston By-Pass for ourselves, and we have also invited the representative organisations listed in Appendix I (see also paragraph 7) to comment on them in the light of experience. Generally speaking the consensus of opinion appears to be that the signs are satisfactorily designed for their purpose, but as a result of our own inspection and of the comments we have received there are a number of relatively minor modifications which we incorporate in our recommendations.

4. The signs now in place on the London-Yorkshire Motorway have been designed in accordance with our recommendations as thus modified. We have used the interval between the opening of the first section of that motorway and the submission of this report, however, to observe the effectiveness of the signs on a full-size motorway and, in the light of our observations, to make one or two very slight further modifications in our recommendations. The advice that

follows therefore reflects not only more than eighteen months' experience of the Preston By-Pass, but also some twelve months' experience of the London-Yorkshire Motorway.

5. Our interim report was not published, but we understand it is probable that this final report will be. It accordingly goes over the ground already covered in the interim report and also contains our recommendations for signs for which there were no counterparts on the Preston By-Pass and which were therefore not included in the interim report—such as signs for service areas, telephones and junctions of two motorways. If this final report is not to be published you may feel it wise to make some public pronouncement outlining the essential differences between the new motorways and the national road system to which the public is accustomed. We believe that this should be seriously considered in view of the education needed—even for experienced drivers—before the tempo of the motorways can be properly absorbed. Similarly, if our advice to you to reduce the number of place-names and route-numbers shown in any one motorway sign is taken, it may well be wise to explain to the motoring public the reason for such a decision.

Method of Work

6. Our first step was to consider whether the present standard system of direction signposting as laid down in the Ministry's Traffic Signs Regulations, 1957, could be adopted for use on the motorways. We came to the conclusion that this type of sign would be completely inadequate under motorway conditions and that the problems of layout, lettering and colour must be examined afresh.

7. We asked the representative organisations listed in Appendix I for initial opinions on the principles which should be adopted in the new signs. We were impressed by the considerable degree of unanimity which this consultation revealed, as a result of which our recommendations are substantially in line with the great majority of views expressed.

8. We familiarised ourselves with the codified rules for up-to-date signing practice on comparable roads in the U.S.A. and in Europe, and four of our members made a personal inspection of the signs on motorways in Belgium, Holland and North-West Germany. We have been fully aware of the fact that it is not enough merely to drive on foreign motorways to understand all the complex problems of traffic control and the avoidance of misunderstanding and accidents. It is for this reason that we have attached so much importance to our consideration of the foreign systems, as codified, for they have been evolved in the light of practical experience of the peculiar conditions inevitable on motorways, experience which was not available, except vicariously, to ourselves or to any of the expert bodies in this country whose advice we sought. The American and European sign-posting systems have much in common, but in detail our recommendations are closer to European practice.

9. At an early stage in our work we became convinced that the detailed design of the lettering, layout, symbols, arrows and other features of the signs we now

recommend called for the advice of a professional designer. We accordingly appointed Mr. Jock Kinneir to undertake this work on our behalf. Mr. Kinneir has continued to be associated with us in assessing the effectiveness of the signs on the Preston By-Pass and the first section of the London-Yorkshire Motorway, in devising the adjustments that commended themselves, and in considering the other matters which remained to be dealt with in this final report.

General Principles

10. Before dealing with the specific signs which we propose, we wish to draw attention to certain general principles that have guided us. We have had uppermost in our minds the need to give to users of the motorways clear and simple directions which can be read and understood, at the higher speeds for which the motorways are designed, in ample time for them to make the necessary manoeuvres with safety to themselves and to others. There is the further point that, in view of the widely spaced intervals between intersections and the fact that no turning is allowed on the motorway, the inconvenience of missing an exit is great.

11. We have worked on the principle that the traffic signs are an essential element in the design of the motorways, and that their first object is to be efficient as traffic signs. This has forced us to the conclusion that some of the signs must be comparatively large. It will be found, however, that they are in proportion to the very large roads and the type of traffic they will be serving, and we believe that the interests of amenity will have been met by the attention we have given to the quality of their design and to their colour.

Layout

12. We consider it undesirable to follow the present practice of enclosing place-names and route-numbers in panels within the sign as this increases the area of sign required to accommodate letters and numbers of a given size,¹ and also has a constricting effect which detracts from the legibility of the message. Our own observations suggest that in daytime the latter is also true, though to a lesser extent, of a border surrounding the whole sign, but we nevertheless consider it desirable to retain the border because of its value in differentiating the sign from its background, especially at night.

13. We do not think it either necessary or desirable to attempt to show on the advance direction sign preceding the slip road whether the places shown on it lie to the left or right of the motorway. At this stage the essential need is to tell motorists wishing to leave the motorway that their way off is to the left, and the junction symbol we recommend has been chosen with that end in view. The eventual route to be taken will be given by a further direction sign on the slip road leading to the point where the normal road system is joined.

¹Road Research Board: *Road Research 1957* (H.M. Stationery Office, 1958).

Lettering

14. Although standard direction signs at present make use of upper case (capital) letters only, the experimental traffic signs erected on the Preston By-Pass employ lower case lettering with initial capitals in accordance with the provisional recommendation made in our interim report. This is the practice both in the U.S.A. and in Germany. We made it clear in that report, however, that we could make no final recommendation as to the detailing of the alphabet to be used in motorway signs until the legibility and general suitability of this provisional lettering had been assessed under working conditions.

15. As a result of our inspection of the signs on the Preston By-Pass we have considered some minor modifications of the letter forms and now recommend the adoption of the alphabet which appears at Appendix II to this report. The new lettering, with its correct spacing, has also been used in the signs illustrated in Appendix IV. The redesigning of the letter forms has resulted in a slight reduction in the overall size of the signs without loss of legibility.

16. The use of lower case lettering at Preston was on the whole well received—indeed, those representative organisations that have commented on it have been almost unanimously in favour. There has, however, been some criticism of it in the correspondence columns of *The Times*, where it has been suggested that if upper case letters were used and the information appearing on the signs were better arranged the overall size of the signs could be much reduced with no loss of legibility; it was also suggested that further tests should be carried out on the form of lettering to be used in motorway signs.

17. Our own observations tend to show that the distinctive shape that words acquire when lower case lettering with initial capitals is used helps recognition and reduces the time taken to pick out the relevant part of the total message, and there is expert American evidence¹ that on signs of comparable size a greater degree of legibility can be achieved by the use of lower rather than upper case lettering. This evidence, however, relates to signs on which only one name appears; tests which our own Road Research Laboratory have carried out on signs with more than one name suggest that where margins and vertical spacing are reduced to the bare minimum, so as to obtain maximum legibility without regard to considerations of appearance, this advantage does not apply. We feel, however, that in designing a traffic sign regard must be paid to the space around the lettering as well as to the lettering itself, and that a sign that completely filled the space available would be so unattractive as to be quite unacceptable.

18. This being so, we are concerned with only a very slight difference in area of sign, as between upper and lower case lettering, for the same degree of legibility. Our choice has therefore been finally determined by a wider field of considerations. We have a preference for lower case lettering, which we feel accords better than upper case with the general design of the motorways. Moreover, we consider it likely that an increasingly cosmopolitan motoring public will encounter more and more lower case lettering on signs of all kinds and will come to expect it,

¹T. W. Forbes, K. Moskowitz and G. Morgan: 'A comparison of lower case and capital letters for highway signs' (*Proc. Highway Res. Bd.*, 1950, 30, 355-73).

among other places, on the motorway. We see no point in ourselves pursuing further experiments when there is so little choice between alternative areas and legibilities, and while taste plays so important a part, as we believe it should.

Size of Lettering

19. The size of the lettering on a sign is determined by the distance at which the sign is to be read. It is important that the driver should be able to read the sign without having to divert his gaze through too great an angle from the road ahead—hence he must have finished reading it some way before he comes abreast of it. Moreover it takes time to read the sign, and during that time a fast-moving vehicle may have covered a considerable distance. Thus the determining factor in deciding on size of lettering depends as much on the distance at which the driver must begin to read the sign as on that at which he finishes reading it.

20. We believe that the maximum permissible angle through which the driver has to divert his gaze in reading a sign should be about 15° , as used in Germany.¹ As the main motorways will have a three-lane carriageway plus a hard shoulder to the left the centre of the sign may be as much as 50 feet to the left of the driver's path. This means that he should finish reading the sign at least 200 feet before he comes abreast of it.

21. There is evidence^{1, 2, 3} that from a direction sign of the kind we recommend in this report a driver takes about two seconds to extract the information he requires. This time may, however, be longer or shorter depending on the order in which he reads the names on the sign. In addition some allowance should be made for the possibility of the sign being momentarily concealed by other vehicles. We think, therefore, that about four seconds, representing a travelling distance of about 400 feet at speeds of 70 m.p.h., should be allowed for reading the sign. Thus the signs must become legible at least 600 feet before they are reached. Since in conditions of average visibility most drivers can read signs at a distance of about 50 feet for every inch of letter height^{1, 2, 3} we recommend that the x-height (the height of simple letters such as 'a' and 'x') of the lower case lettering should be at least 12 inches.

Colour

22. While the present British standard direction signs use black lettering on a white ground, we have noted that on many motorway signs abroad it has become customary to use light letters on a dark ground. We consider that on large signs such as are inevitable for our purpose here it is not necessary to use a white or light-coloured background to provide adequate target value for the sign as a

¹Dipl.-Ing. Fritz Heiler: 'Regeln zur Bemessung und Gestaltung beschrifteter Verkehrsschilder' (*Strassenverkehrstechnik*, 1957, 1(12), 75–84).

²A. Mitchell and T. W. Forbes: 'Design of sign letter sizes' (*Proc. Amer. Soc. Civ. Engrs.* 1942, 68(1), 95–104).

³Unpublished research by the Road Research Laboratory.

whole, and experiments made in this country¹ support the view that light letters on a black or sufficiently dark ground are more legible than black letters on a white ground, particularly at night when the sign is illuminated by lights or reflective material. We therefore recommend the use of a dark ground in all signs relating to the motorways. This has the further advantage of enabling a distinction to be drawn between signposting on or relating to the motorways and signposting on and relating solely to all-purpose roads, and so of giving an indication to a driver that he is approaching a motorway.

23. We rejected black as the dark colour for the background of motorway direction signs as being too negative in character, and red because it is reserved for danger signs. We finally reduced the field of choice to green (which has been adopted for direction signs on the Interstate Highways of America), blue (which is used on motorway signs for instance throughout Belgium, Holland and North-West Germany) and grey. During our visit to these European countries we observed that, despite the height of the signs, they were mostly seen against the natural greens of grass and trees, which, had the signs been green according to American practice, would have tended to reduce their target value. Apart from this, however, we think that there is in any case advantage in following European rather than American practice. Having thus established the claim of blue in preference to green, we carried out a practical, full-scale comparison between signs using a blue background and signs using grey. Taking both day and night conditions into account, the most satisfactory results were achieved with a blue background, and we therefore recommend the adoption of blue as the background colour for almost² all the motorway signs in this country. The particular shade of blue we recommend is the 'Standard Interstate Blue Colour', which is used on certain signs on the Interstate Highways of America and which is illustrated in the American Association of State Highway Officials' Manual for Signing and Pavement Marking of the National System of Interstate and Defence Highways, 1958. This is the colour employed on the signs on the Preston By-Pass, where we have observed that it tells well against various landscape backgrounds without being unduly obtrusive.

24. The backs of the signs, on the other hand, should naturally be as unobtrusive as possible. We recommend the use of colour No. 4-051 of British Standards Specification 2660 of 1955. This is dark grey-green, which we believe will harmonise satisfactorily with the varied motorway backgrounds.

Illumination

25. We have had two demonstrations, arranged by the Road Research Laboratory, of floodlighting of large signs and were able to compare the legibility of these signs, both by day and night and at the speeds which are possible on the motorways, with that of similar signs dependent only on reflecting materials. We have no doubt that the most satisfactory results are achieved by electric lighting specially provided for the purpose, and we strongly recommend that

¹ Unpublished research by the Road Research Laboratory.

² The only exceptions are the emergency signs (see paragraph 79) and certain warning signs (paragraphs 113, 144 and 145).

all signs on the motorways should be lit by this means. We do not consider that lighting of these signs from the top alone, as is customary with signs of smaller size, would be adequate, because the illumination cannot, with such large signs, be made sufficiently uniform, a factor which we regard as important.

26. Some of the largest signs on the Preston By-Pass are illuminated by experimental floodlights constructed to the design of the Road Research Laboratory.¹ They are mounted in reflectors arranged across the width of the sign, a short distance in front of it and just below its lower edge, and the profile of the reflector has been designed to give uniform illumination over signs of varying heights. This system of lighting gives satisfactory results, but it will be necessary to keep the fittings as small as possible in relation to the sign to ensure that they do not spoil the appearance of the sign or reduce its effectiveness.

27. We have noticed that, to help good illumination of the top of a tall sign from electric lighting at the bottom, a horizontal reflecting strip, having an overhang of about nine inches, is placed across the top of the sign. In daytime this strip can cast a shadow over the upper part of the sign. It must be seen to that this is not allowed to obscure the message.

28. The floodlighting units at Preston were coloured to match the blue of the face of the sign, and this seriously distracted attention from the sign itself. We recommend that floodlighting equipment should be the same neutral colour as the backs of the signs (see paragraph 24 above).

29. Where electric lighting is impracticable we recommend the use of reflective sheeting of good quality* on the letters, symbols and borders of the signs. The slight loss of contrast which results in daylight from the fact that some of these materials are not pure white does not seem to us to be serious, although we look forward to a time when a real white can be achieved.

30. When we inspected the experimental signs on the Preston By-Pass we noted that the performance of reflectorised signs in the full light of headlamps was excellent, but that there was a substantial loss of performance with dipped lights.² Having regard to the present regrettable need to use dipped lights in the face of oncoming traffic on the motorway, and to the fact that on a three-lane carriageway the signs, on the left of the hard shoulder, are even further to the side of the fastest traffic than they are at Preston, we consider the use of reflecting material to be very much a second best alternative as compared with electric lighting.

Mounting and Siting

31. Since the signs on the Preston By-Pass were experimental they were mounted on frankly temporary tubular frames which have been criticised as unsightly. We have been shown two alternative forms of permanent support, comprising

¹V. J. Jehu: 'A method of illuminating direction signs on motorways' (*Light and Lighting*, 1959, 51(11), 339-40).

²As specified in British Standards Specification 873 of 1959.

³From American data and from the results of tests carried out in this country, the reduction is estimated at about 10-20 per cent for 12-inch letters.

respectively vertical rolled steel joists and reinforced concrete pillars, which are made in various lengths, tapering at the rear towards the top. In both cases purlins are clipped to the front of the supports and the signs are clipped to the purlins. We understand that the sign manufacturers are satisfied that either method affords adequate flexibility in the actual erection of the signs. For our part we prefer the concrete to the steel pillars, and we recommend that this form of mounting should be adopted as standard for all large motorway signs.

32. We understand that the smaller signs will have the more conventional type of steel support, and we would recommend that such supports should be painted the same colour as the backs of the signs (see paragraph 24 above).

33. The latest German signs, which are comparable to those we now recommend, are very slightly tilted backwards at an angle of about 1 in 80 from the perpendicular. In addition the signs are sited at right-angles to the road, or even at a slightly greater angle. These measures are taken to eliminate specular reflection, or shine, from headlight beams back on to the road, and we suggested in our interim report that their advantages should be tested with the experimental signs on the Preston By-Pass.

34. The signs on the Preston By-Pass are at present at right-angles to the road and are vertical, and specular reflection on to the road has been observed from them. The Road Research Laboratory have made measurements of the alignment of the four largest signs on the By-Pass and of the degree of specular reflection observed. It is apparent that it is unnecessary to deflect the signs both laterally and vertically, and since we understand that small specified inclinations to the vertical plane present a difficult problem of erection we consider it sufficient to rely on a lateral deflection to eliminate shine. Though it is also apparent that except on left-hand bends signs at right-angles to the road will tend to reflect light away from the road, even on straight roads some lateral angling of the sign will probably be necessary to prevent reflection back on to the road from irregularities in the surface of the sign. The Road Research Laboratory have accordingly recommended that all signs should be erected in a vertical plane but that on straight sections of road and on right-hand bends they should be turned laterally away from the road through an angle of 2° - 3° from the normal, and on left-hand bends through one of 2° - 3° from a line at right angles to a chord drawn from the site of the sign to a point an equal distance from the edge of the carriageway and 600 feet in front of the sign. We endorse these recommendations.

35. Our members who visited the Continent also observed that the majority of the motorway signs seen there were mounted too close to the ground, so that the lower parts of the signs were often hidden by vegetation or defaced by road dirt. The signs themselves could also too easily be obscured by another vehicle. We suggest that the bottom edge of all signs should where possible be not less than five feet above the level of the carriageway.

36. It has been suggested that motorway signs should be duplicated, one on either side of the carriageway, but in general there will be insufficient room on the central reservation for the erection of signs there as is done on some of the

latest German motorways. For this reason we content ourselves with recommending that of the permanent motorway signs only the comparatively small route-number confirmatory sign should be sited on the central reservation.

37. In the paragraphs that follow we recommend that many of the signs should be sited at specific distances from the feature to which they relate. We are conscious, however, of the importance of siting large motorway signs with the interests of the surrounding landscape and of their own visibility very much in mind, and we consider that to help this a tolerance of a hundred yards either way should be allowed in implementing these recommendations. Where reflectorised signs are used great care is needed to ensure that no other street furniture intervenes between them and the direct beams of light from oncoming traffic at night, which would thus cast a shadow over the sign itself.

Content of Signs

Place-Names

38. We consider it essential that the number of place-names should be kept to a minimum on any one sign. On advance direction signs the number of names of places lying off the motorway should ideally be limited to two, one to the left and one to the right of the motorway. If necessary a third name could be added, but with more than three names in a word-group the legibility of the group is considerably reduced, and we should not like to see four names in a word-group save in the most exceptional circumstances. Similarly the number of places to be named which may be reached by driving on along the motorway should be kept to an absolute minimum. We recommend that the total number of place-names appearing on any one sign on the motorway should not exceed four or, exceptionally, five. We were pleased to learn that on most of the signs on the first section of the London-Yorkshire Motorway it has been possible to limit the number of names to three; this makes possible a sensible reduction in the size of the signs as compared with those on the Preston By-Pass, the largest of which show five names.

39. We have considered the problem of fitting unusually long names into a standard design of direction sign prepared for names of normal length. The comparatively long name 'Birmingham', for example, appears at almost every junction on the first section of the London-Yorkshire Motorway. On some at least of the signs some abbreviation of the name may be necessary. Great care needs to be taken with abbreviations, however; one of the main arguments in favour of lower case lettering is that, as we have said, it produces a clearer visual pattern, and this advantage might well be lost with an indiscriminating use of abbreviations. We consider it important that in any abbreviated form the distinguishing syllables of the name should be preserved intact. Thus we recommend 'Birm'ham' for Birmingham, 'N'hampton' for Northampton, 'Wellingboro'' for Wellingborough, 'L'ton Buzzard' for Leighton Buzzard and 'Stony S'ford' for Stony Stratford (in order to distinguish it from Fenny Stratford). We are aware that in some cases local feelings may possibly be offended by the use of an abbreviated form of the place-name, and we ourselves consider that in all cases the full name is ideally to be preferred and that abbreviations should be used only as a last resort; we hope that local bodies will recognise, however, that the interests of economy and speedy legibility by the motoring public may sometimes

make such abbreviations unavoidable. Double names like Leighton Buzzard can sometimes be suitably dealt with by putting the two parts on different lines, reducing the vertical spacing between the two words as compared with that between two different names, and indenting the second part to show that both words form one name.

Mileages

40. We recognise that there is value in giving information about the distance to places which are signposted on the motorways but we do not agree that this is of prime importance. We follow current practice in considering that mileages should be given, not on advance direction signs when drivers are still concerned with selecting and getting on to their right route, but on confirmatory signs provided after the right road has been reached. We have included in this report proposals for such confirmatory signs on the motorways and recommend that corresponding signs, for which provision is already made in the Traffic Signs Regulations, 1957, should always be provided on the all-purpose roads into which exits from the motorways lead.

Route-Numbers

41. While we accept the need to incorporate route-numbers, both of the motorways themselves and of the roads with which they are connected, in the signing system, we do not consider that these numbers should be given any greater prominence than place-names. They should be treated as equivalent items of information in their own right. In the interests of simplicity we consider it desirable that, on motorway advance direction signs preceding an interchange, only one route-number should be given and that should be the route-number of the main connecting road; it should be placed after the place-names with which it is associated.

Detailed Design of Recommended Signs

42. The siting and design of the signs we recommend are discussed in detail in the following paragraphs. The different types of sign are illustrated in Appendix IV to this report.

Motorway Symbol

43. We suggested in our interim report that since motorways would be restricted to certain classes of traffic and special rules would apply to their use there was need for a bold and simple symbol, for use in traffic signs, which would enable drivers quickly to identify a road as a motorway and which would also help in directing traffic to the motorway from distant places. We had considered the symbol which was then under consideration (it has since been accepted) by the

Inland Transport Committee of E.C.E. (reproduced in figure 1 of Appendix III), but we feel that its attempt to show in perspective a road with limited access results in extremely poor design. We find it confused and over-representational, it does not tell well at a distance and it lacks the instant impact which we believe to be essential. Cancelled by a red diagonal bar to denote the end of a motorway (figure 2 of Appendix III), it is particularly unattractive. Moreover, if it is to be incorporated in various traffic signs relating to the motorway, as we originally proposed, we believe it will be impossible, because of its shape and complexity, to prevent its becoming confused with the vertical edges of blocks of lettering elsewhere on the same sign. For these reasons, and in the absence at that time of international agreement, we were unable to recommend its adoption in this country. Instead we provisionally recommended the less pictorial symbol shown in figure 3 of Appendix III. We understand that in Europe the perspective symbol will be exhibited on its own signplate and not as part of a larger sign, but it seems to us that one of the merits of our own simpler, circular motif is that it can be used for either purpose, either on its own or as part of another sign, and can make its impact without becoming confused with other messages. Your predecessor accepted our symbol for experimental use on the Preston By-Pass, where it quickly became accepted as a recognisable part of the motorway scene. While we appreciated that the need to secure agreement internationally might determine the symbol ultimately to be adopted, we suggested that an attempt should be made to obtain acceptance of the one we recommended.

44. In the meantime we considered whether any improvement was possible in the symbol we recommended. We finally decided in favour of the one illustrated in figure 4 of Appendix III. It bears a close resemblance to the original, which has however been reversed in order to meet the rather frivolous criticism that in the earlier version the diagonal bars gave the impression of a motorway coming to a sudden stop; the circular white border has also been thickened and its junctions with the diagonal bars have been rounded. The version in figure 5 of Appendix III can be used at the end of the motorway to show that the motorway Regulations no longer apply.

45. At the same time we considered whether the European symbol could be improved by means of not too sweeping modifications, and we now submit as figure 6 of Appendix III a version of the perspective representation which we are convinced is the best possible attempt to reconcile conformity with international practice and the interests of good design. It has not proved possible, however, to remove what we conceive to be the faults of the European symbol without altering it beyond recognition.

46. As we see it the choices before you are four: first, which we should much prefer, to adopt the symbol illustrated in figures 4 and 5 of Appendix III; secondly, if conformity with international practice is paramount, to adopt our version of the European symbol at figure 6 of Appendix III; thirdly, to adopt the original European symbol at figures 1 and 2 of Appendix III; and fourthly, to do without a motorway symbol altogether and to rely on the distinctive white on blue colour scheme of the other signs we recommend in this report to denote that a road is a motorway (this fourth alternative has in fact been tried out on the London-Yorkshire Motorway, where it appears to have proved effective).

Joining the Motorway

Signs at Distant Points

47. There is little reason for building a motorway unless traffic can find its way to it. With this in mind we have designed a distinctive series of signs, intended to be attached to existing direction signs on all-purpose roads, to indicate the route to the motorway from places as much as ten miles or more from it.

48. The signs we propose are illustrated in figures 1-5 of Appendix IV. It will be seen that many of them consist merely of the word 'Motorway', the motorway route-number and an arrow. In many cases this will be sufficient, but there will be places from which there are two convenient routes to the motorway and where the choice will depend on the direction the driver intends to take when he reaches it. In these cases we recommend that the signs should include the appropriate motorway destination in order to differentiate between the two routes. The broad arrow should be used only in forward-pointing signs which incorporate a place-name.

49. Since the signs will be sited on all-purpose roads, and on the approaches to intersections, where speeds will not normally be high, we consider that lower case lettering having an x-height of four inches will be adequate for the word 'Motorway' and the place-name. We recognise, however, that at some urban sites there may not be room for signs incorporating this size of lettering, and at these places it will be necessary to use a smaller-scale version of the signs illustrated.

50. These signs are a good example of the use to which a clear and simple motorway symbol could be put. In those illustrated in figures 1-5 it could certainly replace the word 'Motorway', and except in places where there is more than one motorway in the neighbourhood it could replace the motorway route-number as well. If this were done, however, the whole sign would of course have to be redesigned as its existing balance would have been destroyed.

Signs on the Immediate Approach to Junctions with the Motorway

51. In our interim report we suggested that, in view of the fact that special Regulations apply to the motorway, the advance direction signs on all-purpose roads on the immediate approach to junctions with the motorway should distinguish clearly between the directions relating to the motorway and those relating to the all-purpose road. We rejected the possibilities of giving motorway and all-purpose road directions on separate signs and of combining both in a single sign but identifying the motorway directions by means of the motorway symbol. Instead we recommended a sign which was basically similar to the standard advance direction signs on all-purpose roads in that it employed black lettering on a white ground for the all-purpose road directions but in which all the names were in lower case lettering having an x-height of four inches and the motorway directions were given in white lettering on a blue panel.

52. Having seen this sign in place at Preston, however, we felt that the attempt to combine on the same sign the black on white colour scheme of all-purpose roads with the white on blue colour scheme of motorways was not a success.

The large expanse of white background on a sign this size is very unsightly, and we were particularly concerned about the effect on the eye when it travelled quickly from the image of dark lettering on a light ground to the opposite image of light on dark. We accordingly considered the possibility of employing the white on blue colour scheme for the entire sign and distinguishing between the all-purpose road and motorway directions by using upper case lettering for the one and lower case lettering for the other. The effect of this was also unhappy, chiefly because the place-names in upper case lettering tended to look clumsy against those in lower case, and we therefore decided to recommend to you that the sign should appear in the white on blue colour scheme but employ lower case lettering exclusively; the motorway directions would be distinguished by the route-number.

53. The sign we now recommend is illustrated in figure 6 of Appendix IV. The x-height of the lower case lettering in the place-names should normally be four inches and the height of the route-numbers eight inches. In those few instances where there are as many as four groups of place-names and route-numbers, however, route-numbers of this size would tend to dominate the sign, and for such signs we recommend that the route-number should be in characters only one and three-quarters times the x-height of the lower case letters.

54. The layout of the particular sign illustrated in figure 6 happens to correspond fairly closely to the configuration of the actual junction. Though this is clearly desirable, we also consider that it is important for maximum clarity that the component parts of the message should be separated as widely as possible. We recommend that on all such signs the arms representing the outlets should, so far as the layout of the junction allows, be so aligned as to achieve this degree of separation.

55. Where the junction has outlets formed by minor roads as well as by major all-purpose roads and the motorway or slip roads, these minor roads should be represented on the advance direction sign by stubs, which should be shorter than the arms representing the major outlets. The stubs are essential if the driver is to judge whether he wants the first, second or third outlet from the junction. We do not, however, think it essential that place-names should be attached to the stubs representing the minor roads.

56. We recognise that for the user of the all-purpose roads these signs with a motorway direction in them form a link in the chain of all-purpose signposting he may be following, and he will therefore be looking for a sign in the familiar black and white colour scheme. On the other hand a motorist who wishes to use the motorway should be able to follow a consistent series of signs while he approaches the motorway and after that until he leaves it. Our attempt to cater for both drivers by combining the two colour schemes on the same sign having, we believe, proved unsuccessful, we have been forced to choose between them, and our choice has been partly determined by the consideration that the white on blue sign will give all drivers a warning that they are approaching a junction with a motorway.

57. Traffic joining the Preston By-Pass at the only intermediate junction along the motorway must leave the all-purpose road at one of two roundabouts

depending on which carriageway of the motorway it wishes to join. At the present time these two roundabouts are signposted separately, and some drivers have shown an understandable reluctance to pass the first roundabout when in fact they should proceed along the all-purpose road to the second one, of whose existence they may however be unaware. The result has been in some cases that they have found themselves on the wrong carriageway of the motorway. Since we understand that this type of junction is likely to be employed elsewhere we have designed a special sign which clearly shows both roundabouts. It is illustrated in figure 7 of Appendix IV. This sign represents the only exception to the rule we have enunciated earlier that on advance direction signs the place-names should precede the route-number; the rule has been broken in this case to separate more clearly the place-names in different word-groups.

Supplementary Direction Signs at the Junction itself

58. In our interim report we recommended a pointer-type sign for use on the all-purpose road at junctions with the motorway to supplement the motorway directions already given on the advance direction signs and to point the way to the motorway or the slip road leading to it. It incorporated white letters on a rectangular blue panel within a pointed white sign, and it has been represented to us that viewed from certain angles the white pointed area of the sign fades into the background. We think there is some substance in this objection, and we now recommend a revised design (figures 8 and 9 of Appendix IV) in which the white point is emphasised by being enclosed in a wide band of blue.

59. It will be seen that where the sign incorporates more than one place-name and the pointed area is therefore larger the distance between the white point and the route-number nevertheless remains constant, so that the route-number is at least partly inside the pointed area. We consider in fact that two is the ideal number of names to appear on this sign, although three could be tolerated. With four or more names on the sign, however, the pointed end would lose definition, and we therefore recommend that if more than three names are to be given two signs should be used.

60. The conventional black and white pointer signs should be used on all-purpose roads at junctions with the motorway to point to or along the all-purpose arms of the junction, and standard 'No Entry' signs should be erected to prevent traffic attempting to join the motorway by means of an exit slip road.

Signs Indicating Motorway Regulations

61. We recognise with some reluctance that in the early stages at least it will be necessary to give some positive guidance about the motorway Regulations at all accesses to the motorways and we propose two signs for the purpose. These are shown at figures 10 and 12. The first, dealing with the traffic excluded from the motorway, should be put up at the entry to the slip road leading to the motorway, and the second, dealing with the use of the motorway, should be placed on the slip road before the motorway is reached.

62. We debated whether, since the first of these signs will appear just at the point where the driver starts his manoeuvre on to the motorway, some advance

warning to excluded traffic is required. It is certainly not the ideal point at which to tell a motorist he cannot go on the motorway. We consider, however, that the effective exclusion of various classes of traffic from the motorway will have to depend largely on the Regulations themselves and on the publicity given to them rather than on a traffic sign, the main function of which should be the legal one of indicating where the restrictions begin. Moreover, any advance warning would have to be given on each of as many as four approaches to the junction. We consider that in the circumstances no more advanced warning is either practicable or strictly necessary.

63. The main difference between the first of the two signs we now recommend and its counterpart at Preston is that the wording is set out in a running text instead of in a column. This device, which has involved altering the order of the words, has, we believe, made the sign easier to read and has reduced its size. The word 'Motorway' is in letters with a four-inch x-height. Apart from the use of the new alphabet (see paragraph 15), the only difference between the second sign and its counterpart at Preston is that the motorway symbol has been deleted and the width of the sign has been reduced accordingly.

64. The sign at present in use on the London-Yorkshire Motorway to indicate excluded traffic, while in accordance with an earlier recommendation from us, is slightly different from that illustrated in figure 10. It is headed 'Prohibited on motorway' and the word 'NO' in the body of the text is of course omitted. It suffers from the disadvantage that it does not make it clear that the motorway Regulations are effective from the point at which it is sited, and drivers have been known to stop on the slip roads under the impression that they are allowed to do so. It may continue to have some limited use, however, at the beginning of roads which, while the motorway Regulations do not apply to them, lead only to the motorway, and we therefore illustrate it in figure 11 of Appendix IV.

65. Finally, however, we should stress our view that the presence at every point of access to the motorways of signs setting out the Regulations, which must of necessity be wordy, should not be contemplated as a permanent feature. We think that every effort should be made to ensure that these rules and Regulations become part of the general knowledge of the motoring public, so that the mere indication of a motorway, by either word or symbol, will carry with it all the necessary implications. We are glad to note that to this end an addition to the Highway Code has been prepared which deals in detail with the use of the motorways.

On the Motorway

Confirmatory Signs

66. The type of confirmatory sign recommended is shown in figure 13, and includes the distance to the destinations shown. The number of place-names can of course be increased. The sign should be placed on the near side of the motorway beyond the end of the acceleration lane where it will cater both for traffic that has just entered and traffic already on the motorway. Being purely confirmatory in purpose this sign does not really require 12-inch letters, and we recommend that eight-inch lettering should be used.

67. It will be seen that no provision is made in this sign for the inclusion of the route-number of the motorway. We understand that some lengths of motorway will bear not only the United Kingdom classification number but also a number in the European system of international arteries. In our view the most satisfactory way of showing these numbers will be by separate signs, as shown in figure 14, mounted on the central reservation. They too should be provided after every access to the motorway, and it is suggested that they could also be usefully provided at approximately five-mile intervals.

Telephone Signs

68. At one-mile intervals on the first section of the London-Yorkshire Motorway there are emergency telephones situated along the outer edge of the hard shoulder on both sides of the road and connected to a local police station. Each telephone is housed in a grey-green box about 16 inches high supported on a pillar of similar colour 3 feet 9 inches high and is reached through a drop-open door 12 inches high in the front of the box. We were asked to recommend a sign which would clearly identify the installation and which would appear on the front of the box to face oncoming traffic—i.e. partly on the drop-open door and partly on the four-inch ledge above it.

69. Although we had some misgivings both about the colour of the box and about its general appearance, we submitted the design for a sign which we thought satisfactorily fulfilled the requirements laid down for it. This is illustrated in figure 15; the telephone number (which it is important should be visible to the emergency services going to the scene in response to a call) appears on the four-inch ledge above the door and the lower part of the sign on the door itself.

70. The sign was already being manufactured and fixed to the telephone boxes when we were told that at some sites, where the road was in a cutting or on an embankment, the ground beyond the hard shoulder sloped so steeply that it was impossible to stand at the telephone box without discomfort, and it was therefore proposed to turn all the boxes through an angle of 90° and to level a small space of ground in front of them. As a result the sign we had recommended would not now face oncoming traffic, and it was clearly necessary to design a second sign for the side of the box, which was considerably narrower than the front. This second sign is illustrated in figure 16; our freedom in designing it has been restricted not only by the smaller area but by the need to match features on the original panel which are now otiose.

71. Our experience with these signs has thus been somewhat unfortunate, and we strongly urge that if emergency telephone boxes are to be installed on other motorways the whole conception should be revised so that box and sign can be designed as an integral whole. We can see no object, incidentally, in colouring these necessary emergency instruments in a colour the only purpose of which could be to render them as invisible as possible.

Emergency Signs

72. Signs will be needed from time to time to indicate temporary obstructions of the carriageway in the event of accident or when road works are being

carried out. We cannot emphasise too strongly the need to ensure that clear and early warning is provided of any obstruction occurring on these high speed roads. This will call for quicker and more informed thought and action than anything that the road traffic authorities in this country are likely to have encountered in the past.

73. We said in our interim report that the full range of signs required would depend on the organisation finally set up to deal with emergencies and the extent to which it was anticipated that traffic would have to be confined on occasions to the use of a single carriageway. Since then your Department have had discussions with representatives of the Chief Constables and County Surveyors concerned with the Preston By-Pass and the first section of the London-Yorkshire Motorway in order to settle the procedure to be adopted.

74. We understand that as soon as the police receive the report of an accident a police vehicle will go to the spot (which will be located by the number of the nearest telephone pillar) and at the same time a radio message will be sent for the appropriate emergency service. The necessary signs, lamps, and first aid equipment will be kept permanently in each police vehicle as well as at the police post, and the first duty of the police on arrival at the scene will be to erect the signs.

75. The Chief Constables, who had been impressed by the emergency signposting arrangements in force on the motorways of North-West Europe, proposed that in this country a series of signs should be used, comprising an initial warning sign some distance in advance of the obstruction, a sign prohibiting overtaking, a sign imposing a speed limit and a series of rubber cones starting about 100 yards from the obstruction, to guide traffic into the proper lane to pass the obstruction. All the signs would be duplicated, one on the nearside verge and one on the central reservation; thus none of them would be sited on the carriageway itself, with the possible exception of the last pair, which might encroach by up to two feet on to the carriageway.

76. So far as road works are concerned, most repairs would be pre-arranged and the signposting would not therefore be an emergency measure but would be a matter for the highway authority or his agents. In emergencies, however, signposting would be the primary responsibility of the police, although in practice it would be carried out by whoever was first on the scene, whether the emergency was a repair job or an accident. The signposting arrangements for road works and accidents would be almost identical—indeed the only difference would be that in the case of repairs the first sign would give an indication of road works ahead.

77. Where it is necessary to close one carriageway completely and operate two-way working on the other the signposting arrangements on the carriageway to be closed would be the same as those described above except that the cones would guide traffic through a gap in the central reservation, and at this point 'Two way traffic' signs would be necessary. On the other carriageway the advance signs would, of course, relate to the point where the opposing traffic leaves it, not where it joins it; the cones would guide traffic into the nearside half of the carriageway and 'Two way traffic' signs would be necessary here too. 'No

overtaking' signs would be repeated at the beginning of the length subject to two-way working, and probably at intervals along it.

78. Finally, we were told that though elaborate arrangements had been made for gritting the road before ice was likely to form there might still be a need for signs to give warning of icy conditions in those isolated spots where it was likely to form without the whole road being affected—e.g. under and over bridges. Similar signs might also be erected, at the discretion of the highway authority or the police, at entrances to the motorway when icy conditions were likely, or in prolonged icy conditions.

79. We think there is much to be said for signposting accidents and road works in the same way, and we accordingly suggest that, in order that the same signs may be used in either type of emergency, the first warning sign proposed by the police should have 'Accident' on one side and 'Road works' on the other (figures 18 and 19); it should be rectangular, and sited 900 yards in advance of the obstruction. We feel that this sign should be preceded by a more general warning, and we recommend that for this purpose the opportunity should be taken to move closer to European international practice by using a sign (figure 17) similar to the European sign for an unspecified hazard, adapted however so that the symbol forms an exclamation mark; this adaptation of the European sign is widely used in Belgium. We recommend that it should be sited 1,000 yards before the obstruction. The 'No overtaking' sign, which is rectangular, is illustrated in figure 20; it should be placed 600 yards before the obstruction. With regard to the suggested sign imposing a speed limit, we understand that the Motorways Traffic Regulations do not empower the police to impose such a restriction, and in these circumstances we have had to limit the message on the sign, which is also rectangular, and should be sited 300 yards in advance of the obstruction, to the word 'Slow' (figure 21). The rectangular 'Two way traffic' sign we recommend is illustrated in figure 22 and the 'Ice' sign, which is triangular, in figure 23. All these signs have reflectorised white symbols and lettering on a red non-reflectorised background with a red reflectorised border. This colour scheme ensures that in daylight the inscriptions will appear white on a solid red background and at night in headlights they will appear white on a dark ground within a red border.

80. We also recommend a 'Fog' sign (figure 24), to be placed at entrances to the motorway, and possibly at intervals along it, when fog is likely to be encountered along the route. The basic design of this sign is similar to that of the 'Ice' sign.

81. The signs should obviously be as large as possible in order to attract maximum attention. On the other hand they must be easily portable, and we accordingly recommend that the triangular signs should be four feet high and the rectangular signs (with the exception of the 'Two way traffic' sign, which will, we understand, be fitted into slots to be provided at all gaps in the central reservation, and can therefore be as high as six feet) should be four feet long by two feet high. We are satisfied that signs of this size will be sufficiently prominent.

82. We have not considered the design of the cones used to guide traffic past the obstruction, which properly regarded are articles of street furniture, but we think that they should be supplemented by signs with a white arrow on a blue

disc to indicate the route to be followed past the obstruction (figure 25); these signs, with a red background, were recommended in our interim report, but in deference to the views since expressed by several interested organisations we now revert to the conception of a white on blue sign to conform with international practice. We also recommend that where it is necessary to close one carriageway completely prohibition of entry should be indicated by a sign consisting of a white bar on a red disc (figure 26); this sign was also recommended in our interim report. We propose a three-foot disc for each of these signs, which should be reflectorised.

83. Finally we recommend a reflectorised sign reading 'Road clear' (figure 27), to be placed after the obstruction, or after ice. This sign, which is white on blue, will we feel give a helpful indication to the motorist which is conspicuously lacking in similar circumstances on all-purpose roads.

84. We understand that some highway authorities may wish to use larger versions of these signs for pre-arranged repairs, when the signs could be erected more at leisure. We should naturally welcome this, provided the signs are erected in accordance with the same code of practice as the emergency signs.

Leaving the Motorway

Intermediate Junctions

Advance Direction Signs

85. As has already been mentioned, it is essential that drivers should receive sufficient warning of an exit to enable them to get into the left-hand lane in readiness to turn off the motorway without endangering other traffic. This means that signs must be provided well in advance of the exit and that they must be repeated so that there is no risk of other traffic obscuring them at the crucial time. We propose the provision of three direction signs in advance of the exit and one at the exit itself.

86. The first advance direction sign (figure 28), sited one mile in advance of the exit, is intended as a primary warning that an exit lies ahead. Its principal features are therefore the junction symbol and the distance to the exit. The route-number of the all-purpose road which can be reached from this junction is also included.

87. The second advance direction sign (figure 29), sited half a mile in advance of the exit, repeats the information contained in the first and adds the names of places which can be reached by leaving the motorway at the junction. It again includes the important reference to the distance to the exit.

88. The third and final advance direction sign (figure 30), sited at the beginning of the deceleration lane, in turn repeats the information contained in the second and adds the forward destination reached by driving on along the motorway. The omission of any reference to the distance to the exit will indicate that the driver has reached the point where his path along the deceleration lane begins to diverge from the main line of the motorway.

89. It will be seen that in the junction symbols in each of these signs, the arm representing the motorway is just off vertical. This not only gives prominence

to the arm representing the motorway ahead by separating it clearly from the border, but in our view improves the design by making it more telling. We do not consider that any difficulty will result from the use of this design at a site where the actual alignment of the motorway may differ from that which the symbol might be taken to suggest.

90. The signs we recommend in this section differ in one or two respects from those erected at Preston in accordance with our provisional recommendations, the most important difference being that at Preston it is the second, not the third, advance direction sign that gives the forward destination of the motorway. When we saw the actual signs in place at Preston we felt that the absence of any indication at the exit, especially at night, of the continuation of the motorway was a defect. We therefore decided to recommend that the two signs should be transposed; besides producing a more logical build-up of information, this device, by deleting $\frac{1}{2}$ m' from the old half-mile sign, reduces the height of the tallest sign on the motorway. In the new mile and half-mile signs the stub arm representing the motorway has been lengthened and given a point, and in the half-mile and final signs the route number has been enlarged and aligned with the word-group above it.

Exit Distance Markers

91. We have noted the German use of exit distance markers and consider that they serve a useful purpose. A marker of the kind shown in figure 31 is recommended at distances of 300, 200 and 100 yards in advance of the beginning of the deceleration lane.

92. These signs also differ from those recommended in our interim report, which were in the form of horizontal blue bars on a narrow white triangle. We were unimpressed by the performance of those signs at Preston, partly because they were too small (2 feet 9 inches high with a nine-inch ground clearance), but chiefly because of the presence of blue and white posts of approximately the same size, which were not part of our recommendations, set at 110-yard intervals to mark the outside edge of the hard shoulder. To make the exit distance markers more distinctive we now recommend that they should be rectangular and larger (four feet high with a one-foot ground clearance), that their colour scheme should be reversed and that the bars should be diagonal rather than horizontal. This would make them very much closer to continental practice, although we have not extended the diagonals to the edge of the sign, as in the continental versions we have seen, because we feel that the zigzag effect obtained by cutting them short makes them very much more arresting.

93. In our interim report we also recommended a fourth marker to define the point of land between the slip road and the motorway proper. At our suggestion this marker was omitted at the junctions on the first section of the London-Yorkshire Motorway, chiefly because there was invariably a supplementary exit sign (see paragraphs 94 and 95 below) in the point of land. But experience has shown that some form of marker is desirable in addition to the supplementary exit sign (which because of its width may have to be set some way back from the point), and we now suggest that the point of land should be marked by a bollard, which should preferably be internally illuminated.

Supplementary Exit Signs

94. An enlarged version of the sign illustrated in figure 8 or 9 of Appendix IV is recommended for use at the exit, sited on the right of, and indicating, the slip road. We do not consider, however, that the lettering here needs to be so large as that in the advance direction signs, and the height of the lower case lettering may therefore be reduced from 12 inches to 10 inches in this sign.

95. At many of the junctions along the first section of the London-Yorkshire Motorway the slip road leaves the motorway at such a narrow angle that there is not room between them for signs of the type recommended in the previous paragraph if they are to be large enough to be read from the point at which the driver should begin to turn off. We recommend that in these circumstances a rectangular sign should be employed which embodies only the route-number and a left-pointing arrow (figure 32); the driver will receive confirmation as to place-names almost immediately from the advance direction sign on the slip road (paragraph 97 below). The route-number is in 20-inch characters. (At present, in accordance with an earlier recommendation from us, these junctions are provided with a shortened version of the sign illustrated in figure 8 of Appendix IV which includes no place-names. Experience has shown, however, that the fact that the route-number virtually fills the sign reduces the blue background both in area and in the intensity of the colour and consequently reduces the target value of the sign. In so squat a sign the pointed end is also comparatively ineffective. The sign we now recommend has a larger area of undiluted blue background and is, we believe, more emphatic.)

Carriageway Markings

96. We have not in general interpreted our terms of reference as embracing carriageway markings, but we feel we should draw attention here to certain difficulties, which both we and the police have noticed, in determining the exact position of the exit slip road, especially at night. These difficulties may be partly due to a contrast in colour between motorway and slip road, producing an inhibiting effect on drivers intending to leave the motorway, and this inhibiting effect may be enhanced by the very wide broken white line separating the deceleration lane and slip road from the motorway—the object of which is, of course, to prevent drivers entering the slip road by mistake. We believe that the improved target value of the supplementary exit sign we recommend in the previous paragraph, and the illuminated bollard recommended in paragraph 93, will go some way towards overcoming the difficulties, but we recommend that consideration should also be given to the possibility of using catseyes to make the position of the slip road more clear at night or in fog, although care will have to be taken to ensure that in fog the catseyes do not lead all the motorway traffic into the slip road. It may be that the only really satisfactory solution of the night-time difficulty will be to light the whole junction.

Final Advance Direction Sign on the Slip Road

97. For the final advance direction sign required on the slip road to indicate to traffic leaving the motorway the direction to be taken on joining the all-purpose road we recommend the use of a sign similar to that illustrated in figure 6 of Appendix IV. The x-height of the lettering should be not less than four inches.

98. We recommended in our interim report that this sign on the slip road should use black letters on a white ground, because the directions on it related entirely to all-purpose roads. We have already drawn attention, however (in paragraph 52), to the unsightly expanse of white background on a sign this size, and in conformity with our recommendation in paragraph 22 above, that signposting on the motorway, whether relating to motorways or to all-purpose roads, should always have the same colour scheme, we now recommend that this sign in common with other direction signs on the motorway, should have white lettering on a blue ground. For the rest, the considerations set out in paragraphs 53, 54 and 55 apply equally to this sign.

Sign Indicating End of Motorway Restrictions

99. We have already recommended (paragraph 61 above) a sign to indicate to drivers after they have entered the motorway the rules governing the use of the motorway, and we now recommend a sign, to be erected at the end of the exit slip road, to signify that the rules no longer apply. We should like to recommend that the sign should consist of the motorway symbol cancelled by a red diagonal bar, but as we cannot conscientiously recommend the international motorway symbol (see paragraph 43) we content ourselves with recommending the worded sign illustrated in figure 33. The sign, which is rectangular, has white four-inch letters on a blue ground.

White Arrow on a Blue Ground

100. We recommend that, where the exit slip road joins the all-purpose road at a roundabout, a sign consisting of a large white arrow on a blue ground should be erected on the roundabout to indicate to traffic on the slip road the direction that it is intended to follow round the roundabout. In our interim report we recommended that the standard white arrow on a red ground, illustrated in the Traffic Signs Regulations, 1957, should be used here, and this has in fact been done on the first section of the London-Yorkshire Motorway. We are impressed, however, by the advantages of employing a blue rather than a red background: it conforms with the colour scheme of the great majority of the signs we are recommending for motorways; in particular it is consistent with our recommendation in paragraph 82 that signs with a white arrow on a blue disc should be used to indicate the route to be followed past obstructions on the motorway; and it is in line with practice on the Continent. Red should be reserved for danger signs, and should not be used for direction signs of this nature. For the sake of uniformity we consider that the white on blue arrow should be erected facing each entrance to the roundabout, whether along an all-purpose road or a motorway slip road, just as every approach to a junction with a motorway should be signposted with the distinctive white on blue advance direction signs (see paragraph 52).

Merging Traffic

101. After it has passed the exit slip road, traffic still on the motorway will pass the acceleration lane from the entering slip road. This will also be on the left. We have considered whether the American practice should be adopted of providing a sign to give warning to the main motorway traffic that vehicles may here be merging with it. We consider that provided the mouth of the entry slip road and the boundary of the acceleration lane are sufficiently clearly marked on the carriageway, a sign of this kind should not be necessary. Later on in this

report, however (paragraph 113), we recommend such a sign for use at the junctions of two motorways, and we suggest that this sign should also be erected at other junctions if it should prove necessary.

Junctions of Two Motorways

Advance Direction Signs

102. As with ordinary junctions along the motorway, so with junctions of two motorways it is essential that drivers should receive sufficient warning to enable them to get into the appropriate traffic lane without endangering other traffic. Indeed, this is even more important at junctions of two motorways, because not only will traffic in the offside lane intending to bear left have to move over to the nearside, but traffic in the left-hand lane intending to bear right will have to move out into the centre or right-hand lane. Moreover these junctions cannot be signposted in the same way as ordinary junctions along the motorway because both arms are of equal importance and it is therefore necessary to give the route-numbers and/or destinations of both arms on all the advance direction signs. We propose the provision of a series of three direction signs in advance of each of these junctions.

103. The first advance direction sign (figure 34), like its counterpart for ordinary intermediate junctions, is sited one mile in advance of the junction. The junction symbol is more nearly in the form of a letter 'Y', in order to emphasise that the junction represents a divergence of two equals. For the same reason the route-number of each arm of the junction is given.

104. While we are satisfied that the sign recommended in the previous paragraph will be suitable for most junctions of two motorways, it seems to have given rise to some confusion at the junction on the first section of the London-Yorkshire Motorway (Route M1) where the spur to Birmingham (Route M45) branches off to the left. No doubt because of the popular misconception that M1 is the London-Birmingham Motorway, some Birmingham traffic moves over to the right at this point, only to be told at the next sign that Birmingham is to the left. In these rather special circumstances we have prepared an alternative design for this sign (figure 38) which makes it explicit that it is the M45 that leads to Birmingham. It will be seen that it is similar to the final advance direction sign at ordinary junctions along the motorway (paragraph 88 and figure 30), except that 'M1' is substituted for the forward destination and the message '1 mile' has been added. We do not consider that the need for this alternative design will survive the extension of the M1 to Yorkshire, when the route-number will become more closely associated in the public mind with more northerly destinations.

105. We recommend that the second advance direction sign should be an overhead sign straddling the whole of one carriageway. We make this recommendation with some reluctance; the sign and its supports would constitute an enormous structure (something fairly elaborate would probably be necessary to facilitate lighting, cleaning and maintenance), and we are fully aware of the disruptive effect that it might have on the landscape. Nevertheless we are convinced that when traffic volumes on the motorway have built up to the maximum expected a sign of this type, which is used in America, Germany, and Italy, will be

essential in the interests of smooth and safe traffic flow; with downward-pointing arrows associated with the relative place-names and route-numbers, it is the only really sound method of indicating the appropriate traffic lanes, and because of its size and position it should be visible from a considerable distance. It would also be out of the range of mud splash. We consider that its disruptive effect on the landscape can be kept to a minimum by the careful design both of the sign itself and of its supporting structure; the sign we recommend is illustrated in figure 35.

106. We recommend that the third sign should also be an overhead sign and should be sited just beyond the point of bifurcation of the two arms of the junction. In this position it would fulfill the same function as the final advance direction sign and supplementary exit sign at ordinary junctions along the motorway.

107. We recognise that the recommendations we have made in the two preceding paragraphs for overhead signs may encounter opposition in some quarters, and in general we see no reason why these signs should be erected before traffic volumes have reached the size at which the maximum visibility they offer becomes necessary. We think that in the meantime roadside signs more closely comparable with the half-mile and final advance direction signs for ordinary intermediate junctions will probably be sufficient. Because of the even greater need for correct lane discipline at these junctions of two motorways, however, and because both arms of the junctions are of equal importance, the half-mile and final advance direction signs we recommend here (figure 39) differ in several respects from their counterparts for other intermediate junctions. To save space we have dispensed with the junction symbol altogether and adopted the American device of 'stacking' the place-names and route-numbers with an arrow alongside each word-group pointing in the appropriate direction. (There is already provision for signs of this basic type in the Traffic Signs Regulations, 1957.) We have added the instruction 'Get in lane'; we do not, however, favour the inclusion of ' $\frac{1}{2}$ m' in the half-mile sign, because it would add to the height of an already tall sign, because an indication of distance has already been given on the mile sign (paragraph 103), and because if the instruction 'Get in lane' is followed it is not strictly necessary. The half-mile and final signs will thus be identical; the final sign should be sited at the point where the motorway begins to widen to form the two arms of the junction. We do not think that these signs are so clear as either the overhead signs we have recommended in paragraphs 105 and 106 or the roadside signs we have recommended in paragraphs 86-88 for ordinary intermediate junctions, and we do not think they should be used in place of those signs unless there are very sound reasons (e.g. small traffic volumes at junctions of two motorways, insufficient space combined with small traffic volumes at other junctions) for this course.

108. It so happens that at one of the forks in the first section of the London-Yorkshire Motorway there is a bridge carrying an all-purpose road over the motorway at almost precisely the point where the roadside final direction sign would be sited, and we consider that the opportunity should be taken to place a direction sign on the parapet of this bridge in order to be able immediately to assess the effectiveness of overhead signs in this country. We understand that while the Royal Fine Art Commission would not object to this if it was considered

essential, they feel that on no account should the signs be deeper than the parapet and that they should preferably be less than its full height, in order not to break up the line of the bridge. We have much sympathy with this view, but it has unfortunately not proved possible to accommodate all the necessary information in a sign whose height is less than that of the parapet, particularly as the arrows have to point down into the centres of the appropriate traffic lanes. The illustration of the sign we recommend for this particular location (figure 36) will make this clear; the sign is in two parts, which will appear side by side on the parapet. We recommend that if in fact the sign does prove to spoil the line of the bridge the erection of a railing along the top of the parapet would go some way towards preserving it.

109. We do not recommend that a practice should be made of placing traffic signs on bridge parapets. As a general rule it is much preferable that overhead signs, even when they are quite close to existing bridges, should be placed on separate structures specially designed for the purpose.

Supplementary Direction Signs

110. Where the overhead signs recommended in paragraphs 105 and 106 are used there will be no need for a sign corresponding to the supplementary exit sign at ordinary junctions along the motorway, since, as explained in paragraph 106, its function is fulfilled by the second of the two overhead signs. Where the advance direction signs are roadside signs, however, we see a need for a supplementary sign in the point of land between the two arms of the junction. This sign will necessarily be large because it will have to relate to both arms. At most forks in the motorway the two arms will diverge at such a narrow angle that there will not be room for such a sign unless it is mounted high on a post and cantilevered out over the two carriageways. We recommend that this should be done. Figure 37 illustrates the two arms of the sign we recommend; where there are two or more place-names they should be aligned on the inner side of the arm.

111. The versions of this sign at present in use on the London-Yorkshire Motorway, in accordance with an earlier recommendation from us, do not incorporate arrows. We do not now consider that they give the clearest possible indication of the route to be followed, and it will be seen that the design we now recommend has an arrow at the outer edge of each arm, with the route-number next to it. In principle each arrow should point down diagonally into the respective carriageway; this means that on any one sign the angle of slope of one arrow might differ from that of the other, depending on the angle at which the carriageway to which it relates curves away from the straight. Provided that the arrows distinguish clearly between the two carriageways, however, we do not think it necessary to destroy the symmetry of the sign by having them point at different angles.

Merging Traffic

112. We have recommended at paragraph 101 that at ordinary junctions along the motorway no sign is necessary to give warning of traffic from the entry slip road merging with the main motorway traffic. Where two motorways converge, however, each of them consisting of multi-lane carriageways, the problem is obviously more serious, and we consider that appropriate warning should be given.

113. We recommend a series of two signs for this purpose. The first of these (figure 40), which would be sited half a mile before the junction, is a worded rectangular sign with the legend 'Motorways merge $\frac{1}{2}$ mile' in white lettering on a blue ground. The second sign (figure 41), which would be sited at the junction itself, is triangular, and its inscription consists solely of a symbol in the form of a diagrammatic representation of the plan of the junction. Like the emergency signs described in paragraph 79 the sign has a white reflectorised symbol on a red non-reflectorised background with a red reflectorised border. We think the symbol is sufficiently clear to make any wording on the sign unnecessary, especially as there is a worded warning of the hazard half a mile back. The sign illustrated in figure 41 would be used on the right-hand arm of the fork and a mirror image of it on the left-hand arm; the driver will naturally identify the vertical arm of the symbol with the arm of the fork on which he is driving. For obvious reasons the sign on one arm of the fork would have to be screened from traffic on the other arm, or at least angled away from it. (The existing versions of these signs on the London-Yorkshire Motorway, in accordance with an earlier recommendation from us, do not have fish-tails in the legs of the symbol; instead there is a large arrow-head at the top of the vertical arm. We now consider that this arrow-head makes the symbol ugly and top-heavy, and that the design we now recommend is both clearer and more attractive.)

114. We have spoken in paragraph 112 of the problem of merging traffic posed by the convergence of two multi-lane carriageways. An attempt has been made at one of the forks in the first section of the London-Yorkshire Motorway, where a two-lane carriageway merges with one of three lanes, to solve this problem by separating the two lanes of the two-lane carriageway so that the fast lane merges with the three-lane carriageway some 300 yards before the slow lane. There is an island between the two lanes which is about 500 yards long but no more than eight feet wide at its widest point. The lanes and the island between them are flush and are differentiated only by means of colour, the lanes being of black asphalt and the island of concrete.

115. Clearly, if this island is to serve its purpose, and is not to be a source of confusion and danger, it must be preceded by an adequate warning sign which makes it clear that there is an island ahead and that vehicles may pass either side of it, depending only on the side of the road they happen to be on already. We have considered various forms that this sign might take; we have rejected the idea of an overhead sign with the legend 'Slow traffic—fast traffic' and arrows pointing down into the appropriate lane because we think that it might induce a sudden change of lane on the part of a driver who, being in the slow lane, fears that he may have to remain in it. We have also rejected the idea of a sign reading 'Pass either side'; to be intelligible such a sign would have to be placed on the island itself, and since the island is flush with the traffic lanes this would be dangerous. Instead we recommend the sign illustrated in figure 42. We feel that 'Don't change lane' is a clearer instruction than 'Keep in lane', which might suggest to motorists conditioned to driving on the left that they should draw to the nearside and stay there. The sign should be sited about 150 yards before the beginning of the island. It should be complemented by a single continuous white line along the middle of the carriageway extending from a point about 300 yards before the beginning of the island as far as the island itself, and the island should be made as clearly visible as possible by means of a white

surface dressing, so that the continuous white line as it were becomes the island. We appreciate that under the present Traffic Signs Regulations the single continuous white line will cease to be an authorised carriageway marking on 12th May, 1962, but we see no reason why it should not continue to be used here, and if necessary be specifically authorised, for this unique purpose.

Cloverleaf Junctions

116. We understand that there is no immediate prospect that any junctions on motorways will be in cloverleaf form, but we are told that there is a likelihood that this form of junction will be employed at some time. The essential feature of such junctions is that traffic leaving the motorway for destinations to the left of it does so at a different point from traffic bound for destinations to the right (although both exits are of course to the left). We propose a series of four advance direction signs for such junctions.

117. The first advance direction sign should be sited one mile in advance of the first exit. It contains the junction symbol, the distance to the exit and the route-number of the intersecting road, and is in all respects identical in design with the first advance direction sign for ordinary junctions along the motorway (paragraph 86 and figure 28).

118. The second advance direction sign, sited half a mile in advance of the first exit, is illustrated in figure 43. It is generally similar to its counterpart at ordinary junctions on the motorway (paragraph 87 and figure 29) except that it also shows the second slip road and the name of the place that can be reached by driving along it. The route-number of the intersecting road is shown against both exits in order to show that both join the same road, albeit different carriageways of the road. Provided that the two slip roads are not more than a quarter-mile apart, we do not think it necessary to give any indication of distance against the arm representing the second slip road. We considered whether a sign precisely similar to that illustrated in figure 29 would suffice at this point, but rejected it because it would give the impression that both carriageways of the intersecting road were reached by driving along the same slip road.

119. The third advance direction sign, sited at the beginning of the first deceleration lane, is illustrated in figure 44. It is similar to the third advance direction sign at ordinary junctions along the motorway (paragraph 88 and figure 30) except that it does not show the forward destination of the motorway. This is reserved for an overhead sign (figure 45) straddling both the first slip road and the motorway just beyond their point of bifurcation (and therefore closely following the third advance direction sign), where it also serves as a supplementary exit sign (paragraph 94). This overhead sign also shows the destination of the second slip road and, on a separate sign-plate, the destination of the first one; the arrows below the place-names point down into the respective traffic lane or carriageway. We considered whether a sign exactly similar to that illustrated in figure 30 would be sufficient here, with the destination of the second slip road appearing above the arm representing the motorway, but we decided that the transfer of this destination from an arm representing a slip road on the preceding sign to the arm representing the motorway on this one would be a source of confusion to drivers. We also considered a sign similar to the half-mile sign

(paragraph 118), with the addition of the forward destination of the motorway, but this would produce a sign of such enormous proportions that we rejected it.

120. The fourth advance direction sign should be sited at the beginning of the second deceleration lane. It contains the junction symbol, the forward destination of the motorway, the destination of the slip road and the route-number of the intersecting road, and is in all respects identical in design with the advance direction sign sited at the beginning of the deceleration lane at ordinary junctions along the motorway (paragraph 88 and figure 30).

121. Exit distance markers (paragraph 91 and figure 31) should of course be used at the junctions with both exit slip roads. A supplementary exit sign (paragraph 94) should also be erected at the second junction.

Junctions Close Together

122. In all the proposals we have made so far for the signposting of junctions along the motorway we have recommended that the first direction sign for each junction should appear a mile in advance. This recommendation presupposes that all the junctions will be more than a mile apart, as otherwise the signposting of one junction might overlap the signposting of the next, with a consequent risk of confusion to drivers. There will be cases, however, where two junctions are a mile apart or less, and where some modification of the direction signing arrangements we have already recommended will clearly be necessary. We discuss below three alternative ways in which this might be done: the alternative adopted will very largely depend on traffic conditions at the junction or junctions concerned.

123. The first and simplest alternative is merely to dispense with the one-mile advance direction sign for the second junction. This means that the first sign for this junction would be only half a mile in advance, and we do not therefore consider that this alternative should be employed lightly; it should obviously not be used, for example, where a substantial volume of traffic leaves the motorway at the second junction.

124. The second alternative also involves the omission of the one-mile sign for the second junction, but would involve in addition the use of an overhead sign instead of a roadside sign at the half-mile point. As we have already pointed out (paragraph 105), an overhead sign is visible from a considerable distance, and this will do much to offset the disadvantage of siting the first advance direction sign in such comparative proximity to the junction to which it relates. This is an important consideration at junctions where a large volume of traffic leaves the motorway. We have already recommended three different types of overhead sign (figures 35, 36 and 45), and it will be found that one of them, appropriately adapted, will be suitable for use here.

125. The third alternative involves signposting the exit slip roads of the two junctions in the same way as the two exit slip roads of a cloverleaf junction (paragraphs 116–121). Where the junctions are a mile apart, only the signs at the beginning of the first deceleration lane need show both; where they are nearer half a mile apart the half-mile sign for the first junction should also show both, with an indication of distance against each arm representing a slip road.

Terminal Junctions

'End of Motorway' Signs

126. A special problem arises here since traffic will arrive at the terminal junction (usually in the form of a roundabout) without leaving the main carriageway of the motorway. It is therefore imperative that adequate warning should be given so that drivers, though still on the motorway, will reduce speed to the greater extent which is necessary to enable them to negotiate the junction in safety.

127. Two signs of the kind shown in figure 46, with a white message on a blue ground, are recommended for this purpose. The first should be sited one mile, and the second (with the message amended to read ' $\frac{1}{2}$ mile') half a mile before the junction.

Advance Direction Sign

128. An advance direction sign similar to that illustrated in figure 6 of Appendix IV should be sited a quarter of a mile before the junction. It should be in lettering having an x-height of eight inches. The considerations set out in paragraphs 53, 54 and 55 apply equally to this sign.

Exit Distance Markers

129. The exit distance markers recommended in paragraph 91 and illustrated in figure 31 should also be used at distances of 300, 200, and 100 yards in advance of the junction.

Sign Indicating End of Motorway Restrictions

130. The sign recommended in paragraph 99 and illustrated in figure 33 should also be erected at or as near as practicable to the precise point where the motorway Regulations cease to apply. It will follow logically on the 'End of motorway' signs described in paragraph 127 above and erected a mile and half-mile in advance.

White Arrow on a Blue Ground

131. Where the terminal junction is in the form of a roundabout, then, as at the end of an exit slip road (paragraph 100), a sign consisting of a large white arrow on a blue ground should be erected on the roundabout to face traffic leaving the motorway. Similar signs should be erected to face the other entrances to the roundabout.

Fly-Over Junctions with All-Purpose Roads

132. Some motorways will end at fly-over junctions with all-purpose roads, where one carriageway of the all-purpose road is carried over or under the motorway so that it leaves or joins the motorway on the left. On the approach to the junction along the motorway the 'End of motorway' signs described in paragraphs 126 and 127 should be erected a mile and half-mile in advance. Since there will be no choice of route to traffic approaching the junction along the motorway, advance direction signs would be inappropriate; this makes it all the more necessary that the signs indicating that the end of the motorway has been reached (illustrated in figure 33) should be prominently displayed at or as near as practicable to the junction itself. About a hundred yards before the junction there should be a sign giving warning of merging traffic, of the type illustrated in figure 41.

Urban Motorways

133. We have not considered the signposting of urban motorways in detail, but the recommendations we have already made are generally applicable to urban as to rural motorways. The main distinguishing features of the urban motorway will probably be the closer spacing of junctions and the fact that it may be carried for some distance by a viaduct, so that there may not be room for the roadside advance direction signs we have recommended for most junctions. We have devoted a section of this report (paragraphs 122-125) to the signposting of closely spaced junctions. On viaducts, overhead signs may be the only possible way to present the necessary information in lettering of adequate size, and as we have pointed out in paragraph 124, we have already recommended three alternative forms of overhead sign (figures 35, 36 and 45) which we think will be found suitable.

Miscellaneous Signs

Signs for Service Areas

134. At intervals of some miles along most major motorways we understand that there will be service areas where travellers will be able to stop for fuel, refreshment or merely for a rest. Each service area will contain, as a minimum, one filling station (with facilities for emergency repairs) on each side of the motorway; transport cafe; vehicle parks; cafeteria; public telephones and toilet facilities. It may also include a restaurant. A covered footbridge over the motorway will link the two sides of each area for pedestrians, but motor traffic will not be allowed to pass across the motorway from one side to the other.

135. As with intermediate junctions, it is essential that drivers should receive sufficient warning to enable them to get into the left-hand lane in readiness to turn off the motorway to enter the slip road to the service area without endangering other traffic. We therefore propose that the approach to a service area should be signposted in the same way as the approach to an intermediate junction, with signs a mile and half-mile in advance and at the beginning of the deceleration lane leading into the slip road. We also think there is much to be said for the German practice of placing signs indicating the distance to the next facilities offered shortly after each point of entry to the motorway, and we consider that the practice should be adopted here.

136. We therefore recommend that the sign illustrated in figure 47 should, where appropriate, be erected after each intersection along the motorway. This sign is intended as a warning to a driver to leave the motorway at the next intersection if he requires one of the services available (particularly fuel), but is unwilling (or unable through lack of fuel) to travel the distance indicated to the service area. (It follows that it should not be erected after the last intersection before the service area.) We considered whether the sign should be erected before rather than after the intersection, both on the motorway and on the all-purpose roads approaching the intersection, but this would raise difficult problems of siting, especially as some intersections have as many as four different approaches along all-purpose roads; the message would have to be more complicated because not every driver passing the signs would be going on to the motorway, and it would also be necessary to give separate indications according

to the intended direction of travel on the motorway. We feel it should not be necessary to devise a special sign to deal with the rare driver who might venture on to the motorway with insufficient fuel to take him to the next intersection, and we do not therefore consider that there is any need to add such a sign to the number of signs before each intersection which our recommendations necessarily entail.

137. The sign we recommend to be sited one mile in advance of the service area is illustrated in figure 48. It shows the distance to the service area and also, where appropriate, the distance to the next service area beyond the one the driver is now approaching.

138. The sign we recommend to be sited half a mile in advance of the service area is illustrated in figure 49. Just as the second advance direction sign for intermediate junctions (paragraph 87) adds to the information contained in the first and gives the names of places which can be reached by leaving the motorway at the junction, so this sign indicates the main facilities available at the service area. It will be seen that the individual facilities are indicated by symbols only, a petrol pump (similar to the European sign) for fuel, a knife and fork for meals, a cup for snacks and the international white on blue P for parking facilities; we believe that reliance on symbols makes for a very much livelier sign and constitutes a welcome departure from the usually unnecessary but nevertheless widespread practice of duplicating messages on traffic signs by means of both words and symbols. We are convinced that drivers will find these symbols self-explanatory. It will also be seen that no reference is made to toilets and telephones, on the principle that these can be assumed to form part of any services, and on the same principle no reference is made to the transport cafes since transport drivers will quickly learn that all service areas contain them; we feel, however, that the refuelling facilities are sufficiently important to justify departing from this principle, and that the vehicle parks should also be indicated to show that they are a separate facility in their own right and to serve as a reminder that stopping on the motorway is prohibited.

139. The sign we recommend to be sited at the beginning of the deceleration lane leading to a service area is illustrated in figure 50. It is identical with the previous sign except that the legend 'Services $\frac{1}{2}$ m' is replaced by an arrow and the word 'Services'.

140. Exit distance markers, of the kind recommended in paragraph 91 and illustrated in figure 31, should be erected in advance of the beginning of the deceleration lane.

141. The sign illustrated in figure 51 is recommended for use in the point of land between slip road and motorway, where it fulfils the same function as the supplementary exit sign for intermediate junctions recommended in paragraph 94. Where the slip road leaves the motorway at so narrow an angle that there is not room between them for this sign if it is to be read from the critical point, the sign illustrated in figure 52 should be used instead.

142. On the slip road itself a sign is necessary to mark the point where the motorway Regulations cease to apply and beyond which vehicles are therefore

permitted to stop. The motorway symbol, cancelled, would have been ideal for this purpose, but, as we cannot recommend the new international symbol, we recommend the worded sign illustrated in figure 53. The corresponding signs on the slip road out of the service area back to the motorway, showing where the Regulations again become effective, should be those we have recommended in paragraph 61 and illustrated in figures 10 and 12. Standard 'No Entry' signs should be used to prevent traffic attempting to rejoin the motorway by the wrong slip road.

143. The approaches to highways maintenance compounds and/or police posts from the motorway will be similar in appearance to the approaches to service areas and to road junctions, and signs will be necessary at the beginning of their deceleration lanes to make it clear that the slip road leads only to such places. We recommend a sign with the legend 'Works unit only' (figure 54) for this purpose. A route-number confirmatory sign, of the type recommended in paragraph 67 and illustrated in figure 14, should also be erected on the left-hand verge of the motorway just beyond the slip road.

'Bend' Signs

144. Until the motorway construction programme is completed there are bound to be individual lengths of motorway which are scheduled for eventual extension but which for the time being end at junctions with all-purpose roads which will ultimately be merely intermediate junctions along the finished motorway. It is almost inevitable that one or other of these junctions, which now serves the whole of the motorway traffic at that particular point but which will finally serve only a proportion of it, will be somewhat substandard compared with a junction designed and constructed as a terminal junction from the outset. Thus, at what is at present a terminal junction, the motorway may follow the route of what will eventually be merely an exit slip road, and may therefore describe a curve sharper than could normally be tolerated on such a high speed road. A sign will clearly be necessary to draw attention to this hazard, and we recommend the sign illustrated in figure 55; it should be sited on each side of the carriageway some 400 yards in advance. It is similar in pattern to the continental sign, but in view of its nature we think its colour scheme should be similar to that of the emergency signs described in paragraph 79 and the sign giving warning of merging traffic described in paragraph 113—a reflectorised white symbol on a plain red ground within a reflectorised red border.

'Road Narrows' Signs

145. The present northerly terminal of the London-Yorkshire Motorway is an example of a junction where the motorway takes the route of what will ultimately be only an exit slip road. At this point the motorway narrows fairly abruptly from a three-lane to a two-lane carriageway, and a warning sign will obviously be necessary here too. We recommend the sign illustrated in figure 56; its colour scheme is similar to that of the emergency signs described in paragraph 79 and it should be sited some 400 yards from the point where the road begins to narrow.

Acknowledgments

146. We should like to take this opportunity of thanking the many organisations and individuals who have assisted us in our task. In particular we would mention the representative organisations listed in Appendix I whom we consulted both when first principles were under discussion and later when we sought their comments on the experimental signs erected on the Preston By-Pass; we express our appreciation of the obvious trouble they took in giving us the benefit of their views on both occasions.

147. We must particularly acknowledge the valuable assistance given to us by the Road Research Laboratory, especially in arranging a demonstration of photographs and diagrams at the Laboratory to illustrate practice abroad, in organising practical demonstrations of various experimental signs at Hendon Aerodrome, which we saw at speed both by day and by night, and in undertaking special research into the legibility distance of various kinds of lettering and signs. We also wish to acknowledge the contribution to our discussion of colour made by Air Vice-Marshal Neely of the R.A.F. Central Medical Establishment and Squadron Leader Whiteside and Mr. C. Cameron of the Institute of Aviation Medicine.

148. We wish also to take this opportunity of expressing our appreciation of the valuable contribution made to this report by Mr. Jock Kinneir, the designer, who has been associated with us from a very early stage in our work. He has always fulfilled our often heavy demands on his time and resources with the utmost patience and good humour, but, more important still, he has produced designs which will, we believe, be welcomed as distinguished and effective solutions of an important problem.

149. We also wish to express our gratitude to the Lancashire County Council and the Lancashire Constabulary for their helpfulness and hospitality in making the necessary arrangements for our inspection of the experimental signs on the Preston By-Pass. Our especial thanks are due to the Council's Highways Committee, under their Chairman Alderman Doodson, to Mr. James Drake, the County Surveyor and Bridgemaster, and to Chief Superintendent Wren of the Lancashire Constabulary, who accompanied us on our inspection.

150. Similarly, we wish to thank Superintendent Pritchard and Sgt. King of the Hertfordshire Constabulary, who accompanied us on our later inspection of the signs on the London-Yorkshire Motorway and whose practical knowledge and experience of conditions on the motorway proved most helpful.

151. To our secretaries, Mr. R. L. Huddy, who established us on our path, and Mr. A. W. Lovett, who saw us through to the final completion of this report, we owe a great deal. There has been a complicated mass of material to assimilate and to present to us and we have been very satisfied with the clarity and thoroughness with which this has been achieved and with the skill that has been shown in drawing up our decisions in a form suitable if necessary for publication.

Signed on behalf of the Committee
Colin S. Anderson
Chairman

A. W. Lovett, Secretary, 1st December, 1960

Appendix I

List of Representative Organisations Consulted

County Councils Association
Association of Municipal Corporations
Urban District Councils Association
The Standing Joint Committee of the R.A.C., A.A. and R.S.A.C.
Royal Society for the Prevention of Accidents
National Road Transport Federation
Traders Road Transport Association
Road Haulage Association
The Passenger Vehicle Operators Association
British Road Federation Ltd.
Municipal Passenger Transport Association
Public Transport Association
British Transport Commission
British Road Services
Society of Motor Manufacturers and Traders
The Motor Agents Association
Federation of British Industries
Institute of Highway Engineers
British Cycle & Motor Cycle Industries Association
The National Conference of Road Transport Clearing Houses
National Union of Railwaymen
Transport and General Workers Union
The British Travel & Holiday Association
The National Parks Commission
Royal Fine Art Commission
Glass Manufacturers Federation
The Association of Road Traffic Sign Makers

Appendix II



Figure 1.-Form and proportion of capital letters, where employed, for all uses except in route-numbers (see figure 4) and telephone numbers (see figure 5). (Paragraph 15)

FGHIJ

OPQR

WXYZ




Figure 2. Form and proportion of lower-case letters. (Paragraph 15)

fghij

opqr

wxyz



12345
67890

Figure 3. Form and proportion of numerals for all uses except in route-numbers (see figure 4).
(Paragraph 15)



Figure 4. Form and proportion of letters and numerals for use in route-numbers.
(Paragraph 15)



Figure 5. Form and proportion of letters for use in telephone numbers (see Appendix IV, figures 15 and 16). (Paragraph 15)



Figure 1. Motorway symbol adopted by the Inland Transport Committee of E.C.E. (Paragraph 43)



Figure 2. Sign adopted by the Inland Transport Committee of E.C.E. to denote the end of a motorway. (Paragraph 43)



Figure 3. Motorway symbol accepted for experimental use on the Preston By-Pass. (Paragraph 43)



Figure 4. Motorway symbol now suggested for use in this country. (Paragraph 44)



Figure 5. Sign now suggested for use in this country to denote the end of a motorway (Paragraph 44)



Figure 6. Proposed modification of motorway symbol adopted by the Inland Transport Committee of E.C.E. (Paragraph 45)



Figure 1. Sign to direct traffic to the motorway from distant points. (Paragraph 48)



Figure 2. Sign to direct traffic to the motorway from distant points. (Paragraph 48)



Figure 3. Sign to direct traffic to the motorway from distant points. (Paragraph 48)



Figure 4. Sign to direct traffic to the motorway from distant points. (Paragraph 48)



Figure 5. Sign to direct traffic to the motorway from distant points. (Paragraph 48)

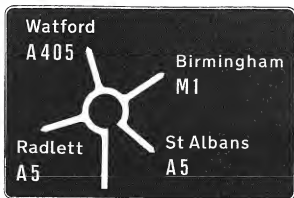


Figure 6. Advance direction sign on the immediate approach to a junction with the motorway. (Paragraph 53)



Figure 7. Advance direction sign on the immediate approach to a junction with the motorway which incorporates two roundabouts. (Paragraph 57)



Figure 8. Supplementary sign at a junction with, and indicating, a motorway. (Paragraph 58)



Figure 9. Supplementary sign at a junction with, and indicating, a motorway. (Paragraph 58)

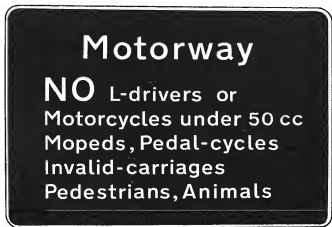


Figure 10. Sign now recommended to indicate traffic excluded from the motorway. (Paragraph 61)



Figure 11. Existing sign to indicate traffic excluded from the motorway. (Paragraph 64)



Figure 12. Sign to indicate rules governing use of the motorway. (Paragraph 61)



Figure 13. Confirmatory sign on the motorway. (Paragraph 66)



Figure 14. Route-number confirmatory sign on the motorway. (Paragraph 67)



Figure 15. Sign on front of emergency telephone box. (Paragraph 69)



Figure 16. Sign on side of emergency telephone box. (Paragraph 70)

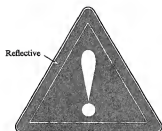


Figure 17. Emergency sign to be placed 1,000 yards in advance of obstruction. (Paragraph 79)

Figure 18. Emergency sign to be placed 900 yards in advance of an accident. (Paragraph 79)



Figure 19. Emergency sign to be placed 900 yards in advance of road works. (Paragraph 79)

Figure 20. Emergency sign to be placed 600 yards in advance of an obstruction. (Paragraph 79)

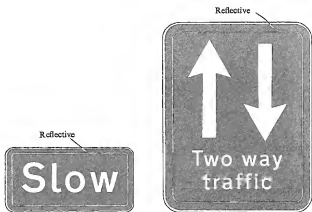


Figure 21. Emergency sign to be placed 300 yards in advance of an obstruction. (Paragraph 79)

Figure 22. Emergency sign for use, where appropriate, at gaps in the central reservation. (Paragraph 77)

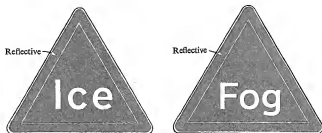


Figure 23. Emergency sign to give warning of icy conditions. (Paragraph 78)

Figure 24. Emergency sign for use when fog is likely to be encountered. (Paragraph 80)

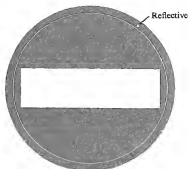


Figure 25. Emergency sign to indicate the route to be followed past an obstruction. (Paragraph 82)

Figure 26. Emergency sign to indicate prohibition of entry. (Paragraph 82)



Figure 27. Sign to be placed after an obstruction. (Paragraph 83)



Figure 28. First advance direction sign for an intermediate junction. (Paragraph 86)



Figure 29. Second advance direction sign for an intermediate junction. (Paragraph 87)



Figure 30. Third advance direction sign for an intermediate junction. (Paragraph 88)

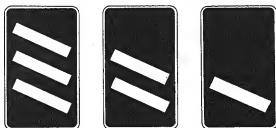


Figure 31. Exit distance markers, to be placed 300, 200 and 100 yards in advance of the beginning of the deceleration lane. (Paragraph 91)

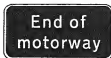


Figure 32. Supplementary exit sign for use where there is not room for place names. (Paragraph 95)

Figure 33. Sign to indicate that the motorway regulations no longer apply. (Paragraph 99)



Figure 34. First advance direction sign for a junction of two motorways. (Paragraph 103)



Figure 38. Alternative design for first advance direction sign for a junction of two motorways. (Paragraph 104)



Figure 39. Alternative design for second advance direction sign for a junction of two motorways. (Paragraph 107)

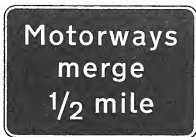


Figure 40. First warning sign for a convergence of two motorways. (Paragraph 113)

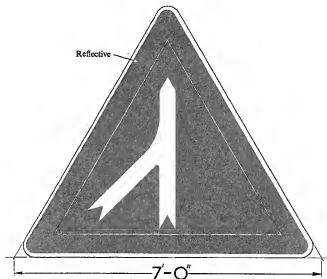


Figure 41. Second warning sign for a convergence of two motorways. (Paragraph 113)



Figure 42. Warning of traffic island. (Paragraph 115)



Figure 43. Second advance direction sign for a cloverleaf junction. (Paragraph 118)



Figure 44. Third advance direction sign for a cloverleaf junction. (Paragraph 119)



Figure 46. Sign to give warning of approach to end of motorway. (Paragraph 127)



Figure 45. Overhead sign for a cloverleaf junction. (Paragraph 119)



Figure 47. Sign to be erected, where appropriate, after each intersection along the motorway. (Paragraph 136)



Figure 48. Sign to be erected one mile before the first of two or more service areas along the motorway. (Paragraph 137)



Figure 49. Sign to be erected half a mile in advance of a service area. (Paragraph 138)



Figure 50. Sign to be erected at the beginning of the deceleration lane leading to a service area. (Paragraph 139)



Figure 51. Supplementary direction sign indicating a service area. (Paragraph 141)



Figure 52. Alternative design for supplementary exit sign indicating a service area. (Paragraph 141)

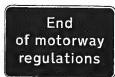


Figure 53. Sign at the entrance to a service area to indicate that the motorway Regulations no longer apply. (Paragraph 142)

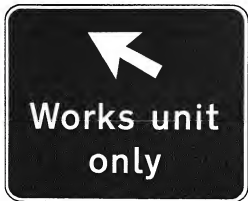


Figure 54. Sign to be erected at the beginning of a deceleration lane leading only to a police post and/or maintenance compound. (Paragraph 143)

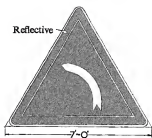


Figure 55. Sign to give warning of a bend. (Paragraph 144)

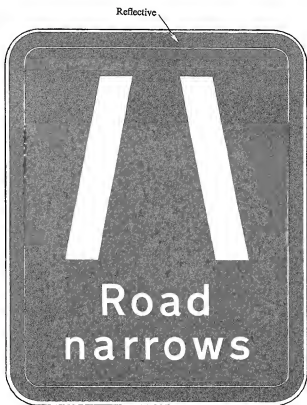


Figure 56. Sign to give warning that the motorway narrows. (Paragraph 145)



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Figure 30. Standard (overhead) advance direction signs for a junction of two motorways. (Paragraph 300)



Figure 31. Alternative design for standard advance direction signs for a junction of two motorways. (Paragraph 300)



Figure 32. Supplementary direction signs (for use when appropriate) at a junction of two motorways. (Paragraph 310)